

**CyberMedia<sup>®</sup>**

**First Aid<sup>®</sup>**  
*New For* **97**

**Fixes Windows Problems... Automatically!**

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## PC System Diagnostics

HOME SCREEN



## **Install the software that came with the drive.**

### **Actions:**


- 1)** Install the CD-ROM software accompanying the CD-ROM drive. Follow the instructions accompanying the software.
- 2)** Re-attempt accessing the CD-ROM drive.



## Remove and reinsert the CD-ROM controller card.

### Actions:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

- 1) Turn off the computer and unplug the power cables.
- 2) Unplug any external CD-ROM cables.
- 3) Remove the base unit cover.  
 Photo: Removing cover
- 4) Reseat the CD-ROM controller card.
- 5) Replace the base unit cover.
- 6) Plug all external power and data cables that were unplugged in steps 1) and 2).
- 7) Turn on the computer and make sure the POST completes successfully.
- 8) Retest the CD-ROM drive by doing the following:
  - a) Place a CD in the CD-ROM drive.
  - b) Access a file located on the CD.






## Reseat controller card.

### Actions:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

- 1) Turn off the computer and unplug the power cables.
- 2) Unplug any external CD-ROM cables.
- 3) Remove the base unit cover.  
 Photo: Removing cover
- 4) Reseat the CD-ROM controller card.
- 5) Replace the base unit cover.
- 6) Plug all external power and data cables that were unplugged in steps 1) and 2).
- 7) Turn on the computer and make sure the POST completes successfully.
- 8) Retest the CD-ROM drive by doing the following:
  - a) Place a CD in the CD-ROM drive.
  - b) Access a file located on the CD.



## **Check if the controller card in the computer is the right kind for this CD-ROM drive.**

### **Actions:**

- 1) Make sure the CD-ROM drive is compatible with the controller card.

EXAMPLE: If the CD-ROM drive is a SCSI drive, make sure the controller card is a compatible SCSI card.

*NOTE: Consult the CD-ROM drive and controller card manuals for further information, or call the vendor for technical support.*



## Resolve any settings conflicts with the CD-ROM drive.

### Actions:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

- 1) Check for and resolve any IRQ ([interrupt](#)), port, and DMA conflicts with the CD-ROM drive.
- 2) See [Resolving conflicts with a CD-ROM drive](#) for advice on resolving conflicts.



## Edit computer startup files to put driver & MSCDEX in low memory.

### Actions:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Load the CD-ROM device driver and MSCDEX in low memory.

1) Edit CONFIG.SYS.

- a) Find the line that loads the CD-ROM device driver.

*NOTE: Consult the documentation for the CD-ROM drive if you are not sure which device driver is to be used.*

- b) Change the 'DEVICEHIGH' command at the beginning of the CD-ROM device driver line to 'DEVICE' (if DEVICEHIGH is used at all). The line should now look similar to the following:

DEVICE=C:\CDROM\MTMCDAL.SYS /D:MTMIDE01 /T:170,15

(where the particular driver filename used is only an example.)

- c) Save any changes to CONFIG.SYS.

2) Edit AUTOEXEC.BAT.

- a) Find the line that loads MSCDEX.EXE.

- b) Delete the 'LH' or 'LOADHIGH' from the beginning of the MSCDEX line (if there is one). The line should now look like the following:

C:\DOS\MSCDEX.EXE /D:MTMIDE01 /L:D

- c) Save any changes to AUTOEXEC.BAT and exit the editor.

3) Press CTRL+ALT+DEL to reboot the computer.

4) Retest the CD-ROM drive by doing the following:

- a) Place a CD in the CD-ROM drive.  
b) Access a file located on the CD.



## Edit computer startup files to add correct driver and MSCDEX.

### Actions:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

#### 1) Edit CONFIG.SYS.

- a) Look for the CONFIG.SYS line that loads the CD-ROM driver.

*NOTE: If you are not sure which driver is used, consult the CD-ROM drive manual.*

- b) Do one or both of the following:

- 1] Add a line to CONFIG.SYS to load correct CD-ROM device driver.

- 2] Check/correct the spelling, pathname, and filename of the CD-ROM device driver line (e.g., Make sure the driver is actually in the referenced directory).

- c) Save changes to CONFIG.SYS.

#### 2) Edit AUTOEXEC.BAT.

- a) Look for a line that loads MSCDEX.EXE.

EXAMPLE:

C:\DOS\MSCDEX.EXE /D:MSD0001 /L:D

(See MSCDEX options.)

- b) Do one or both of the following:

- 1] Add a line to load MSCDEX.EXE in AUTOEXEC.BAT.

- 2] Check the spelling, pathname, and filename used in MSCDEX.EXE line (e.g., Make sure MSCDEX in path is used).

- c) Save the changes and exit the editor.

#### 3) Press CTRL+ALT+DEL to reboot the computer.

#### 4) Retest the CD-ROM drive by doing the following:

- a) Place a CD in the CD-ROM drive.

- b) Access a file located on the CD.





## Check CD-ROM access command.

### Actions:

Carefully review the access command being used to access the CD-ROM drive.

- 1) Check the spelling of the entire command line.
- 2) Make sure to use the correct drive letter.

*NOTE: See MSCDEX command options if not sure which drive letter to use.*

- 3) Make sure the path and filename of the command are correct (e.g., D:\SETUP.EXE).

*(NOTE: Consult the MS-DOS, Windows, or CD-ROM drive user manual for assistance if you are unsure about command syntax.)*



## Check all cords (cables) and their connections.

### Actions:

Check the power to the CD-ROM drive and all of the cables and connections external to the base unit.

- 1) External CD-ROM. Make sure the power switch (usually located at the back of the unit) is on.
- 2) Make sure the power cord is securely plugged into a wall outlet or surge protector, and the power connector on the back of the CD-ROM drive. Check the power light on the CD-ROM drive.

*NOTE: On some external CD-ROM drives, the power cable may be permanently connected to the drive. Internal CD-ROM drives get power directly from the computer's power supply.*

- 3) External CD-ROM. Make sure the surge protector switch is on (check the power light usually provided), and the outlet used is not connected to a wall switch that is off. Connect a lamp to the power outlet if you are unsure if power is available.
- 4) External CD-ROM. Make sure the data (e.g., SCSI) cable is securely connected both to the drive and to the port located at the back of the computer.
- 5) Make sure all the SCSI chains are correctly terminated.





## Check that the CD is inserted in the CD-ROM drive correctly.

### Actions:

- 1) Make sure the CD is inserted (label side up) in the CD-ROM.
- 2) Make sure the CD is positioned carefully in the drive, and is resting on the spindle without blocking the drive door as it closes.

**CAUTION:** Do not try to jam a CD into the drive, or force the CD-ROM drive door shut. Both the CD and the drive may be seriously damaged.



## Correct CD-ROM conflicts.

### Actions:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

- 1) Check for and resolve any IRQ ([interrupt](#)), port, and DMA conflicts with the CD-ROM drive.
- 2) See [Resolving conflicts with a CD-ROM drive](#) for advice on resolving conflicts.



## Load MSCDEX and driver low.

### Actions:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Load CD-ROM device driver and MSCDEX in low memory.

1) Edit CONFIG.SYS.

- a) Find the line that loads the CD-ROM device driver.

*NOTE: If you are not sure which driver is used, consult the CD-ROM drive manual.*

- b) Change the 'DEVICEHIGH' command at the beginning of the CD-ROM device driver line to 'DEVICE' (if DEVICEHIGH is used at all). The line should now look similar to the following:

DEVICE=C:\CDROM\MTMCDAL.SYS /D:MTMIDE01 /T:170,15

(where the particular driver filename used is only an example.)

- c) Save any changes to CONFIG.SYS.

2) Edit AUTOEXEC.BAT.

- a) Find the line that loads MSCDEX.EXE.

- b) Delete the 'LH' or 'LOADHIGH' from the beginning of the MSCDEX line (if there is any). The line should now look like the following:

C:\DOS\MSCDEX.EXE /D:MTMIDE01 /L:D

- c) Save any changes to AUTOEXEC.BAT and exit the editor.

3) Press CTRL+ALT+DEL to reboot.

4) Retest the CD-ROM drive by doing the following:

- a) Place a CD in the CD-ROM drive.

- b) Access a file located on the CD.



## Check driver and MSCDEX.

### Actions:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

1) Edit CONFIG.SYS.

- a) Look for the CONFIG.SYS line that loads the CD-ROM driver.

*NOTE: Consult a manual, if necessary, to see what driver is used.*

- b) Do one or both of the following:

1] Add a line to CONFIG.SYS that loads correct CD-ROM device driver.

2] Check spelling, pathname, and filename of the CD-ROM device driver line (e.g., make sure the driver is actually in the referenced directory).

- c) Save changes to CONFIG.SYS.

2) Edit AUTOEXEC.BAT.

- a) Look for a line that loads MSCDEX.EXE.

EXAMPLE:

C:\DOS\MSCDEX.EXE /D:MSD0001 /L:D

(See MSCDEX options.)

- b) Do one or both of the following:

1] Add a line to load MSCDEX.EXE in AUTOEXEC.BAT.

2] Check the spelling, pathname, and filename used in MSCDEX.EXE line (e.g., make sure MSCDEX is in named directory).

- c) Save changes and exit the editor.

3) Press CTRL+ALT+DEL to reboot.

4) Retest the CD-ROM drive by doing the following:

- a) Place a CD in the CD-ROM drive.

- b) Access a file located on the CD.



## Reseat CD-ROM card.

### Actions:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

- 1) Turn off the computer and remove power cables.
- 2) Remove any external CD-ROM cables.
- 3) Remove base unit cover.



Photo: Removing cover

- 4) Reseat the CD-ROM controller card.
- 5) Replace base unit cover.
- 6) Replace all external power and data cables that were removed in steps 1 and 2.
- 7) Turn on the computer and make sure the POST completes successfully.
- 8) Retest the CD-ROM drive by doing the following:
  - a) Place a CD in the CD-ROM drive.
  - b) Access a file located on the CD.



## Check for CD-ROM conflict.

### Actions:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

- 1) Check for and resolve any IRQ ([interrupt](#)), port, and DMA conflicts with the CD-ROM drive.  
See [Resolving conflicts with a CD-ROM drive](#) for advice on resolving conflicts.



## CD-ROM drive freezes computer.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Load the CD-ROM device driver and MSCDEX in low memory.

1) Edit CONFIG.SYS.

- a) Find the line that loads the CD-ROM device driver.

*NOTE: If you are not sure which driver is used, consult the CD-ROM drive manual.*

- b) Change the 'DEVICEHIGH' command at the beginning of the CD-ROM device driver line to 'DEVICE' (if DEVICEHIGH is used at all). The line should now look similar to the following:

```
DEVICE=C:\CDROM\MTMCDAL.SYS /D:MTMIDE01 /T:170,15
```

(where the particular driver filename used is only an example.)

- c) Save any changes to CONFIG.SYS.

2) Edit AUTOEXEC.BAT.

- a) Find the line that loads MSCDEX.EXE.

- b) Delete the 'LH' or 'LOADHIGH' from the beginning of the MSCDEX line (if there is any). The line should now look like the following:

```
C:\DOS\MSCDEX.EXE /D:MTMIDE01 /L:D
```

- c) Save any changes to AUTOEXEC.BAT and exit the editor.

3) Press CTRL+ALT+DEL to reboot the computer.

4) Retest the CD-ROM drive by doing the following:

- a) Place a CD in the CD-ROM drive.

- b) Access a file located on the CD.



## Check load sequence.

### Actions:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Try alternate loading sequences:

- 1) Create new CONFIG.SYS and AUTOEXEC.BAT files for each load sequence to try for device drivers and TSRs.
- 2) Do the following:
  - a) Try using the first alternate configuration (from step 1).
    - 1] Type the following commands at the DOS prompt for the first CONFIG.SQ# and AUTOEXEC.SQ# files:  
  
COPY CONFIG.SQ# CONFIG.SYS  
  
COPY AUTOEXEC.SQ# AUTOEXEC.BAT  
  
*NOTE: Replace '#' with the number of the CONFIG and AUTOEXEC files used in a load sequence.*
    - 2] Press CTRL+ALT+DEL to reboot the computer.
    - 3] Check if device drivers/TSRs are loading high.
  - b) Repeat step 2)a) with a different combination of the files from step 1) until exhausting all combinations, or until all device drivers and TSRs successfully load high.

*NOTE: Pairs of CONFIG and AUTOEXEC files with different numbers can be used together.*

EXAMPLE: Use CONFIG.SQ1 with AUTOEXEC.SQ3, or AUTOEXEC.SQ2 with CONFIG.SQ4.





## Check for parameters.

### Actions:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

*NOTE: Refer to the printouts of AUTOEXEC.BAT and CONFIG.SYS for easy reference.*

- 1) Make sure no lines in CONFIG.SYS or AUTOEXEC.BAT use parameters that prevent load high.
  - a) Consult the documentation for device drivers or TSRs that will not load high, to see if the lines use any such parameters.
  - b) Consult the MS-DOS manual, Help, or a third party DOS reference book to see if any of the DOS utilities are using such parameters.

Examples of DOS commands with parameters that stop load high.

- 2) Edit CONFIG.SYS.
  - a) Delete the parameters in any lines preventing drivers from loading high.
  - b) Save any changes to CONFIG.SYS.
- 3) Edit AUTOEXEC.BAT.
  - a) Delete the parameters in any lines preventing TSRs from loading high.
  - b) Save any changes to AUTOEXEC.BAT and exit the editor.
  - c) Press CTRL+ALT+DELETE to reboot.
- 4) Check if device drivers/TSRs are loading high.



## Check himem/emm386 version.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

*NOTE: The most recent versions of HIMEM.SYS and EMM386.EXE come with DOS version 6.x. The next most recent versions come with Windows 3.1; followed by DOS 5.0.*

- 1) Check if a more recent version is available.
  - a) Using DOS 5.0 with Windows 3.1: Use Windows 3.1 versions in the \WINDOWS directory in step 2.
  - b) Using DOS 6.x with Windows 3.1: Use DOS 6.x versions in the \DOS directory in step 2.
  - c) Using DOS 5.0 without Windows 3.1: No updated version available without upgrading.
- 2) Use a more recent version of HIMEM.SYS and EMM386.EXE in CONFIG.SYS (if available).
  - a) Edit CONFIG.SYS.
  - b) Change the path used in the HIMEM.SYS and EMM386.EXE lines to the path for the most recent versions available (as determined in step 1).
  - c) Save any changes to CONFIG.SYS and exit the editor.
  - d) Press CTRL+ALT+DEL to reboot computer.
- 3) Check if device drivers and/or TSRs are loading high.



## Check spelling and CMD usage.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

1) Edit CONFIG.SYS.

- a) Begin every line for a device driver to load high with the 'DEVICEHIGH=' command.

EXAMPLE:

DEVICEHIGH=C:\CDROM\MTMCDAL.SYS /D:MTMIDE01 /T:170,15

(where driver given is simply an example.)

*NOTE: Do not abbreviate 'DEVICEHIGH' to 'DH'.*

- b) Check the spelling, filename, and pathname used in each line.  
c) Save any changes to CONFIG.SYS and exit the editor.

2) Edit AUTOEXEC.BAT.

- a) Begin every line for a TSR to load high with the 'LOADHIGH' or 'LH' command.

EXAMPLE:

LOADHIGH C:\DOS\MSCDEX.EXE /D:MTMIDE01 /L:D

(where the program given is an example, the DOS CD-ROM extensions.)

- b) Check the spelling, filename, and pathname used in each line.  
c) Save any changes to AUTOEXEC.BAT and exit the editor.

- 3) Press CTRL+ALT+DEL to reboot the computer.  
4) Check if device drivers and/or TSRs are loading high.  
5) Repeat steps 1-2 if load high fails to look for missed errors.



## Check CONFIG.SYS setup.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Make sure CONFIG.SYS is setup correctly to load programs and/or device drivers in the upper memory area.

- 1) Edit CONFIG.SYS.
- 2) Make sure the following three lines are in CONFIG.SYS in the following sequence, and BEFORE any 'DEVICEHIGH' commands:

DEVICE=C:\DOS\HIMEM.SYS

DEVICE=C:\DOS\EMM386.EXE NOEMS

DOS=UMB

- 3) (Optional) To load DOS into the high memory area, use the following line instead:

DOS=HIGH, UMB

*NOTE: The computer must have more than 1MB of memory to load DOS into the high memory area. The high memory area (HMA) is the first 64K (minus 16 bytes) of extended memory.*

- 4) (Optional) If using programs that require EXPANDED memory, use the following EMM386 line instead:

DEVICE=C:\DOS\EMM386.EXE RAM

*NOTE: See Setting up CONFIG.SYS to use upper memory blocks for more information.*



## Check lines not loading high.

### Actions:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

1) Edit CONFIG.SYS.

- a) Begin every line for a device driver to load high with the 'DEVICEHIGH=' command.

EXAMPLE:

DEVICEHIGH=C:\CDROM\MTMCDAL.SYS /D:MTMIDE01 /T:170,15

(where driver given is simply an example.)

*NOTE: Do not abbreviate 'DEVICEHIGH' to 'DH'.*

- b) Check the spelling, filename, and pathname used in each line.  
c) Save any changes to CONFIG.SYS and exit the editor.

2) Edit AUTOEXEC.BAT.

- a) Begin every line for a TSR to load high with the 'LOADHIGH' or 'LH' command.

EXAMPLE:

LOADHIGH C:\DOS\MSCDEX.EXE /D:MTMIDE01 /L:D

(where the program given is an example, the DOS CD-ROM extensions.)

- b) Check the spelling, filename, and pathname used in each line.  
c) Save any changes to AUTOEXEC.BAT and exit the editor.

- 3) Press CTRL+ALT+DEL to reboot the computer.  
4) Check if device drivers and/or TSRs are loading high.  
5) If device/TSR fails to load high, repeat steps 1-2.



## Device drivers/TSRs wont load high

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

- 1) Print a copy of CONFIG.SYS and AUTOEXEC.BAT.
- 2) Print the MEM /CLASSIFY command output by entering the following command at the DOS prompt:  
MEM /CLASSIFY > PRN:

*NOTE: PRN: is mapped by default to the LPT1: parallel port. Use 'LPT2:' instead of 'PRN:' if printer is connected to the LPT2: port.*

- 3) Check if any TSRs and/or device drivers are loading high.
  - a) Mark each line on the printouts of AUTOEXEC.BAT and CONFIG.SYS that begins with the 'LOADHIGH' (or 'LH') or 'DEVICEHIGH' command.
  - b) Look at the printout of the MEM /CLASSIFY command. MEM /CLASSIFY
  - c) Compare each line marked in AUTOEXEC.BAT or CONFIG.SYS with the line in the MEM /CLASSIFY output for the same device driver/TSR.
  - d) Check if a device driver/TSR is loading high by noting if the amount in the last column (Upper Memory) is greater than zero.
  - e) Repeat steps 3b-3d for every marked line in CONFIG.SYS and AUTOEXEC.BAT, and note the loadhigh/devicehigh commands that fail.



## Check DOS version.

### **Actions:**

- 1) Type the following command at the DOS prompt to determine the DOS version being used:  
VER
- 2) Note the DOS version number displayed on the screen.



## Check total memory.

### **Actions:**

Check the amount of available memory on the computer.

- 1) Type the following command at the DOS prompt (when Windows is NOT running):  
MEM /C
- 2) Examine the TOTAL MEMORY number in the second column of the MEM /C output (near the bottom, under 'Memory Summary').





## Starting MS-DOS message.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

- 1) Edit CONFIG.SYS and look for a line in CONFIG.SYS that looks like the following:

SWITCHES = /x

(where 'x' could be either 'f' or 'n')

*NOTE: The 'f' switch makes the computer skip the two second delay after the 'Starting MS-DOS...' message. The 'n' switch prevents the F5 or F8 keys from being used to bypass startup commands.*



## Check DOS version.

### **Actions:**

To Check the current DOS version:

- 1) Type VER at the DOS prompt.
- 2) Identify whether the current version is DOS version 3.3 or earlier.



## Check path.

### **Actions:**

- 1) DOSHELL is a DOS program that is usually loaded in the C:\DOS directory (unless it is moved elsewhere).
- 2) Type the following command at the DOS prompt:  
C:\DOS\DOSSHELL



## Cannot load DOSSHELL program.

### **Actions:**

Check spelling used to load the program:

- 1) DOSSHELL is 1 word.
- 2) DOSSHELL uses 2 'SS'.



## **New program does not use.**

### **Actions:**

Read the new application user manual, and check the application setup options to determine where the new application is looking for data files, versus where they are stored on hard disk.



## Check memory conflicts.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Check for memory conflicts in AUTOEXEC.BAT:

- 1) Press CTRL+ALT+DEL to reboot the computer.
- 2) Edit CONFIG.SYS.
- 3) Comment out all commands that load programs or TSRs by typing a REM followed by a space in front of each line except the first one.
- 4) Save the file and press CTRL+ALT+DEL to reboot the computer.
- 5) Run the application. If there is no problem, reedit AUTOEXEC.BAT and add (uncomment) one program or utility, save the file, reboot the computer and retry application.
- 6) Repeat Step 5 until computer freezes again. When it does, the item just added back in is causing the conflict with this application.



## Application crashes.

### Actions:

- 1) Read the application user manual and identify the memory requirements to run this application.
- 2) Run hardware utility (e.g., Microsoft Diagnostics (MSD) to determine how much memory is in the computer.
  - a) Type MSD at the DOS prompt.



Choose MSD Memory Status

- b) Choose 'Memory Status'.



Memory Status

- 3) Determine if the system has enough memory to run this application.



## Check for power disruption.

### **Actions:**

Perhaps someone (e.g., user) disabled the electrical power by kicking the power cable, turning the surge protector off, unplugging the power cable from the PC or wall receptacle, turning off a wall switch or killing the circuit breaker.





## System freezes appears loop.

### **Actions:**

Try one of the following, in sequence, until the loop is broken:

- 1) Press ESC or CTRL+C or CTRL+BREAK to break out of the loop.
- 2) Press CTRL+ALT+DEL to reboot the computer.
- 3) Turn the computer off. Wait 15 seconds. Turn the computer back on.



## Check for bad keyboard.

### Actions:

Check the keyboard by swapping it with another computer that uses a similar keyboard.



## Check loose keyboard cable.

### **Actions:**

Trace the keyboard cable to the back of the computer and carefully press it in all the way. Make sure the cable is secure.



## Check for overheating.

### Actions:

- 1) Turn the computer off and let it cool for 1 hour.
- 2) Move the computer to an open space with plenty of circulation.
- 3) Inspect all air vents for dirt, dust and other obstructions. Look for vents on the rear and sides of the base unit. Clean vents and remove obstructions.
- 4) Plug the power cable in and turn the power switch on. Let the printer run for 30 minutes.



## Check for electrical power.

### **Actions:**

Check for good power supply:

- 1) Make sure there is power at wall receptacle. Observe that another appliance plugged into this receptacle is operational, or plug a lamp into this receptacle and see if it works.
- 2) If the power receptacle is not working, check for a blown fuse or circuit breaker, or move the computer to a working outlet.
- 3) Turn the computer on and observe if it boots properly.



## Check loose power cables.

### **Actions:**

Check for loose power cables:

- 1) Make sure the power cables are securely plugged into the surge protector.
- 2) Make sure the surge protector is turned on completely.
- 3) Make sure the surge protector is securely plugged into the wall receptacle.



## Sudden drop in hard disk..

### Actions:

STOP IMMEDIATELY! There may be a virus present. Do the following to check for viruses:

***CAUTION:** If you have reason to believe a virus is present, save your files, shut down your computer immediately, and call a qualified computer technician.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Turn the computer off.
  - d) Identify all diskettes that have been used in the computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Scan for viruses.
  - a) Insert a bootable, write-protected diskette in the bootable floppy drive (usually drive A), and turn on the computer.
  - b) After boot, insert a write-protected diskette that contains a virus detection program in the floppy drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disks, all network drives, all backups and every floppy diskette in the vicinity).
- 3) Report results of virus scan to a designated authority.



## Try format/unformat.

### Actions:

The following process attempts to restore the partition table by reading files from a disk:

- 1) Format the disk by typing the following command at the DOS prompt:

FORMAT x:

(Where x is the logical name of the disk to be formatted.)

- 2) Use a 3d-party file/disk recovery utility to UNFORMAT the drive.

*NOTE: This process will attempt to read the disk from the bottom up and reload the partition table with pointers to the files that are actually still on the disk.*

- 3) Check the disk and attempt to run a few programs to determine if the files are recovered.





**Try scandisk.**

**Actions:**

Use a 3d-party file/disk recovery utility to attempt to recover the files and partition table.



## Defrag stops in middle of..

**Actions:**

- 1) Press CTRL+ALT+DEL to reboot the machine.
- 2) Type DIR at the DOS prompt to determine if the appropriate files are visible.



## Check disk magnetism.

### Actions:

- 1) Run a disk resuscitation program (e.g., Spinrite) on the hard disk.

*NOTE: This will take several to many hours to complete.*

- 2) Observe the disk read/write performance for any improvement.



## Check for fragmented files.

### **Actions:**

Do one of the following:

- 1) (DOS 6.x) Type the following command at the DOS prompt:  
SCANDISK x: /AUTOFIX  
(Where x is the logical name of the drive with file problems.)
- 2) (DOS 5.x or earlier) Type the following command at the DOS prompt:  
CHKDSK x: /F  
(Where x is the logical name of the drive with file problems.)



## Check flipped cable.

### Actions:

- 1) Remove the base unit cover.



Photo: Removing cover

- 2) Unplug the floppy drive cable connector, turn it over, and plug it in again.
- 3) Power up the computer system.
- 4) Insert a diskette in the drive.
- 5) Run any command that accesses the drive (e.g., DIR\*,\*).
- 6) Observe drive light to see if the light is on.



## **Data file missing parts..**

### **Actions:**

Check for a loose line connection:

- 1) Make sure the modem line is securely connected to the modem.
- 2) Make sure the modem line is securely connected to the wall telephone receptacle.
- 3) Redial and try communications again.



## **Check loose cable.**

### **Actions:**

- 1) Check the modem cable for damage.
- 2) Make sure the modem cable is securely connected to the modem.
- 3) Make sure the modem cable is securely connected to the wall connector.
- 4) Retry communications.



## Check communications protocol.

### **Actions:**

Check for matching communications protocols:

- 1) Contact distant end and identify communications protocol in use (e.g., XMODEM).
- 2) Check local setting and make it match the distant end.
- 3) Redial and retry communications session.





## Communications become garble.

### **Actions:**

Check communications settings:

*NOTE: Set the same serial communications package configuration and hand-shaking parameters, on BOTH local and distant communications devices (and in communications software) for reliable communications. These include baud rate, parity, data bits, stop bits and buffer settings. The most common settings are: connection speed (e.g., 9600 baud), no parity, 8 data bits and 1 stop bit (i.e., 9600,n,8,1). Refer to communications software manual for instructions to set this configuration through the software (which sets these parameters on the modem).*

- 1) Contact the distant party and find out what communications parameters they are using.
- 2) Apply these communications parameters on this end by entering them in the communications settings option of the communications software. Save the settings.
- 3) Redial the distant party and retry communications.



## Check and adjust connection settings with other party.

### Actions:

*NOTE: Set the same serial communications package configuration and hand-shaking parameters, on BOTH local and distant communications devices (and in communications software) for reliable communications. These include baud rate, parity, data bits, stop bits and buffer settings. The most common settings are: connection speed (e.g., 9600 baud), no parity, 8 data bits and 1 stop bit (i.e., 9600,n,8,1). Refer to communications software manual for instructions to set this configuration through the software (which sets these parameters on the modem).*

- 1) Contact the distant party and find out what communications parameters they are using.
- 2) Apply these communications parameters on this end by entering them in the communications settings option of the communications software. Save the settings.
- 3) Redial the distant party and retry communications.
- 4) Repeat Steps 1-3 until good communications are maintainable.



## Check high baud rate.

### **Actions:**

Check for matching baud rate:

- 1) Contact distant end and find out the maximum baud rate acceptable (e.g., 2400, 9600, 14400, or 28800).
- 2) Make sure a matching or lesser rate is set in the local communications package.
- 3) Redial and try to connect again.



**Make sure the serial port cable is secure on both ends.**

**Actions:**

Check the serial cable connectors at both ends to make sure they are securely fastened.



**Remove and reinsert adapter card and restart computer.**

**Actions:**

Reseat the adapter card.



## Correct any setting conflict with this card & other device.

### Actions:

Check for memory address or IRQ conflict:

- 1) Do one of the following:
  - a) Run a hardware utility program (e.g., WinSleuth or Norton System Information) to identify assigned memory addresses, DMA channels and IRQ assignments.
  - b) Run Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments.
    - 1] Type the following command at the DOS prompt:  
C:\DOS\MSD
    - 2] Choose 'IRQ Status...' from the MSD main screen.



Choose MSD IRQ Status

- 2) Print the screen or write down the memory addresses, IRQs and DMA assignments: particularly the items in conflict (if any).
- 3) Determine whether there appears to be a memory address or IRQ conflict.



## Change jumper cables & DIP switches on adapter card.

### Actions:

Recheck jumpers and DIP switches



Photo: Moving jumpers



Photo: DIP Switches



## Check IRQ/address conflict.

### Actions:

Check for memory address or IRQ conflict:

- 1) Do one of the following:
  - a) Run a hardware utility or diagnostics program (e.g., WinSleuth or Norton System Information) to identify assigned memory addresses, DMA channels and IRQ assignments.
  - b) Run Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments.
    - 1] Type the following command at the DOS prompt and press 'ENTER':  
C:\DOS\MSD
    - 2] Choose 'IRQ Status...' from MSD main screen.



Choose MSD IRQ Status

- 2) Print the screen or write down memory addresses, IRQs and DMA assignments: particularly the items in conflict (if any).
- 3) Determine if there appears to be a memory address or IRQ conflict.





## Check if the adapter card's driver (software) is installed correctly.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Check to see if the driver for this card was disturbed:

- 1) Edit AUTOEXEC.BAT and check if the driver is present and not commented out.
- 2) Edit CONFIG.SYS and check if the driver is present and not commented out. Also make sure the command sequence was not changed.



## **Re-install the software that came with adapter card.**

### **Actions:**

Try running/rerunning the adapter card software installation:

- 1) Insert the installation diskette in Drive A.
- 2) Do one of the following:
  - a) Follow the installation instructions that came with the software diskette for the adapter card.
  - b) Type one of the following commands at the DOS prompt:  
A:SETUP  
  
OR  
A: INSTALL
- 3) Follow the instructions in the installation program.
- 4) Press CTRL+ALT+DEL to reboot the computer for changes to take effect.
- 5) Run an application that makes use of this adapter card.



## **Card too long for empty slot.**

### **Actions:**

Do the following, simultaneously:

- 1) Identify a filled slot where the new adapter card will fit.
- 2) Determine if connecting tabs on the card to be moved will fit in one of the other empty bus slots.
- 3) Determine if this card will fit in short card slot.



## Adapter card does not fit.

### Actions:

Determine why the adapter card will not fit.

Adapter cards vary in size and shape to fit different bus architectures and slot lengths. The most important fit element is the width of the data path, and the length and positioning of the connector tabs. 8-bit cards have a single connector tab, and 16-bit cards have 2 connector tabs.



[Photo: 8-bit adapter card](#)



[Photo: 16-bit adapter card](#)

Cards with more connector tabs will not fit in an 8-bit bus slot. An 8-bit adapter card with one tab will fit in any of the other bus slots and work fine; however, this keeps the slot from being used for another, perhaps more sophisticated, card.



[Photo: Mainboard bus](#)

Also, some cards are full-length and others are half-length. A half-length card fits anywhere length-wise, and full-length cards will not fit in the half-size slots available in many computers.



## Check for paper jam.

### Actions:

Check for paper jam:

- 1) Open the top cover of the printer.
- 2) Check the paper path for a paper jam (refer to the paper path diagrams on the inside cover of the printer for key areas).
- 3) If a paper jam is located, carefully remove jammed paper, ensuring to remove all of it.  
***WARNING: Internal printer components can be extremely hot!***
- 4) Reinsert the paper and realign it if necessary.
- 5) Close the printer cover.
- 6) Press the printer on line button to place the printer on line.
- 7) If the printer does not come back on line, there still may be a paper jam somewhere. Repeat Steps 1-6.
- 8) Resend the document to the printer.



## Check appl paper length.

### Actions:

- 1) Open 'Printer Setup' in the application (or Windows).
- 2) Make sure the paper size selection in the application is set properly and matches the paper loaded in the printer paper tray.
- 3) Make sure the tray containing the desired paper is selected.
- 4) Make sure the printer is on line.
- 5) Resend the document to the printer.



## Check appl paper length.

### **Actions:**

Check the application for manual paper feed:

- 1) Open 'Printer Setup' in the application (or Windows).
- 2) Make sure 'Manual Paper Feed' is NOT selected.
- 3) If 'Manual Paper Feed' is selected, do one of the following:
  - a) Uncheck 'Manual Paper Feed' and reprint the document.
  - b) Manually feed the printer paper until it is done printing.
- 4) Make sure the printer is on line.
- 5) Resend the document to the printer.



## Check for hung port.

### **Actions:**

- 1) Exit all applications and Windows.
- 2) Turn the computer completely off. Wait 15 seconds. Turn the computer back on.
- 3) Reenter the application.
- 4) Turn the printer off. Wait 15 seconds. Turn the printer back on. Make sure the printer is on line.
- 5) Reprint the document.





## **Check for bad ventilation.**

### **Actions:**

- 1) Turn the printer off and let it cool for 1 hour.
- 2) Move the printer to an open space with plenty of circulation.
- 3) Inspect all air vents for dirt, dust and other obstructions. Look for vents on the rear and sides of the printer. Clean vents and remove obstructions.
- 4) Plug the power cable in and turn the power switch on. Let the printer run for 30 minutes.



## Check power cord for damage.

### **Actions:**

Inspect the power cord for damage:

- 1) Turn the power switch off.
- 2) Unplug both ends of the power cable and inspect it for damage (e.g., power cable crushed).
- 3) Do one of the following:
  - a) If the cable shows any signs of wear or possible damage, replace it.
  - b) If the cable appears serviceable, replace it.
- 4) Make sure the power cable is securely attached at both ends.
- 5) Turn the printer power switch on and check if printer is working.



## **Erratic power on laser..**

### **Actions:**

- 1) Make sure the printer power cable is securely plugged in to the surge protector or wall receptacle.
- 2) If the printer has a detachable power cable, make sure the cable is securely connected to the printer.
- 3) Make sure the printer comes back on and stays on.



## Unwanted blank spots in..

### **Actions:**

Check paper in use:

- 1) Remove paper from the printer paper tray or bin.
- 2) Find copier paper (16-24 pound) and fan to separate.
- 3) Insert paper into the paper tray and reinsert the tray into the printer.
- 4) Make sure the printer is on line.
- 5) Reprint the document.



## Check paper path.

### Actions:

Clean the paper path:

- 1) Open the top cover of the printer.
- 2) Wipe the paper path with a clean, soft rag to collect bits of toner (refer to paper path diagrams on inside cover of printer for key areas).

***WARNING: Internal printer components can be extremely hot!***

- 3) Reinsert paper and realign if necessary.
- 4) Close the printer cover.
- 5) Press the printer On Line button to place the printer on line.
- 6) Resend the document to the printer.



## **Squashed or stretched images.**

### **Actions:**

Check the type of paper in use:

- 1) Remove any paper from the printer paper tray or bin.
- 2) Examine the type of paper in use. The following types should be avoided: heavy stock, glossy, shiny, porous, or textured.
- 3) Find copier paper (16-24 pound) and fan to separate.
- 4) Insert paper into the paper tray and reinsert the tray into the printer.
- 5) Make sure the printer is on line.
- 6) Reprint the document.



## Check for appl page eject.

### Actions:

- 1) Open 'Options' or 'Printer Setup' within the application.
- 2) Locate a 'Page Eject' or similarly worded switch and make sure it is turned off.
- 3) Reprint the document.



## Perform printer self-test.

### **Actions:**

Check printer operation:

- 1) Turn the printer off.
- 2) Check the inside of the top cover or the printer manual to identify how to perform a printer self-test.
- 3) Perform the printer self-test (usually hold down one or two buttons and turn the printer power on).
- 4) Examine the page generated by printer self-test (if one is generated).





## **Check for low/shifted toner.**

### **Actions:**

Try extending the usable life of the old cartridge by several hundred pages prior to discarding or recycling it and installing a new one as follows:

- 1) Grasp the cartridge and lift it out of the printer.
- 2) Grasp the cartridge in the center with one hand and hold it out at full arms-length away from the body over the floor (this minimizes the chances of getting toner dust on clothes and documents).
- 3) Gently tip the cartridge back and forth from side to side (about 45 degrees each way) about 6 times to redistribute the toner evenly throughout the length of the cartridge.
- 4) Reinsert the old cartridge back into the printer gently, close the door, turn the printer on and run several test prints. If quality problems continue after page 5, repeat this procedure again.



## White streaks, faded text..

### **Actions:**

Adjust the print density:

- 1) Turn the laser printer off and unplug the electrical power cord.
- 2) Open the top cover.
- 3) Locate the print density adjustment. May be called 'Darkness'. (Look for a knob inside the printer compartment. Check user manual for specifics.)
- 4) Adjust the print density to a higher (darker) setting.
- 5) Close the printer cover.
- 6) Reinsert the paper and realign it if necessary.
- 7) Press the printer On Line button to place the printer on line.
- 8) Resend the document to the printer.



**Try replacing toner cartridge.**

**Actions:**

[Replace the toner cartridge.](#)



## **Check for shifted toner.**

### **Actions:**

Try extending the usable life of the old cartridge by several hundred pages prior to discarding or recycling it and installing a new one as follows:

- 1) Grasp the cartridge and lift it out of the printer.
- 2) Grasp the cartridge in the center with one hand and hold it out at full arms-length away from the body over the floor (this minimizes the chances of getting toner dust on clothes and documents).
- 3) Gently tip the cartridge back and forth from side to side (about 45 degrees each way) about 6 times to redistribute the toner evenly throughout the length of the cartridge.
- 4) Reinsert the old cartridge back into the printer gently, close the door, turn the printer on and run several test prints. If quality problems continue after page 5, repeat this procedure again.



## Check paper path.

### Actions:

Clean the paper path:

- 1) Open the top cover of the printer.
- 2) Wipe the paper path with a clean, soft rag to collect bits of toner (refer to paper path diagrams on inside cover of printer for key areas).

***WARNING: Internal printer components can be extremely hot!***

- 3) Reinsert the paper and realign if necessary.
- 4) Close the printer cover.
- 5) Press the printer On Line button to place the printer on line.
- 6) Resend the document to the printer.



## **Check for type of drum.**

### **Actions:**

- 1) The photosensitive drum that transfers toner onto the paper is scratched.
- 2) Read the printer user manual and determine the type of drum:
  - a) The drum is housed inside the toner cartridge.
  - b) The drum is housed in a separate cartridge.



**Entire page is black.**

**Actions:**

Reseat toner cartridge:

- 1) Turn the laser printer off.
- 2) Open the top cover by pressing the button to release the latch.

*NOTE: Some printers require removing the paper tray first.*

**CAUTION:** *If laser printer has been on for an extended time period, several internal components are extremely HOT! Either let printer cool for 15 minutes or be extremely careful not to get burned.*

- 3) Reseat the toner cartridge or grasp the cartridge and lift it straight out and reinsert it. Make sure it is fully seated.
- 4) Close the door, turn the printer on and print another page.



## Check printer setup WIN.

### **Actions:**

Check the printer setup:

- 1) Open 'Printer Setup' within the application or in Windows.
- 2) Make sure the correct printer driver for this printer is installed and active.
- 3) Examine all other print options (e.g., form feed) to Make sure they are set properly.
- 4) Reprint the document.





## Check if print from DOS.

### Actions:

- 1) Open a DOS window.
- 2) Select an existing plain text file (e.g., AUTOEXEC.BAT).
- 3) Type the following command at the DOS prompt:  
PRINT <filename>  
(Where <filename> is the name of the plain text file (e.g., AUTOEXEC.BAT).)
- 4) When asked for port, reply:  
LPT1 (or LPT2 if using parallel port 2)
- 5) Determine if the printer prints the file.



## Check for right port/setting.

### Actions:

Check if the printer cable is connected to the correct port on the computer:

- 1) Open 'Printer Setup' within the application or Windows. Identify what port this application thinks the printer is using.
  - a) [Update or add device to Windows.](#)
- 2) Turn both the computer system and the printer off.
- 3) Trace the cable from the back of the printer to the back of the computer base unit. Normally the parallel printer cable is connected to the parallel (25-pin port) labeled 'Printer' or 'LPT1'.



[Photo: Connect parallel printer cable to base unit](#)

- 4) Compare the LPT port assignment in the software with the port the cable is connected to on the back of the base unit.



## Check for a/b line switch.

### **Actions:**

*NOTE: Occasionally there is an A/B Switch Box that permits a computer to link to 2 printers or enable 2 computers to share a single printer.*

- 1) Check if there is an A/B Switch Box present.
- 2) If present, make sure the switch selection is switched to route printer data from this computer to desired printer.



## Check for loose data cable.

### Actions:

- 1) Turn both the computer system and the printer off.
- 2) Check the printer cable connections:
  - a) Make sure the printer cable is securely connected to the printer port (usually 25-pin parallel port) on the back of base unit.



Photo: Connect parallel printer cable to base unit

- b) Trace the same cable to the back of the printer unit and make sure it is securely connected to the printer port (usually parallel Centronics port). Attach the side clips on the Centronics connector.



Photo: Connect parallel printer cable to printer

- 3) Turn on both the computer system and the printer.
- 4) Open the application and reprint the document.
- 5) Examine the document for any errors.



**Press the self-test button on the printer.**

**Actions:**

Check printer operation:

- 1) Turn the printer off.
- 2) Check inside the top cover of the printer or in the printer manual to identify how to perform a printer self-test.
- 3) Perform the printer self-test (usually hold down one or two buttons and turn printer power on).
- 4) Examine the page generated by printer self-test (if one is generated).



## Check for paper jam.

### Actions:

Check for a paper jam:

- 1) Open the top cover of the printer.
- 2) Check the paper path for a paper jam (refer to paper path diagrams on inside cover of the printer for key areas).
- 3) If a paper jam is located, carefully remove the jammed paper, making sure to remove all of it.  
***WARNING: Internal printer components can be extremely hot!***
- 4) Reinsert the paper and realign if necessary.
- 5) Close the printer cover.
- 6) Press the printer On Line button to place the printer on line.
- 7) If the printer does not come back on line, there still may be a paper jam somewhere. Repeat Steps 1-6.
- 8) Reprint the document.



## Check paper tray.

### **Actions:**

Check for paper, paper size and location:

- 1) Make sure the printer has paper, forms or envelopes loaded.
- 2) Check the size and type of paper currently loaded in the printer (including what tray if a laser printer).
- 3) Open 'Printer Setup' in the application (or Windows).
- 4) Make sure the selected paper size, type of paper and location (i.e., tray) matches what is currently installed in the printer.
- 5) If there are differences, do one of the following:
  - a) If the printer contains desired paper size and type, change settings in 'Printer Setup'.
  - b) If the 'Printer Setup' contains desired paper size and type, reload the printer with paper of this size and type in the designated location.
- 6) Make sure the printer is on line.
- 7) Resend the document to the printer.



## Check printer fuse.

### **Actions:**

Check for a blown printer fuse:

- 1) Read the printer manual to determine the location and type of printer fuse.
- 2) Turn the printer off and unplug the printer power cable.
- 3) Locate the fuse well on the printer (usually inside the printer or on back panel) and check fuse.
- 4) If the fuse is blown, replace it. If not, make sure it is fully seated.
- 5) Close the printer case.
- 6) Plug in the printer power cable and turn the printer on.
- 7) Reprint the document.





## Check electrical power source.

### **Actions:**

Check for a good power source:

- 1) Do one of the following:
  - a) If the printer is plugged into a surge protector, make sure the surge protector is plugged in, the switch is turned on and light is lit (it is OK if computer is currently running from this same surge protector).
  - b) If the printer is connected to a wall receptacle, make sure there is power at receptacle. Check that another appliance plugged into this receptacle is operational or plug a lamp into this receptacle and see if it works.
- 2) If the power receptacle is not working, check for a blown fuse or circuit breaker, or move the printer to a working outlet.
- 3) Turn the printer on and reprint the document.



## **Check printer power cable.**

### **Actions:**

- 1) Make sure the printer power cable is securely plugged into the surge protector or wall receptacle.
- 2) If the printer has a detachable power cable, make sure it is securely connected to the printer.



## Check printer power switch.

### Actions:

- 1) Locate the printer power switch. Try one of the following locations:
  - a) Along the left or right side of the printer.
  - b) Somewhere on the back of the printer.
  - c) Sometimes in the front or along the top of the printer.
- 2) Make sure the printer power switch is turned on (one or more lights should appear on display).
- 3) Reprint the document.



## **Check if online/formfeed.**

### **Actions:**

- 1) Make sure the printer is on line. Check if the on line light is on, press the On Line button until the light comes on.
- 2) Press the Form Feed button.



## Check printer fuse.

### **Actions:**

Check for a blown printer fuse:

- 1) Read the printer manual to determine the location and type of printer fuse.
- 2) Turn the printer off and unplug the printer power cable.
- 3) Locate the fuse well on the printer (usually on the inside or on the back panel) and check the fuse.
- 4) If the fuse is blown, replace it. If not, make sure it is fully seated.
- 5) Close the printer case.
- 6) Plug in the printer power cable and turn the printer on.
- 7) Reprint the document.



## Check surge/wall power.

### **Actions:**

Check for a good power supply:

- 1) Do one of the following:
  - a) If the printer is plugged into a surge protector, make sure the surge protector is plugged in, the switch is turned on and the light is lit (it is OK if computer is currently running from this same surge protector).
  - b) If the printer is connected to a wall receptacle, make sure there is power at the receptacle. Check that another appliance plugged into this receptacle is operational or plug a lamp into this receptacle and see if it works.
- 2) If the power receptacle is not working, check for a blown fuse or circuit breaker or move the printer to a working outlet.
- 3) Turn the printer on and reprint the document.



## Check printer operation.

### **Actions:**

Check the printer operation:

- 1) Turn the printer off.
- 2) Check the inside of top cover of the printer or in printer manual to identify how to perform a printer self-test.
- 3) Perform the printer self-test (usually hold down one or two buttons and turn printer power on).
- 4) Examine the page generated by printer self-test (if one is generated).



## Replace printer data cable.

### Actions:

- 1) Turn the computer base unit off and unplug the power cable.
- 2) Unplug the old printer cable:
  - a) Go to the back of the printer and disconnect connector clips or screws from the data cable running to computer. Note the type and location of the connector.



[Photo: Connect parallel printer cable to printer](#)

- b) Trace the cable to the back of the computer base unit, unscrew the connector screws and carefully remove the printer cable.



[Photo: Connect parallel printer cable to base unit](#)

- 3) Connect the new printer cable:
  - a) Orient and attach the identical new printer cable to the same port from which the old one was removed on the back of the base unit. It only goes one way. Secure connector screws.
  - b) Carry the other end of the cable to the back of the printer, orient and connect the cable to the same port where the old one was removed. It also only goes one way. Secure connector clips or screws.
- 4) Turn on the computer and printer, reprint the document.





## **Check if printer online.**

### **Actions:**

- 1) Make sure the printer is on line. Check the on line light and press the On Line button until light comes on.
- 2) Press the Form Feed button.



## Check for right port.

### Actions:

Check if the printer cable is connected to the correct port on the computer:

- 1) Open 'Printer Setup' within the application or Windows. Identify what printer port this application is using.
  - a) [Update or add device to Windows.](#)
- 2) Turn both the computer system and the printer off.
- 3) Trace the cable from the back of the printer to the back of the computer base unit. Normally the parallel printer cable is connected to the parallel (25-pin port) labeled 'Printer' or 'LPT1'.



[Photo: Connect parallel printer cable to base unit](#)

- 4) Compare the LPT port assignment in the software with the port the cable is connected to on the back of the base unit.



## Printer has power no print.

### Actions:

- 1) Turn both the computer system and the printer off.
- 2) Check the printer cable connections:
  - a) Make sure the printer cable is securely connected to the printer port (usually 25-pin parallel port) on the back of base unit.



Photo: Connect parallel printer cable to base unit

- b) Trace the same cable to the back of the printer unit and make sure it is securely connected to the printer port (usually parallel Centronics port). Attach the side clips on Centronics connector.



Photo: Connect parallel printer cable to printer

- 3) Turn both the computer system and the printer on.
- 4) Open the application and reprint the document.



## **Printer has no power.**

### **Actions:**

- 1) Locate the printer power switch. Try one of the following locations:
  - a) Along the left or right side of the printer.
  - b) Somewhere on the back of the printer.
  - c) Sometimes in the front or along the top of the printer.
- 2) Make sure the printer power switch is turned on (one or more lights should appear on display).
- 3) Reprint the document.



## **Check font availability.**

### **Actions:**

- 1) Check the printer font settings inside the application.
- 2) Read the printer manual (including any additional font cartridge manuals), and determine if the font is available for this printer (i.e., if printer can print this font).



## Check for paper misfeed.

### Actions:

Check for a paper misfeed:

- 1) Open the top cover of the printer.
- 2) Check the paper path for a paper misfeed (refer to the paper path diagrams on the inside cover of the printer for key areas).
- 3) If the paper appears to be angled incorrectly, it may be misfeeding through the printer. Remove the paper and reinstall it, ensuring it is correctly aligned.

***WARNING: Internal printer components can be extremely hot!***

- 4) Close the printer cover.
- 5) Press the printer On Line button to place the printer on line.
- 6) Resend the document to the printer.



## Check printer setup.

### **Actions:**

Check printer setup:

- 1) Open the 'Printer Setup' within the application or in Windows.
- 2) Make sure the correct printer driver for this printer is installed and active.
- 3) Examine all other print options (e.g., form feed) to make sure they are set properly.
- 4) Reprint the document.



## Check for paper jam.

### Actions:

Check for a paper jam:

- 1) Open the top cover of the printer.
- 2) Check the paper path for a paper jam (refer to paper path diagrams on inside cover of the printer for key areas).
- 3) If a paper jam is located, carefully remove the jammed paper, making sure to remove all of it.  
***WARNING: Internal printer components can be extremely hot!***
- 4) Reinsert the paper and realign it if necessary.
- 5) Close the printer cover.
- 6) Press the printer On Line button to place the printer on line.
- 7) If the printer does not come back on line, there may still be a paper jam somewhere. Repeat Steps 1-6.
- 8) Reprint the document.





## **Check paper size/location.**

### **Actions:**

Check the paper size and location:

- 1) Check the size and type of paper currently loaded in the printer (including what tray if it is a laser printer).
- 2) Open the 'Printer Setup' in application (or Windows).
- 3) Make sure the selected paper size, type of paper and location (i.e., tray) matches what is currently installed in the printer.
- 4) If there are differences, do one of the following:
  - a) If the printer contains the desired paper size and type, change settings in the 'Printer Setup'.
  - b) If the 'Printer Setup' contains desired paper size and type, reload the printer with paper of this size and type in the designated location.
- 5) Make sure the printer is on line.
- 6) Resend the document to the printer.



## Check for paper jam.

### Actions:

Check for a paper jam:

- 1) Open the top cover of the printer.
- 2) Check the paper path for a paper jam (refer to paper path diagrams on inside cover of the printer for key areas).
- 3) If a paper jam is located, carefully remove the jammed paper, making sure to remove all of it.  
***WARNING:** Internal printer components can be extremely hot!*
- 4) Reinsert the paper and realign if necessary.
- 5) Close the printer cover.
- 6) Press the printer On Line button to place the printer on line.
- 7) If the printer does not come back on line, there may still be a paper jam somewhere. Repeat Steps 1-6.
- 8) Reprint the document.



## **Check offline & formfeed.**

### **Actions:**

- 1) Make sure the printer is on line. Check the on line light and press On Line button until light comes on.
- 2) Press the Form Feed button.



## Check loose printer cable.

### Actions:

- 1) Turn both the computer system and the printer off.
- 2) Check the printer cable connections:
  - a) Make sure the printer cable is securely connected to the printer port (usually 25-pin parallel port) on the back of base unit.



Photo: Connect parallel printer cable to base unit

- b) Trace the same cable to the back of the printer unit and make sure it is securely connected to the printer port (usually parallel Centronics port). Attach the side clips on Centronics connector.



Photo: Connect parallel printer cable to printer

- 3) Turn both the computer system and the printer on.
- 4) Open the application and reprint the document.
- 5) Examine the document for any errors.



## Computer makes a constant.

### **Actions:**

The fan in the base unit power supply is going bad. User may continue to use the computer normally (if they can stand the whining) without the threat of causing damage. Otherwise, consider replacing the power supply (continue).



## Computer has no customary..

### **Actions:**

STOP! Turn the computer off immediately!

Unplug the power cables and do not attempt to turn the computer on or use it. Doing so may cause further damage to critical electronic components.



## Check for valid TSR/driver.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Determine if the program/device driver attempting to load high will run from conventional (low) memory.

- 1) Edit AUTOEXEC.BAT and locate the line for the program (TSR).
- 2) Edit CONFIG.SYS and locate line with the device driver.
- 3) Remove the LOADHIGH= (in AUTOEXEC.BAT) or DEVICEHIGH= (in CONFIG.SYS) prefix from the beginning of the command line (temporarily).
- 4) Save the file and reboot the computer.
- 5) Type MEM /C /P at the DOS prompt to list programs by memory location. Determine if applicable programs/device drivers are loading high.



## Check for size switch.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Determine if the program/device driver attempting to load high includes a size switch.

- 1) Edit AUTOEXEC.BAT and locate the line for the program (TSR).
- 2) Edit CONFIG.SYS and locate line with the device driver.
- 3) If the program/TSR or device driver has a size switch following it (on the same line), write that switch down for reference and remove it (temporarily).
- 4) Save the file and reboot the computer.
- 5) Type MEM /C /P at the DOS prompt to list programs by memory location. Determine if applicable programs/device drivers are loading high.





## System freezes when loading..

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Determine if attempting to load one of the following commands into upper memory:

- 1) Edit AUTOEXEC.BAT and locate the line containing the command SMARTDRV, if present. It should NOT be preceded with the LOADHIGH command.
- 2) Edit CONFIG.SYS and locate lines with HIMEM.SYS (or another memory manager) and EMM386.EXE.

EXAMPLE:

DEVICE=C:\DOS\HIMEM.SYS

DEVICE=C:\EMM386.EXE

DEVICE=C:\DOS\SMARTDRV.SYS (DOS 5.0 ONLY)

They should NOT be preceded with a DEVICEHIGH prefix.

- 3) If any of these commands are preceded with LOADHIGH= (in AUTOEXEC.BAT) or DEVICEHIGH= (in CONFIG.SYS), remove this prefix.
- 4) Save the file and reboot the computer.
- 5) Type MEM /C /P at the DOS prompt to list programs by memory location. Determine if applicable programs/device drivers are loading high.



## Check memory manager.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

- 1) Edit CONFIG.SYS and try to locate a line with a memory manager (e.g., HIMEM.SYS, QEMM, etc.) similar to the following:  
DEVICE=C:\DOS\HIMEM.SYS
- 2) Do one of the following:
  - a) If the command is present, make sure the drive, path and filename used in the command are correct. Especially make sure the path is correct, and that the HIMEM.SYS line (or line for other memory manager) is listed first.
  - b) If the command is not present, add the command shown in Step 2)a) to CONFIG.SYS.  
*NOTE: It should be the first command in the file.*
- 3) Save the file and reboot the computer.
- 4) Do one or both of the following:
  - a) Type MEM /C at the DOS prompt to view the available memory.
  - b) Load an application that uses the additional memory (e.g., Windows).



## Installed additional memory..

### Actions:

- 1) Run [Setup](#).
- 2) Examine the 'Memory' section and determine if the memory added to the system is reflected here.
- 3) If all the installed memory is not reflected here, update it accordingly.
- 4) Save the Setup and reboot the computer.
- 5) Run the MEM /C command and/or run program that will access additional memory.



## DOS runs slowly or see ..

### **Actions:**

Type EXIT at the DOS prompt.



## Chronically low memory..

### Actions:

STOP Immediately! There may be a virus present.

***CAUTION:** If a virus is present, it should be diagnosed and repaired by qualified computer technicians using updated virus detection and cleanup software.*

Do the following to check for the presence of a virus:

- 1) Perform an immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Turn the computer off.
  - d) Identify and segregate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Scan for virus(es).
  - a) Insert a bootable, write-protected diskette in floppy drive and turn the computer on.
  - b) After boot, insert a write-protected diskette containing a virus detection program in floppy drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all network drives, all backups and every floppy diskette in the vicinity).
- 3) Report results of virus scan.



**Swap mouse with one of same type that works on another computer.**

**Actions:**

Check the mouse by exchanging it with a similar mouse from another computer.



## **Check if the correct mouse driver is installed for your version of Windows.**

### **Actions:**

Check the Mouse Configuration in Windows

- 1) Check the mouse driver installation in Windows:
  - a) Open 'Windows Setup'.
  - b) Select 'Options'.
  - b) Select 'Change System Settings'.
  - c) Look at the 'Mouse' list box and make sure it contains the correct mouse/driver as the one installed.



## Check for a COM port or IRQ conflict involving the mouse.

### Actions:

- 1) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
- 2) Choose 'Com Ports...' from the MSD main screen.



[MSD Choose COM Ports screen](#)

- 3) Identify the port assignments and write them down. Also identify which port is being used by both devices.



[MSD COM Ports example](#)

- 4) Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)





## Check for port 1 or 2.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

- 1) Edit AUTOEXEC.BAT or Edit CONFIG.SYS

and locate a line with the word 'MOUSE...' similar to one of the following:

- a) In AUTOEXEC.BAT: C:\DOS\MOUSE\MOUSE.COM /x
  - b) In CONFIG.SYS: DEVICE=C:\DOS\MOUSE\MOUSE.SYS /x
- 2) After the word 'MOUSE' there may be a '/1' or '/2'. If the digit is a 1, change it to 2; if it is a 2, change it to a 1.
  - 3) Save the file and reboot the computer.
  - 4) Watch for a message about loading the mouse driver during the bootup process.
  - 5) Load an application that uses the mouse (e.g., Windows).
  - 6) Attempt to use the mouse.
  - 7) If this does not work, switch the digit back to the original.



## Check loading of mouse driver.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

- 1) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and try to locate a line with the word 'MOUSE...' similar to one of the following:
  - a) In AUTOEXEC.BAT: C:\DOS\MOUSE\MOUSE.COM /x
  - b) In CONFIG.SYS: DEVICE=C:\DOS\MOUSE\MOUSE.SYS /x
- 2) Do one of the following:
  - a) If the command is present, check the drive, path and filename used in the command for correctness. Especially make sure the path is correct.
  - b) If the command is not present, add the correct command shown in Step 1 to which ever file is open.

*NOTE: Leave '/x' off for now.*

- 3) Save the file and reboot the computer.
- 4) Watch for a message about loading the mouse driver during the bootup process.
- 5) Load an application that uses the mouse (e.g., Windows).
- 6) Attempt to use the mouse.



## Check for incorrect driver.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

- 1) Identify the brand and model of the mouse by examining manufacturer's decal on bottom of the mouse.
- 2) Identify the mouse driver being loaded, including the pathname, filename, date, time and driver version number:
  - a) Search the hard disk ([Locate file](#)) for MOUSE.\* to identify available mouse drivers.
  - b) [Edit AUTOEXEC.BAT](#) or [Edit CONFIG.SYS](#), and try to locate a line with the word 'MOUSE...', similar to one of the following:
    - 1] In AUTOEXEC.BAT: C:\DOS\MOUSE\MOUSE.COM
    - 2] In CONFIG.SYS: DEVICE=C:\DOS\MOUSE\MOUSE.SYS
- 3) Determine if the mouse driver being loaded is the correct driver for this type of mouse, and whether it is an updated or outdated mouse driver.



## Check for mouse driver.

### **Actions:**

Check if the mouse software is installed on the hard disk. See [Locate file](#) for instructions. Search for MOUSE.\* to locate the mouse driver (e.g., MOUSE.COM or MOUSE.SYS).

Mouse software usually resides in one of the following locations:

C:\DOS

C:\MOUSE

C:\DOS\MOUSE



## Check mouse cable connection.

### Actions:

Check the mouse cable connection:

- 1) Turn the computer off.
- 2) Trace the mouse cable to back of computer.
- 3) Do one of the following:
  - a) If socket is a PS/2 style connector, make sure it is inserted into the connector marked 'Mouse' or one with a mouse icon. Make sure it is secure.
  - b) If the socket is a 9-pin size serial connector, make sure it is securely attached to an open COM port (Usually COM1. Make sure screws are snug.
- 4) Pick up the mouse and make sure the tracking ball moves freely inside its compartment.
- 5) Turn the computer on and watch for a message about loading the mouse driver during the bootup process.
- 6) Load an application that uses the mouse (e.g., Windows).
- 7) Attempt to use the mouse.



## Check if the mouse is for left-handed people or right-handed people.

### **Actions:**

*NOTE: The primary button is:*

- 1) For right-handed users, the LEFT button.
- 2) For left-handed users, the RIGHT button.



## Use the opposite hand to use the mouse.

### Actions:

*NOTE: Most software now allows exchanging mouse buttons to support left-handed and right-handed users. In other words, the primary mouse button (ordinarily the left one) may be switched to the right one via software to accommodate left-handed mouse users.*

- 1) The mouse may be set (left-handed or right-handed) opposite of what is expected due to one of the following:
  - a) The user is using someone else's computer that is set opposite of expectations.
  - b) Someone else may have exchanged settings on the user's computer.
- 2) Try using the mouse with the opposite hand to determine if setting is reversed (i.e., if right-handed, try to use mouse with left hand). Ordinarily the left button performs most actions; determine if the right button now performs those actions.



## Check for bad mouse.

### **Actions:**

Inspect the mechanical mouse for defective mouse components:

- 1) Open the mouse ball compartment and remove the mouse ball.
- 2) Inspect and operate the axis rotors for correct operation.
- 3) If either one is sticking or fails to turn freely, mouse is defective and should be replaced.





## **Remove and clean the ball inside mouse and restart computer.**

### **Actions:**

Clean and service a mouse:

- 1) Remove the ball from the compartment.
- 2) Wash ball in warm water and dry with a soft, lint-free cloth.
- 3) Inspect and clean the ball compartment and rollers using a mouse cleaning kit.
- 4) Reassemble the mouse.
- 5) Test the mouse operation.



## **Change the mouse control settings in the software.**

### **Actions:**

[Adjust the mouse control settings](#) in Windows and/ control panel.



## Incorrect driver settings; Verify that the loading syntax is correct in startup.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

- 1) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and locate a line with the word 'MOUSE...' similar to one of the following:
  - a) In AUTOEXEC.BAT: C:\DOS\MOUSE\MOUSE.COM /x
  - b) In CONFIG.SYS: DEVICE=C:\DOS\MOUSE\MOUSE.SYS /x
- 2) Make sure the drive, path, driver and syntax used are correct.
- 3) After the word 'MOUSE' there may be a '/1' or '/2'. Make sure the digit, if mentioned, points to the correct serial port to which the mouse is connected. To change it, if the digit is a 1, change it to 2; if it is a 2, change it to a 1.
- 4) Save the file, if changes were made and reboot the computer.
- 5) Watch for a message about loading mouse driver during the bootup process.
- 6) Load an application that uses the mouse (e.g., Windows).
- 7) Attempt to use the mouse.



## Mouse pointer appears frozen.

### **Actions:**

Check the mouse cable connection:

- 1) Turn the computer off.
- 2) Trace the mouse cable to back of the computer.
- 3) Do one of the following:
  - a) If the socket is a PS/2 style connector, make sure it is inserted into the connector marked 'Mouse' or one with a mouse icon. Make sure it is secure.
  - b) If the socket is a 9-pin size serial connector, make sure it is securely attached to an open COM port (Usually COM1. Make sure screws are snug.
- 3) Pick up the mouse and make sure the tracking ball moves freely inside its compartment.
- 4) Turn the computer on and watch for a message about loading a mouse driver during the bootup process.
- 5) Load an application that uses the mouse (e.g., Windows).
- 6) Attempt to use the mouse.



## Cordless mouse sometimes..

**Actions:**

*NOTE: If the mouse is an infrared mouse, it requires a clear line of sight to the base unit. Desktops often get cluttered with books, papers and other objects that may block this line of sight.*

Clear an applicable portion of the desktop or work surface.



## Check port 1 or 2.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Check whether the correct port is designated:

- 1) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and locate a line with the word 'MOUSE...' similar to one of the following:
  - a) In AUTOEXEC.BAT: C:\DOS\MOUSE\MOUSE.COM /x
  - b) In CONFIG.SYS: DEVICE=C:\DOS\MOUSE\MOUSE.SYS /x
- 2) After the word 'MOUSE' there may be a '/1' or '/2'. If the digit is a 1, change it to 2; if it is a 2, change it to a 1.
- 3) Save the file and reboot the computer.
- 4) Watch for a message about loading a mouse driver during the bootup process.
- 5) Load an application that uses the mouse (e.g., Windows).
- 6) Attempt to use the mouse.



## Connect the mouse cable securely to the correct port.

### Actions:

Check the mouse cable connection:

- 1) Turn the computer off.
- 2) Trace the mouse cable to the back of the computer.
- 3) Do one of the following:
  - a) If the socket is a PS/2 style connector, make sure it is inserted into the connector marked 'Mouse' or one with a mouse icon. Make sure it is secure.
  - b) If the socket is a 9-pin size serial connector, make sure it is securely attached to an open COM port (Usually COM1. Make sure screws are snug.
- 3) Pick up the mouse and make sure the tracking ball moves freely inside its compartment.
- 4) Turn the computer on and watch for a message about loading a mouse driver during the bootup process.
- 5) Load an application that uses the mouse (e.g., Windows).
- 6) Attempt to use the mouse.



## Check keyboard.

**Actions:**

Check the keyboard by exchanging it with another computer that uses a similar keyboard.





## Change keyboard switch and jumpers inside the keyboard.

### Actions:

- 1) Turn the keyboard over and look for an XT/AT switch. If present, set the switch to the AT position. (Otherwise, skip this step.)
- 2) If keyboard contains [DIP Switches](#), set them to enable the desired options, following the instructions in the owners manual. ([Change DIP Switches](#).)



## Check mouse/keyboard swap.

### **Actions:**

*NOTE: If the socket is a PS/2 style connector, make sure the keyboard socket is used (not the mouse socket.)  
The mouse and keyboard plugs may be reversed in their connectors.*



Photo: PS/2 Style Keyboard and Mouse Connectors

Trace the keyboard cable to the back of the computer and make sure it is inserted into the connector marked 'Keyboard' or one with a keyboard icon. Make sure it is secure.



## Check for structured field.

### **Actions:**

Check if this is a structured or restricted field or area.

*NOTE: Some fields or areas of some applications have built-in constraints that permit only certain types of entries (e.g., numbers in numeric fields) in them. This means that the keyboard will appear to not work when attempting to enter prohibited characters or numbers.*



## Keyboard dead or wont type.

### **Actions:**

Make sure an active window is being used and the window is completely visible (if using Windows). Try to move the cursor around by clicking at various points in the window with the mouse.

*NOTE: The mouse may have been clicked on desktop or perhaps text is being entered in a portion of an active window that is not completely visible on the screen.*



## Clean the keyboard and/or straighten springs inside.

### Actions:

*NOTE: Certain characters consistently fail to appear in words because a key is not working or sticks when pressed.*

- 1) Identify which key(s) fail to type.
- 2) Turn the computer off.
- 3) Carefully pry or pop that key off with paper clip or letter opener.
- 4) Do one of the following:
  - a) Wet a cotton swab with warm water and wash/wipe debris away from the key area.
  - b) If the key area is clean, the problem could be a bent spring. Older keyboards use visible springs. If a bent one is visible, carefully bend or straighten it.
- 5) Replace the key. Press down firmly.
- 6) Turn the computer on.
- 7) Open the word processor.
- 8) Press formerly sticking key(s) several times to test them.



**Actions:**

- 1) Identify which key(s) stick.
- 2) Turn the computer off.
- 3) Carefully pry or pop that key off with a paper clip or letter opener.
- 4) Do one of the following:
  - a) Wet a cotton swab with warm water and wash/wipe debris away from the key area.
  - b) If the key area is clean, the problem could be a bent spring. Older keyboards use visible springs. If a bent one is visible, carefully bend or straighten it.
- 5) Replace the key. Press down firmly.
- 6) Turn the computer on.
- 7) Open the word processor.
- 8) Press the formerly sticking key(s) several times to test them.



## Check typing speed.

**Actions:**

*NOTE: If a user is typing very rapidly, especially while the computer is busy with other tasks (e.g., saving a file, running another program) the keyboard buffer (20 characters) will fill up causing the computer to beep.*



**Check if the keys you're pressing are allowed to be used by this field or application.**

**Actions:**

*NOTE: Some programs have input controls that permit only certain entries (e.g., text or numbers or nothing) in certain fields.*

- 1) Check the user manual to verify the type of entry required here.
- 2) Make sure the proper keys are being pressed.





## Check video driver.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

- 1) Verify that the application will work with the installed video driver and video card.  
Do one or more of the following to verify that the latest driver for the video card is installed:
- 2) Edit AUTOEXEC.BAT and Edit CONFIG.SYS to check for a video driver. Verify that it is the correct one for this video card and display unit.
- 3) Check/change the Windows video driver:
  - a) Boot into DOS and Windows.
  - b) Open the 'Windows Setup' under 'Main'.
  - c) Read the resolution (e.g., 800x600x256) on the 'Display:' line.



## **Verify program configuration.**

### **Actions:**

- 1) Review the application installation and the user manual.
- 2) Verify that the program is properly configured for this computer setup.



## Check loose video cable.

### Actions:

- 1) Turn the computer system off.
- 2) Check the video cable connections.
  - a) Make sure the video cable is securely connected to the video port on back of the base unit.
  - b) If the video cable has a connector plug on the display unit end, make sure it is securely connected.
- 3) Turn on the computer system.
- 4) Observe the display and see if the colors return to normal.



## Run a program designed to check for viruses.

### Actions:

**WARNING:** Check for Computer VIRUS!

- 1) Stop using the computer.
- 2) Run a virus detector from clean, bootable, write-protected floppy diskette.



## Check display & video card.

### **Actions:**

Test the display unit and video card by exchanging display units with another similar computer nearby and test both systems.

See [Test display unit and video card](#) for details.



## **Tilt the monitor or move it to different location.**

### **Actions:**

Try one of the following, in sequence:

- 1) Adjust or shift the display unit slightly.
- 2) Move the display unit to the other side of the desk at a different angle.
- 3) Move the computer and display unit across the room or to another room away from fluorescent lights, laser printer, power lines in the wall or another device.



## Check vertical/horizontal.

### Actions:

- 1) Locate the horizontal and vertical adjustment controls on display unit. Try one of the following locations:
  - a) Look for the control labels.
  - b) Just underneath the lower front edge of the display unit.
  - c) A small control panel door to open.
  - d) Along the left or right side of the display unit.
  - e) Somewhere on the rear panel of the display unit.
- 2) Identify the horizontal adjustment control. It often has a box with a horizontal double arrow label.
- 3) Identify the vertical adjustment control. It often has a box with a vertical double arrow label.
- 4) Adjust one (or both, if necessary). They expand or contract the broadness of the screen image. Adjust it so that both image edges just barely reach the edge of the display screen.



## Check contrast/brightness.

### **Actions:**

Adjust the contrast and brightness:

- 1) Open the word processor and a text document (place some text on the screen).
- 2) Locate the brightness and contrast controls on the display unit. Try one of the following locations:
  - a) Look for the control labels.
  - b) Just underneath the lower front edge of the display unit.
  - c) A small control panel door to open.
  - d) Along the left or right side of the display unit.
  - e) Somewhere on the rear panel of the display unit.
- 3) Identify the brightness control. It often has a lightbulb or sun label.
- 4) Identify the contrast control. It often has a half-shaded circle.
- 5) Make sure both the brightness and contrast controls are centered or turned up from the minimum setting.
- 6) Turn the contrast control back and forth until the letters on the screen appear sharp.
- 7) Turn the brightness control all the way up, then turn it down until the light-colored glow around the screen's borders merges into the background.





## Characters.. warped squashed.

### Actions:

- 1) Turn the computer system off.
- 2) Check the video cable connections.
  - a) Make sure the video cable is securely connected to the video port on the back of base unit.
  - b) If the video cable has a connector plug on the display unit end, make sure it is securely connected.
- 3) Turn on the computer system.
- 4) Observe the display and see if the colors return to normal.



**Check if the keyboard layout been reprogrammed so what is typed does not match keys.**

**Actions:**

Some keyboards are programmable. Check to see if this keyboard is programmable and if, perhaps, someone reprogrammed the keyboard using the accompanying hardware manual or software.



## Check the COUNTRY (USA, Germany, etc.) command in CONFIG.SYS.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Do one or both of the following:

- 1) Edit CONFIG.SYS.
  - a) Check for a command line matching the following:  
COUNTRY=xxx  
(Where xxx represents a country or foreign language.)
  - b) If this exists, do one of the following:
    - 1] If the desired language is English, delete this line.
    - 2] If the desired language differs from what is there, change the country to the desired country/language (see the DOS manual for a list of countries).
- 2) Type the following command at the DOS prompt to return to a United States English keyboard configuration:  
KEYB/US



## Keyboard will not type ..

### **Actions:**

- 1) Turn the computer off.
- 2) Trace the keyboard cable to the rear of the base unit.
- 3) Grasp the keyboard plug and unplug it from the keyboard connector.
- 4) Align the plug, and reinsert it into the keyboard connector. Make sure it is securely connected.
- 5) Turn the computer on.
- 6) Press CTRL+ALT+DEL to reboot the computer.
- 7) Wait for the computer to reboot, try typing on the keyboard again.



## Try circular motion.

### **Actions:**

The pointer is likely hidden or off the edge of the screen.

- 1) Pick up the mouse and place it in the center of the mouse pad or desktop area.
- 2) Grasp the mouse and quickly move it in a large circular motion narrowing to smaller concentric circles, while slowing down (i.e., 2-3 spiral circles, moving towards the center.)
- 3) Observe the display, the pointer should appear.

*NOTE: If using a trackball instead of a mouse, skip Step 1 and move the trackball in large to smaller circles, as described.*



## Look carefully at the video cable and connector.

### Actions:

Inspect the video cable and connector for damage:

- 1) Visually inspect the entire video cable for obvious damage.
- 2) Remove the video connector and inspect for broken or damaged pins:
  - a) Turn off the computer and disconnect the power cables.
  - b) Unplug the video cable from the back of the video card.
    - 1] Unplug the display unit's power cable from the surge protector or wall socket.
    - 2] Use a small flat-tip screwdriver to loosen screws holding the video data cable onto the connector on the back of base unit. (TIP: Trace the video data cable from the back of the display unit to the back of the base unit.)
    - 3] Grasp the video cable plug and pull it straight out of socket (***WARNING: Forcing it could damage connector pins or socket; Make sure screws are completely loosened.***) Note orientation of plug to socket.
    - 4] Inspect the connector plug and socket for bent, broken or damaged pins.



## **Adjust brightness & contrast on monitor.**

### **Actions:**

- 1) Open the word processor and a text document (place some text on the screen).
- 2) Locate the brightness and contrast controls on the display unit. Try one of the following locations:
  - a) Look for the control labels.
  - b) Just underneath the lower front edge of the display unit.
  - c) A small control panel door to open.
  - d) Along the left or right side of the display unit.
  - e) Somewhere on the rear panel of the display unit.
- 3) Identify the brightness control. It often has a light bulb or sun label.
- 4) Identify the contrast control. It often has a half-shaded circle.
- 5) Make sure both the brightness and contrast controls are centered or turned up from the minimum setting.
- 6) Turn the contrast control back and forth until the letters on the screen appear sharp.
- 7) Turn the brightness control all the way up. Then turn it down until the light-colored glow around the screen's borders merges into the background.



**Check if video card settings (in video card utility) are set too high for display unit.**

**Actions:**

Check if the video card utility was used to apply settings on the video card that exceed the capability limits of the display unit.





## Check if CONFIG.SYS file's MODE console command matches display.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

- 1) Go to a DOS prompt.
- 2) [Edit CONFIG.SYS.](#)
- 3) Search for the following MODE command line:

DOS: MODE CON: COLS=xx LINES=xx



## Single bright line or dot.

### **Actions:**

- 1) STOP! Turn the computer and the display unit OFF IMMEDIATELY!  
(Suspect power surge has ruined the display unit, video card or both.)
- 2) Test the display unit and video card by exchanging display units with another similar computer nearby and test both systems.

See [Test display unit and video card](#) for details.



## Check for mode command.

### Actions:

- 1) Check the owner's manual for the display unit to determine the maximum allowable display resolution.
- 2) Do one of the following to check resolution of installed video driver for Windows:
  - a) Boot into DOS and Windows.
  - b) Open the 'Windows Setup' under 'Main'.
  - c) Read the resolution (e.g., 800x600x256) on the 'Display:' line.
- 3) Compare the maximum resolution supported by the display unit with the video driver installed.



## **Adjust horizontal & vertical controls on monitor.**

### **Actions:**

- 1) Locate the horizontal and vertical adjustment controls on the display unit. Try one of the following locations:
  - a) Look for the control labels.
  - b) Just underneath the lower front edge of the display unit.
  - c) A small control panel door to open.
  - d) Along the left or right side of the display unit.
  - e) Somewhere on the rear panel of the display unit.
- 2) Identify the horizontal adjustment control. It often has a box with a horizontal double arrow label.
- 3) Identify the vertical adjustment control. It often has a box with a vertical double arrow label.
- 4) Adjust one (or both, if necessary). They expand or contract the broadness of the screen image. Adjust it so that both image edges just barely reach the edge of the display screen.



## Image shimmies flickers ..

### **Actions:**

Try one of the following, in sequence:

- 1) Adjust or shift the display unit slightly.
- 2) Move the display unit to other side of desk at a different angle.
- 3) Move the computer and display unit across the room or to another room away from fluorescent lights, laser printer, power lines in the wall or another device.



## **Check for bad power.**

### **Actions:**

Do one of the following:

- 1) Check the electrical circuit that the PC is on to determine if another device or appliance (e.g., coffee pot, space heater, hot plate, laser printer, etc.) is using this same circuit and drawing excessive electrical power. Eliminate it if possible.
- 2) Move the computer and display to another electrical outlet on a less-used power circuit.



## **Image shrinks then enlarges.**

### **Actions:**

- 1) Make sure all the power cables are securely plugged into their sockets:
  - a) The display power cable into the surge protector.
  - b) The base unit power cable into the surge protector.
  - c) The surge protector cable into the wall receptacle.
- 2) Make sure the cables are routed and the surge protector is positioned such that they are not inadvertently bumped or kicked under the table or desk.



## Remove memory managers & drivers.

### Actions:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

- 1) Edit AUTOEXEC.BAT and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file.
- 2) Edit CONFIG.SYS and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file and reboot the computer.
- 3) Observe the display to see if the normal image appears.





## Exclude video card memory address from memory manager, reboot (restart computer).

### Actions:

**WARNING:** *Some changes made to these files may seriously affect the performance and operation of your computer.*

- 1) Check the video card user manual to see if it uses a specific memory address, and if so, identify it.
- 2) If the video card uses a specific memory address, exclude this memory address from use by the memory manager. For example, if the card uses an address of C800-CFFF, exclude this from the Windows memory management by adding the following line to the [386enh] section of SYSTEM.INI:  
EMMExclude=C800-CFFF  
Save the file and restart the computer.
- 3) Observe the display to see if this corrects the display problem.



**Restart computer and go to 'Setup' to change values.**

**Actions:**

- 1) Check the application manual for a required video settings (e.g., monochrome, 80-column, color, VGA, etc.).
- 2) Restart the computer and run Setup. Compare the setup values with those required for this application.
- 3) Record the current setup values and make changes to the settings for this application. Save setup and reboot the computer.
- 4) Retry using the application and observe the display image.



## **See if display will work with just the video card and controller card installed.**

### **Actions:**

- 1) Touch the metal sides of the base unit to ground any static, and reinstall the controller card. Press down firmly until the card is completely seated
- 2) Insert the screw previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
- 3) Reconnect the disk drive ribbon cables to the controller card.
- 4) Test the configuration:
  - a) Make sure no parts or tools remain in the metal base unit casing.
  - b) Replace the necessary cables (power, keyboard, video) and plug in the power cable.
  - c) Turn on the computer system and display.
  - d) Check the operation of the display and all hard and floppy drives.
  - e) If any drives are not accessible, turn the computer off and make sure all the cables are connected securely.



## Check for bad video card.

### Actions:

- 1) Disconnect the power and video cables.
- 2) [Replace the video card.](#)
- 3) Reconnect the video, power and other cables and turn on the computer.



## **Remove all adapter cards except video card from computer.**

### **Actions:**

- 1) Remove the base unit cover.
- 2) Remove all the adapter cards from the base unit (except the video card).
- 3) Reconnect the power, video and other cables and turn on the computer.
- 4) Observe the display for a normal video image.



## **Restart computer with 'system' diskette in floppy drive.**

### **Actions:**

- 1)** Insert the boot (or System Rescue) diskette in the floppy drive.
- 2)** Press CTRL+ALT+DEL to restart the computer.
- 3)** Watch the display as the computer is rebooting to determine if a normal video appears at any point.



**Watch for normal video to occur at any point during the computer restart process.**

**Actions:**

- 1) Press CTRL+ALT+DEL to reboot the computer.
- 2) Watch the display as the computer is rebooting to determine if a normal video appears at any point.



## **Check for two video cards installed in the computer.**

### **Actions:**

- 1) Check if the base unit has 2 video cards installed.
- 2) If 2 video cards are present:
  - a) Make sure the VGA pass-through cable is properly seated on both cards.
  - b) Make sure all switches (especially the video pass-through switch) are properly set.





**Remove and reinsert video card and cables.**

**Actions:**

Reseat the video card.



## **Ensure monitor cable is securely connected on back of computer.**

### **Actions:**

Make sure the video cable is securely connected to the video card connector on the rear of the base unit.



[Photo: Video cable connection](#)

- 1) Make sure the video cable is connected to the video card connection.
- 2) Make sure the video cable plug is secured (screwed) to the video connector.



## Check brightness/contrast.

### **Actions:**

- 1) Locate the brightness and contrast controls on the display unit. Try one of the following locations:
  - a) Look for the control labels.
  - b) Just underneath the lower front edge of the display unit.
  - c) A small control panel door to open.
  - d) Along the left or right side of the display unit.
  - e) Somewhere on the rear panel of the display unit.
- 2) Identify the brightness control. It often has a light bulb or sun label.
- 3) Identify the contrast control. It often has a half-shaded circle.
- 4) Make sure both the brightness and contrast controls are adjusted properly (i.e., centered or turned up from the minimum setting).



## **Display dead, power light on.**

### **Actions:**

Check if there is a screen saver blanking the screen.

- 1) Press any key on the keyboard (e.g., SPACEBAR).
- 2) Observe the display to see if the image returns.



## **Check if other equipment (e.g., a lamp) works when plugged into this wall outlet.**

### **Actions:**

Verify there is electrical power at the wall receptacle.

- 1) If there is another working appliance (e.g., lamp) plugged into the same wall receptacle as the computer? Verify that it works (i.e., check or turn it on).
- 2) Locate a small, movable working appliance (e.g., lamp) and plug it into the receptacle and turn it on.



## Check power cable.

### Actions:

- 1) Make sure the display unit power cable is securely plugged into the back of the display unit (if it is not directly wired).
- 2) Make sure the display unit power cable is securely plugged into the surge protector or wall receptacle.



## Replace the video adapter card inside the computer.

### Actions:

Upgrade the video card:

- 1) Remove the old video card.
- 2) Locate the jumpers or DIP switches on the new card and [Move the Jumpers](#) and/or [Change the DIP Switches](#), to the new settings required by the display unit.



[Photo: Moving jumpers](#)



[Photo: DIP Switches](#)

- 3) Insert the new video card.
- 4) Connect the video cable to new video card.
- 5) Reconnect the power cables and turn on the computer system.
- 6) Check to see if the display works and whining has stopped.



**Check if the video resolution settings on the video card are correct for your monitor.**

**Actions:**

- 1) Determine the proper video resolution settings for this display unit.
- 2) Remove the base unit cover.
- 3) Check the video resolution settings on the video card.





## **Check video card resolution.**

### **Actions:**

STOP! Turn the computer system and display unit off immediately!

This problem is serious and could damage the display unit.



## Check if the monitor's power light is on.

### **Actions:**

Determine if the power on/off switch on the display unit is in the ON position.

*NOTE: The display unit on/off switch is often located in one of the following locations:*

- 1) Lower front of the display unit, visible.
- 2) Lower front underneath, not visible.
- 3) Lower left or right side, not visible. Sometimes towards the front, back or middle.
- 4) On the back of the display unit.



## **DOS6.2 upgrade w/ OS/2 & DOS.**

### **Actions:**

- 1) Insert the MS-DOS 6.2 Upgrade Setup Disk 1 in Drive A.
- 2) Press CTRL+ALT+DEL to reboot the computer.
- 3) Run setup until it detects the OS/2.
- 4) Identify the message displayed on the screen.



## Install/replace memory.

### Actions:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

- 1) Remove the base unit cover.
- 2) Read the owner's manual and inspect the mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
  - a) Type of memory required (e.g., DRAM, SIMMs, SIPP's CACHE).
  - b) Amount of memory desired/required.

*NOTE: Sometimes memory must be added in specific increments to fill an entire memory bank at the same time (e.g., 2MB, 4MB or 8MB, depending on the memory type).*

EXAMPLE: RAM memory in a 486 computer that uses 1x9 or 4x9 SIMMs, must be installed in increments of four SIMMs of the same size and type at a time (e.g., 4MB, 16MB).

- c) Speed of memory chips already installed.



## Check for bad video card.

### Actions:

- 1) Turn off the computer.
- 2) Connect the display unit to another similar computer.
  - a) Unplug the display unit power cable from the power receptacle.
  - b) Trace the video cable from the back of the display unit to the back of the base unit.
  - c) Unscrew the connector screws completely until the video cable connector can be gently pulled from the connector on the video card.
  - d) Unplug the video cable from the connector on the back of the display unit.
  - e) Move the display unit to another computer.
  - f) Repeat steps a-d above for another computer system.
  - g) Inspect the shape of the connectors on the video cable and video card, holding the cable connector so that it matches the shape of the connector on the video card.
  - h) Gently insert the cable connector into the video receptacle on the video card on the back of the base unit (***WARNING: Do not force the connection: this could damage the fragile connector pins.***)
  - i) Plug the display unit power cable into a power source.
- 3) Turn on the alternate computer.
- 4) Observe the display and see if the colors return to normal.



## Replace the video cable, only if the cable is detachable.

### Actions:

Replace the video cable if the display unit has a detachable video cable:

- 1) Turn off the computer system.
- 2) Replace the video cable.
  - a) Trace the video cable from the back of the display unit to the back of the base unit.
  - b) Unscrew the connector screws completely until the video cable connector can be gently pulled from the connector on the video card.
  - c) Unplug the video cable from the connector on the back of the display unit.
  - d) Insert the video cable into the connector on the back of the display unit.
  - e) Inspect the shape of the connectors on the video cable and video card, holding the cable connector so that it matches the shape of the connector on the card.
  - f) Gently insert the cable connector into the video receptacle on the video card on the back of the base unit (**CAUTION: Do not force connection; fragile pin damage will occur.**)
  - g) Secure the video cable to the back of the display unit.
- 3) Turn on the computer system.
- 4) Observe the display and see if the colors return to normal.



## **Check for loose connections.**

### **Actions:**

- 1) Turn off the computer system.
- 2) Check the video cable connections.
  - a) Make sure the video cable is securely connected to the video port on the back of the base unit.
  - b) If the video cable has a connector plug on the display unit end, make sure it is securely connected.
- 3) Turn on the computer system.
- 4) Observe the display and see if the colors return to normal.



## **Color display is single color.**

### **Actions:**

- 1) Make sure this is a color display unit.
- 2) See if the display unit has a monochrome switch.
  - a) Look for a button, switch or small lever.
  - b) Check along the lower front and side of the display unit. It could be located along the lower side (check both sides) or rear of the display unit.
- 3) Move the button, switch or lever and make sure it is set for color mode.





## **Check power interference.**

### **Actions:**

- 1) Turn computer system off.
- 2) Move the display unit (and computer) across the room or to another room away from other electrical appliances (e.g., laser printers, fluorescent lights and other unshielded appliances) and major power conduits.
- 3) Turn on the computer system.
- 4) Observe the display for rolling horizontal bars similar to before.



## Beep-pause pattern.

### **Actions:**

Coldboot the computer and concentrate on counting the number of beeps in each of the 3 series of beeps, separated by pauses (i.e., BEEP(S)-pause-BEEP(S)-pause-BEEP(S)).

- 1) Coldboot the computer.
  - a) Turn the base unit off. Wait 30 seconds.
  - b) Turn the base unit power on.
- 2) Listen carefully, and count the number of BEEPS in the 3 series of beeps separated by pauses (i.e., BEEP(S)-pause-BEEP(S)-pause-BEEP(S)).



## Count the number of beeps.

### **Actions:**

Coldboot the computer and concentrate on counting the number of beeps.

- 1) Coldboot the computer.
  - a) Turn the base unit off. Wait 30 seconds.
  - b) Turn the base unit power on.
- 2) Listen carefully and count the number of BEEPS in the series.



## **Listen for a 'beep-pause-beep' pattern or a continuous series of beeps.**

### **Actions:**

Some computers beep once or twice when booting normally. Beep error messages apply ONLY when the display is NOT working (to signal that there is a problem with the computer). If the display is working, a text error message should appear if there is a problem.

- 1) Check the video display.
  - a) Make sure the display power is plugged in.
  - b) Make sure the display power switch is turned on.
  - c) Make sure the video cable is securely connected to both the display unit and the video port on the back of the base unit.
- 2) Coldboot the computer.
  - a) Turn the base unit off. Wait 30 seconds.
  - b) Turn the base unit power on.
- 3) Watch the display screen for any messages.
- 4) LISTEN carefully for BEEPS. Try to identify the BEEP PATTERN and count the NUMBER of beeps.



## Laser printer error messages.

### **Actions:**

*NOTE 1: Message wording may vary slightly due to different printers. Do not be concerned if message does NOT match exactly those listed.*

*NOTE 2: Several of these messages are NOT error messages; they simply communicate printer status*



## **CD-ROM drive cannot be accessed due to unknown hardware/software problem.**

### **Cause:**

The CD-ROM cannot be accessed because of an UNKNOWN hardware or software problem with the CD-ROM. The CD-ROM drive or controller card may be bad.

### **Solution:**

***CAUTION:*** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

A qualified computer technician should test both the CD-ROM drive and the controller card independently (and possibly on another computer). Call the vendor or manufacturer for technical assistance, and replace the drive or controller card if necessary.



## CD-ROM drive spins but cannot be accessed due to loose controller card.

### Cause:

The CD-ROM drive controller card is loose or not connected properly. The bad connection prevents access to the CD-ROM drive.

### Solution:

***CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Reseat the CD-ROM controller card, recheck all the connections, and retest the CD-ROM drive.

- 1) Turn off the computer and unplug the power cables.
- 2) Unplug any external CD-ROM cables.
- 3) Remove the base unit cover.



Photo: Removing cover

- 4) Reseat the CD-ROM controller card.
- 5) Replace the base unit cover.
- 6) Replace all the external power and data cables that were unplugged in steps 1 and 2.
- 7) Turn on the computer and make sure the POST completes successfully.
- 8) Retest the CD-ROM drive by doing the following:
  - a) Place a CD in the CD-ROM drive.
  - b) Access a file located on the CD.



## **CD-ROM does not work; No solution to provide at this time.**

### **Cause:**

The CD-ROM does not work because of an UNKNOWN hardware or software problem. The CD-ROM drive or controller card may be bad.

### **Solution:**

***CAUTION:*** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

A qualified computer technician should test both the CD-ROM drive and controller card independently (and possibly on another computer). Call the vendor or manufacturer for technical assistance, and replace the drive or controller card if necessary.





## Loose power cable and connections; Secure power cable and connections.

### Cause:

The CD-ROM drive controller card is loose or not connected properly. The bad connection prevents the CD-ROM drive from working.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Reseat the CD-ROM controller card, check cable connections, and retest the CD-ROM drive.

- 1) Turn off the computer and unplug the power cables.
- 2) Unplug any external CD-ROM cables.
- 3) Remove the base unit cover.



Photo: Removing cover

- 4) Reseat the CD-ROM controller card.
- 5) Replace the base unit cover.
- 6) Replace all the external power and data cables that were unplugged in steps 1 and 2.
- 7) Turn on the computer and make sure the POST completes successfully.
- 8) Retest the CD-ROM drive by doing the following:
  - a) Place a CD in the CD-ROM drive.
  - b) Access a file located on the CD.



## **Controller card not compatible; Replace CD-ROM controller card or drive.**

### **Cause:**

The CD-ROM drive and the controller card are incompatible (i.e., they will not work together).

### **Solution:**

Replace the CD-ROM controller card or drive, depending upon which choice is most cost effective.

- 1) Make sure the CD-ROM drive is compatible with the controller card.

EXAMPLE: If CD-ROM drive is a SCSI drive, make sure the controller card is a compatible SCSI card.

*NOTE: Consult the CD-ROM drive and controller card manuals for further information, or call the vendor for technical support.*

- 2) Replace the CD-ROM controller card or drive, depending upon which choice is most cost effective.



## CD-ROM has IRQ (interrupt), port, DMA conflicts; Resolve conflicts in settings.

### Cause:

An interrupt (IRQ), port address, or DMA conflict with the CD-ROM drive and another device is preventing access to the CD-ROM. Only one device can use an IRQ, port address or DMA channel at a time.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Check for and resolve any IRQ, DMA, or port address conflicts between the CD-ROM drive and other devices.

- 1) Check for and resolve IRQ ([interrupt](#)), port, and DMA conflicts with the CD-ROM drive.
- 2) See [Resolving conflicts with a CD-ROM drive](#) for advice on resolving conflicts.



## CD-ROM drive does not work at all due to conflict or hardware problem.

### Cause:

A still undetermined conflict or hardware malfunction is causing this problem. Further diagnosis by a qualified computer technician is required. The most likely cause is an interrupt, DMA, or port address conflict with another device.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

A qualified computer technician should check for and resolve possible IRQ, DMA, or port address conflicts.

- 1) Check for and resolve IRQ ([interrupt](#)), port, and DMA conflicts with the CD-ROM drive.
- 2) See [Resolving conflicts with a CD-ROM drive](#) for advice on resolving conflicts.



## Driver & MSCDEX in upper memory; Load CD-ROM driver & MSCDEX in low memory.

### Cause:

The CD-ROM device driver and/or MSCDEX are not functioning properly in upper memory. The CD-ROM does not work because of an incompatibility between the CD-ROM driver and/or MSCDEX, and the upper memory area.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Load the CD-ROM device driver and MSCDEX low (in conventional memory).

Load CD-ROM device driver and MSCDEX in low memory.

#### 1) Edit CONFIG.SYS.

- a) Find the line that loads the CD-ROM device driver.

*NOTE: If you are not sure which driver is used, consult the CD-ROM drive manual.*

- b) Change the 'DEVICEHIGH' command at the beginning of the CD-ROM device driver line to 'DEVICE' (if DEVICEHIGH is used at all). The line should now look similar to the following:

DEVICE=C:\CDROM\MTMCDAL.SYS /D:MTMIDE01 /T:170,15

(where the particular driver filename used is only an example.)

- c) Save any changes to CONFIG.SYS.

#### 2) Edit AUTOEXEC.BAT.

- a) Find the line that loads MSCDEX.EXE.

- b) Delete the 'LH' or 'LOADHIGH' from the beginning of the MSCDEX line (if there is any). The line should now look like the following:

C:\DOS\MSCDEX.EXE /D:MTMIDE01 /L:D

- c) Save any changes to AUTOEXEC.BAT and exit the editor.

#### 3) Press CTRL+ALT+DEL to reboot the computer.

#### 4) Retest the CD-ROM drive by doing the following:

- a) Place a CD in the CD-ROM drive.
- b) Access a file located on the CD.





## Driver & MSCDEX not loaded; Edit CONFIG.SYS & AUTOEXEC.BAT to load them.

### Cause:

The CD-ROM device driver does not load correctly in CONFIG.SYS, and/or MSCDEX (MS-DOS CD-ROM extensions) does not load correctly in AUTOEXEC.BAT. Both the driver and MSCDEX must load for the CD-ROM drive to work correctly.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit CONFIG.SYS and AUTOEXEC.BAT. Make sure the device driver and MSCDEX load correctly.

#### 1) Edit CONFIG.SYS.

- a) Look for the CONFIG.SYS line that loads the CD-ROM driver.

*NOTE: If you are not sure which driver is used, consult the CD-ROM drive manual.*

- b) Do one or both of the following:

- 1] Add a line to CONFIG.SYS to load correct CD-ROM device driver.
- 2] Check the spelling, pathname, and filename of the CD-ROM device driver line (e.g., make sure the driver is actually in the specified directory).

- c) Save changes to CONFIG.SYS.

#### 2) Edit AUTOEXEC.BAT.

- a) Look for a line that loads MSCDEX.EXE.

EXAMPLE:

C:\DOS\MSCDEX.EXE /D:MSD0001 /L:D

(See [MSCDEX options.](#))

- b) Do one or both of the following:

- 1] Add a line to load MSCDEX.EXE in AUTOEXEC.BAT.
- 2] Check the spelling, pathname, and filename used in the MSCDEX.EXE line (e.g., make sure MSCDEX is in specified directory).

- c) Save changes and exit the editor.

- 3) Press CTRL+ALT+DEL to reboot the computer.

- 4) Retest the CD-ROM drive by doing the following:

- a)** Place a CD in the CD-ROM drive.
- b)** Access a file located on the CD.





## **CD-ROM software not installed; Install CD-ROM software that came with the drive.**

### **Cause:**

The CD-ROM software that came with the drive on a diskette was not installed, or not installed completely and properly. This software should include the device driver for the CD-ROM drive, and, perhaps, programs required to access the drive.

### **Solution:**

Install the CD-ROM software from the diskette that came with the card.

*NOTE: Consult the documentation for the CD-ROM drive for installation instructions and more information.*



## CD-ROM drive does not work at all due to incorrect access command.

### Cause:

The command used to access the CD-ROM drive is incorrect, misspelled, or uses an incorrect path, drive letter, or filename.

### Solution:

Review and correct the access command to use to access the CD-ROM drive.

Carefully review the access command being used to access the CD-ROM drive.

- 1) Check the spelling of the entire command line.
- 2) Make sure to use the correct drive letter.

*NOTE: See MSCDEX command optionsPCDGS090.TXT if not sure which drive letter to use.*

- 3) Make sure the path and filename of the command is correct (e.g., that the access command program is actually in the directory specified).

*NOTE: Consult the MS-DOS, Windows, or CD-ROM drive user manual for assistance if unsure about command syntax.*



## **CD-ROM drive does not work at all due to loose cables or no power.**

### **Cause:**

The CD-ROM drive does not have power, or one of the cable connections is loose or incorrect.

### **Solution:**

Check all external power and data cable connections. Make sure the power source is good and the CD-ROM drive (if an external drive) is turned on.

Check the power to the CD-ROM drive and all cables and connections external to the base unit.

- 1) External CD-ROM. Make sure the power switch (usually at the back of the unit) is on.
- 2) Make sure the power cord is securely plugged into a wall outlet or surge protector, and the power connector on the back of the CD-ROM drive. Check the power light on the CD-ROM drive.

*NOTE: On some external CD-ROM drives, the power cable may be permanently connected to the drive. Internal CD-ROM drives get power directly from the computer's power supply.*

- 3) External CD-ROM. Make sure the surge protector switch is on (check the power light usually provided), and that the outlet used is not connected to a wall switch that is off. Connect a lamp to the power outlet if unsure if power is available.
- 4) External CD-ROM. Make sure the data (e.g., SCSI) cable is securely connected both to the drive and to the port at the back of the computer.
- 5) Make sure all SCSI chains are correctly terminated.



## **CD not accessible; Insert CD (label up), close drive door completely and retry.**

### **Cause:**

The CD was inserted in the drive incorrectly.

### **Solution:**

Make sure the CD is inserted in the CD-ROM drive correctly.

- 1) Make sure the CD is inserted in the CD-ROM drive label side up.
- 2) Make sure the CD is positioned carefully in the drive, and is resting on the spindle without blocking the drive door as it closes.

***CAUTION:*** Do not try to jam a CD into the drive, or force the CD-ROM drive door shut. Both the CD and the drive may be seriously damaged.



## **CD-ROM drive spins but cannot be accessed due to incompatible card/drive.**

### **Cause:**

The CD-ROM drive and the controller card are incompatible (i.e., they will not work together).

### **Solution:**

Replace the CD-ROM controller card or drive, depending upon which choice is most cost effective.

- 1) Make sure the CD-ROM drive is compatible with the controller card.

EXAMPLE: If CD-ROM drive is a SCSI drive, make sure the controller card is a compatible SCSI card.

*NOTE: Consult the CD-ROM drive and controller card manuals for further information, or call the vendor for technical support.*

- 2) Replace the CD-ROM controller card or drive, depending upon which choice is most cost effective.



## CD-ROM drive spins but cannot access drive due to device conflict.

### Cause:

An interrupt (IRQ), port address, or DMA conflict with the CD-ROM drive and another device is preventing access to the CD-ROM. Only one device can use an IRQ, port address or DMA channel at a time.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Check for and resolve any IRQ, DMA, or port address conflicts between the CD-ROM drive and other devices.

- 1) Check for and resolve IRQ ([interrupt](#)), port, and DMA conflicts with the CD-ROM drive.

See [Resolving conflicts with a CD-ROM drive](#) for advice on resolving conflicts.



## CD-ROM drive spins but cannot access drive due to conflict or hardware.

### Cause:

A still undetermined conflict or hardware malfunction is causing this problem. Further diagnosis by a qualified computer technician is required. The most likely cause is an interrupt, DMA, or port address conflict with another device.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

A computer technician should check for and resolve possible IRQ, DMA, or port address conflicts.

- 1) Check for and resolve IRQ ([interrupt](#)), port, and DMA conflicts with the CD-ROM drive.
- 2) See [Resolving conflicts with a CD-ROM drive](#) for advice on resolving conflicts.



## CD-ROM spins but cannot access drive due to driver/MSCDEX loading high.

### Cause:

The CD-ROM device driver and/or MSCDEX are not functioning properly in upper memory. The CD-ROM cannot be accessed because of an incompatibility between the CD-ROM driver and/or MSCDEX, and the upper memory area.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Load the CD-ROM device driver and MSCDEX low (in conventional memory).

Load CD-ROM device driver and MSCDEX in low memory.

#### 1) Edit CONFIG.SYS.

- a) Find the line that loads the CD-ROM device driver.

*NOTE: If you are not sure which driver is used, consult the CD-ROM drive manual.*

- b) Change the 'DEVICEHIGH' command at the beginning of the CD-ROM device driver line to 'DEVICE' (if DEVICEHIGH is used at all). The line should now look similar to the following:

```
DEVICE=C:\CDROM\MTMCDAL.SYS /D:MTMIDE01 /T:170,15
```

(where the particular driver filename used is only an example.)

- c) Save any changes to CONFIG.SYS.

#### 2) Edit AUTOEXEC.BAT.

- a) Find the line that loads MSCDEX.EXE.

- b) Delete the 'LH' or 'LOADHIGH' from the beginning of the MSCDEX line (if there is any). The line should now look like the following:

```
C:\DOS\MSCDEX.EXE /D:MTMIDE01 /L:D
```

- c) Save any changes to AUTOEXEC.BAT and exit the editor.

#### 3) Press CTRL+ALT+DEL to reboot the computer.

#### 4) Retest the CD-ROM drive by doing the following:

- a) Place a CD in the CD-ROM drive.
- b) Access a file located on the CD.







## CD-ROM drive spins but cannot access drive due to driver and MSCDEX Lines.

### Cause:

The CD-ROM device driver does not load correctly in CONFIG.SYS, and/or MSCDEX (MS-DOS CD-ROM extensions) does not load correctly in AUTOEXEC.BAT. Both commands must load for the CD-ROM drive to work correctly.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit CONFIG.SYS and AUTOEXEC.BAT. Make sure the device driver and MSCDEX load correctly.

#### 1) Edit CONFIG.SYS.

- a) Look for the CONFIG.SYS line that loads the CD-ROM driver.

*NOTE: Consult a manual, if necessary, to see what driver is used.*

- b) Do one or both of the following:

- 1] Add a line to CONFIG.SYS that loads correct CD-ROM device driver.
- 2] Check the spelling, pathname, and filename of the CD-ROM device driver line (e.g., make sure the driver is actually in the referenced directory).

- c) Save changes to CONFIG.SYS.

#### 2) Edit AUTOEXEC.BAT.

- a) Look for a line that loads MSCDEX.EXE.

EXAMPLE:

C:\DOS\MSCDEX.EXE /D:MSD0001 /L:D

(See [MSCDEX options.](#))

- b) Do one or both of the following:

- 1] Add a line to load MSCDEX.EXE in AUTOEXEC.BAT.
- 2] Check the spelling, pathname, and filename used in MSCDEX.EXE line (e.g., make sure MSCDEX is in named directory).

- c) Save changes and exit the editor.

- 3) Press CTRL+ALT+DEL to reboot the computer.

- 4) Retest the CD-ROM drive by doing the following:

- a)** Place a CD in the CD-ROM drive.
- b)** Access a file located on the CD.



## **CD-ROM drive spins but cannot access drive due to software not installed.**

### **Cause:**

The CD-ROM software that came with the drive on a diskette was not installed, or not installed completely and properly. This software should include the device driver for the CD-ROM drive, and, perhaps, programs needed to access the drive.

### **Solution:**

Install the CD-ROM software from the diskette that came with the card.

*NOTE: Consult the documentation for the CD-ROM drive for installation instructions and more information.*



## CD-ROM drive freezes computer due to unknown hardware or software problem.

### Cause:

An UNKNOWN hardware or software problem is freezing the computer when the CD-ROM drive is used. The CD-ROM device driver may not function properly (e.g., create infinite retry loops), or the CD-ROM drive or controller card may be bad.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

A qualified computer technician should test both the CD-ROM drive and controller card independently (and possibly on another computer). Call the vendor or manufacturer for technical assistance, and replace the drive or controller card if necessary.



## CD-ROM controller card not seated properly; Reinsert the CD-ROM controller card.

### Cause:

The CD-ROM drive controller card is loose or not connected properly. The bad connection causes the system to freeze when the CD-ROM drive is used.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Reseat the CD-ROM controller card, and retest the CD-ROM drive.

- 1) Turn off the computer and unplug power cables.
- 2) Unplug any external CD-ROM cables.
- 3) Remove the base unit cover.



Photo: Removing cover

- 4) Reseat the CD-ROM controller card.
- 5) Replace the base unit cover.
- 6) Replace all the external power and data cables that were unplugged in steps 1 and 2.
- 7) Turn on the computer and make sure the POST completes successfully.
- 8) Retest the CD-ROM drive by doing the following:
  - a) Place a CD in the CD-ROM drive.
  - b) Access a file located on the CD.



## CD-ROM drive freezes computer due to port, DMA or IRQ conflict.

### Cause:

An interrupt (IRQ), port address, or DMA conflict with the CD-ROM drive and another device is causing the computer to freeze during operation. Only one device can use an IRQ, port address or DMA channel at a time.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Check for and resolve any IRQ, port address, or [DMA channel](#) conflicts with the CD-ROM drive and another device. Make sure settings are unique for each device.

- 1) Choose one of the following methods of conflict resolution (Recommend 'a' as more reliable if the source of the conflict with the CD-ROM drive is unknown):
  - a) Remove all cards and extra devices from the base unit. Make the system operational. Reinstall the cards or devices one at a time until offending card or device is isolated.
  - b) Choose the card or device believed to cause the problem, change the settings, reboot and try using the CD-ROM drive again.
- 2) If method 1)a) is selected, do the following, if not already complete:
  - a) [Edit AUTOEXEC.BAT](#) and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file and reboot the machine.
  - b) [Edit CONFIG.SYS](#) and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file and reboot the machine.
  - c) [Remove the base unit cover](#).



[Photo: Removing cover](#)

- d) Disconnect all cables from the installed cards (except the video and controller card).
- e) Remove each card by doing the following:
  - 1] Remove the screw from the top notch of the mounting bracket on the card.
  - 2] Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - 3] Place the card on a static-free surface near by, noting which slot it was in.

- f) After appropriate cards or devices are removed, make sure no tools or parts remain inside the base unit, reconnect the power and other cables and turn on the computer (it should work fine).
- 3) Do one of the following:
- a) Run a hardware utility program (e.g., WinSleuth) to identify assigned memory addresses, DMA channels and IRQ assignments.
  - b) Run Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at the DOS prompt and press 'ENTER':  
C:\DOS\MSD  
Choose 'IRQ Status...' from the MSD main screen.



Choose MSD IRQ Status

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 4) Print out the screen or write down memory addresses, IRQs and DMA assignments.
- 5) (Optional) Create a card and device inventory sheet that lists each card or device, vendor, memory address, IRQ, DMA (when applicable) and the driver.
- 6) Read the user manual and inspect the next device to make sure it does not use a memory address, interrupt (IRQ) or DMA channel that is already assigned. If it does, select an unused setting and Move Jumpers and/or Change DIP Switches to apply the new setting to the card or device. (Consult card or device user manual for more information).
- 7) Turn off the machine and unplug the power cables.
- 8) Install the card and connect any necessary ribbon or power cables.
- 9) Turn on the computer. Watch the boot process and the display to make sure the card or device just added creates no conflicts.
- 10) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and add (or uncomment) the device driver for the card/device just installed. Save the file and reboot the machine.
- 11) Rerun the hardware utility and check all assignments to make sure no conflicts exist.
- 12) If the computer locks up or something does not work properly, there is a conflict between the card or device just added and what is already installed. Identify the conflicting setting(s) and change the setting(s) on ONE of the cards/devices (preferably the one just added). Be careful not to create additional conflicts by changing a setting.
- 13) Repeat steps 7-12 to install each additional card/device one at a time, until the offender is identified.
- 14) Edit CONFIG.SYS and add (or uncomment) the memory manager (e.g., HIMEM.SYS).  
  
Be sure to exclude from memory manager use any addresses assigned to a card or device in the above steps. For example, to exclude the address C800-CFFF from Windows, enter the following command in the [386enh] section of SYSTEM.INI:  
EMMExclude=C800-CFFF  
  
Save the file and reboot the machine. (This prevents Windows from using this portion of memory, and prevents lockups and crashes.)
- 15) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and add (or uncomment) any desired TSRs or applications one at a time. Save the file and reboot the machine. Make sure they do not create new conflicts.
- 16) If unable to resolve a conflict with a particular card or device, contact the card manufacturer for technical



support and assistance.



## CD-ROM drive freezes computer due to driver or MSCDEX UMA incompatibility.

### Cause:

The CD-ROM device driver and/or MSCDEX are not functioning properly in upper memory. The computer freezes because of an incompatibility between the CD-ROM driver and/or MSCDEX, and other items in the upper memory area.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Load the CD-ROM device driver and MSCDEX in low memory as a temporary work-around.

Load CD-ROM device driver and MSCDEX in low memory.

#### 1) Edit CONFIG.SYS.

- a) Find the line that loads the CD-ROM device driver.

*NOTE: If you are not sure which driver is used, consult the CD-ROM drive manual.*

- b) Change the 'DEVICEHIGH' command at the beginning of the CD-ROM device driver line to 'DEVICE' (if DEVICEHIGH is used at all). The line should now look similar to the following:

DEVICE=C:\CDROM\MTMCDAL.SYS /D:MTMIDE01 /T:170,15

(where the particular driver filename used is only an example.)

- c) Save any changes to CONFIG.SYS.

#### 2) Edit AUTOEXEC.BAT.

- a) Find the line that loads MSCDEX.EXE.

- b) Delete the 'LH' or 'LOADHIGH' from the beginning of the MSCDEX line (if there is any). The line should now look like the following:

C:\DOS\MSCDEX.EXE /D:MTMIDE01 /L:D

- c) Save any changes to AUTOEXEC.BAT and exit the editor.

#### 3) Press CTRL+ALT+DEL to reboot the computer.

#### 4) Retest the CD-ROM drive by doing the following:

- a) Place a CD in the CD-ROM drive.
- b) Access a file located on the CD.

#### 5) (Optional) Have a qualified computer technician further diagnose the cause of the memory address conflict in the upper memory area.





## Device drivers/TSRs will not load high (upper memory) due to load sequence.

### Cause:

The device drivers and/or TSRs will not load high with the load sequence used in CONFIG.SYS and AUTOEXEC.BAT. Some device drivers/TSRs must be loaded in a particular sequence to allow them to load in upper memory.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit CONFIG.SYS and AUTOEXEC.BAT and rearrange the device driver and TSR lines so that they load in a different sequence. Try several combinations until finding one with the most device drivers or TSRs successfully loading in upper memory.

- 1) Create new CONFIG.SYS and AUTOEXEC.BAT files for each load sequence to try for device drivers and TSRs.

- 2) Do the following to try new load sequences.

- a) Try using the first alternate configuration (from step 1).

- 1] Type the following commands at the DOS prompt for the first CONFIG.SQ# and AUTOEXEC.SQ# files:

COPY CONFIG.SQ# CONFIG.SYS

COPY AUTOEXEC.SQ# AUTOEXEC.BAT

*NOTE: Replace '#' with the number of the CONFIG and AUTOEXEC files used in a load sequence.*

- 2] Press CTRL+ALT+DEL to reboot the computer.

- 3] Check if the device drivers/TSRs are loading high.

- b) Repeat step 2)a) with a different combination of the files from step 1) until exhausting all combinations, or until all device drivers and TSRs successfully load high.

*NOTE: Pairs of CONFIG and AUTOEXEC files with different numbers can be used together.*

*EXAMPLE: Use CONFIG.SQ1 with AUTOEXEC.SQ3, or AUTOEXEC.SQ2 with CONFIG.SQ4.*





## Device drivers/TSRs will not load high (UMA) due to command parameters used.

### Cause:

Command line parameters prevent device drivers and/or TSRs from loading in upper memory. For example, many DOS commands have parameters that force DOS device drivers or utilities to load in conventional memory.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Remove any parameters from the CONFIG.SYS or AUTOEXEC.BAT lines that prevent device drivers/TSRs from loading in upper memory.

*NOTE: Refer to the printouts of AUTOEXEC.BAT and CONFIG.SYS for easy reference.*

- 1) Make sure no lines in CONFIG.SYS or AUTOEXEC.BAT use parameters that prevent load high.
  - a) Consult the documentation for device drivers or TSRs that will not load high, to see if the lines use any such parameters.
  - b) Consult the MS-DOS manual, Help, or a third party DOS reference book to see if any of the DOS utilities are using such parameters.

Examples of DOS commands with parameters that stop load high.

- 2) Edit CONFIG.SYS.
  - a) Delete parameters in any lines that prevent drivers from loading high.
  - b) Save any changes to CONFIG.SYS.
- 3) Edit AUTOEXEC.BAT.
  - a) Delete parameters in any lines that prevent TSRs from loading high.
  - b) Save any changes to AUTOEXEC.BAT and exit the editor.
  - c) Press CTRL+ALT+DELETE to reboot the computer.
- 4) Check if device drivers/TSRs are loading high.





## Device drivers/TSRs will not load high (UMA) due to incompatibility.

### Cause:

The particular device drivers and TSRs that are trying to load high are incompatible with the upper memory area. These programs will not work properly in the upper memory area and refuse to load high because of their design.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Load the device drivers/TSRs in conventional (low) memory.

#### 1) Edit CONFIG.SYS.

- a) Change the 'DEVICEHIGH' to 'DEVICE' at the beginning of each line for a device driver that will not load high.
- b) Save any changes to CONFIG.SYS.

#### 2) Edit AUTOEXEC.BAT.

- a) Delete the 'LH' or 'LOADHIGH' at the beginning of each line for a program or TSR that will not load high.
- b) Save any changes to AUTOEXEC.BAT and exit the editor.
- c) Press CTRL+ALT+DEL to reboot the computer for changes to take effect.

TIP: For future reference, consult the documentation for a device driver or TSR before trying to load it high. Make sure the device driver or TSR will load and function properly in upper memory.





## Device drivers/TSRs will not load high (UMA) due to older HIMEM/EMM386.

### Cause:

The older versions of EMM386.EXE and HIMEM.SYS are not sophisticated enough to load the particular device drivers/TSRs trying to load in upper memory. The older versions may not be identifying all of the free upper memory blocks on the computer or are not using it optimally.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Load updated versions of HIMEM.SYS and EMM386.EXE in CONFIG.SYS.

*NOTE: The most recent versions of HIMEM.SYS and EMM386.EXE come with DOS version 6.x. The next most recent versions come with Windows 3.1; followed by DOS 5.0.*

- 1) Check if a more recent version is available.
  - a) Using DOS 5.0 with Windows 3.1: Use Windows 3.1 versions in the \WINDOWS directory in step 2.
  - b) Using DOS 6.x with Windows 3.1: Use DOS 6.x versions in the \DOS directory in step 2.
  - c) Using DOS 5.0 without Windows 3.1: No updated version available without upgrading.
- 2) Use a more recent version of HIMEM.SYS and EMM386.EXE in CONFIG.SYS (if available).
  - a) Edit CONFIG.SYS.
  - b) Change the path used in the HIMEM.SYS and EMM386.EXE lines to the path for the most recent versions available (as determined in step 1).
  - c) Save changes to CONFIG.SYS and exit the editor.
  - d) Press CTRL+ALT+DEL to reboot the computer.
- 3) Check if device drivers and/or TSRs are loading high.



## Device drivers/TSRs will not load high (upper memory) due to command usage.

### Cause:

The DEVICEHIGH or LOADHIGH commands are used incorrectly in CONFIG.SYS and AUTOEXEC.BAT, or a pathname or filename is spelled or used incorrectly (e.g., the file is not actually in the directory named).

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit AUTOEXEC.BAT and CONFIG.SYS. Check and correct the command spelling, usage, filenames and pathnames. Reboot the computer.

#### 1) Edit CONFIG.SYS.

- a) Begin every line for a device driver to load high with the 'DEVICEHIGH=' command.

EXAMPLE:

DEVICEHIGH=C:\CDROM\MTMCDAL.SYS /D:MTMIDE01 /T:170,15

(where driver given is simply an example.)

*NOTE: Do not abbreviate 'DEVICEHIGH' to 'DH'.*

- b) Check the spelling, filename, and pathname used in each line.  
c) Save any changes to CONFIG.SYS and exit the editor.

#### 2) Edit AUTOEXEC.BAT.

- a) Begin every line for a TSR to load high with the 'LOADHIGH' or 'LH' command.

EXAMPLE:

LOADHIGH C:\DOS\MSCDEX.EXE /D:MTMIDE01 /L:D

(where the program given is an example, the DOS CD-ROM extensions.)

- b) Check the spelling, filename, and pathname used in each line.  
c) Save any changes to AUTOEXEC.BAT and exit the editor.

#### 3) Press CTRL+ALT+DEL to reboot the computer.

#### 4) Check if device drivers and/or TSRs are loading high.

#### 5) Repeat steps 1-2 if device/TSR fails to load high. Identify and repair missed errors.





## Device drivers/TSRs will not load high (upper mem) due to wrong CONFIG.SYS.

### Cause:

CONFIG.SYS is not setup properly to load device drivers and TSRs in upper memory. An important device driver is missing, uses the wrong parameter, or loads in the wrong sequence.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit and correct CONFIG.SYS so that the HIMEM.SYS, EMM386.EXE and DOS=UMB lines are correct and in the correct sequence.

Check that CONFIG.SYS is setup correctly to load programs and/or device drivers in the upper memory area.

- 1) Edit CONFIG.SYS.
- 2) Make sure the following three lines are in CONFIG.SYS in the following sequence, and BEFORE any 'DEVICEHIGH' commands:

DEVICE=C:\DOS\HIMEM.SYS

DEVICE=C:\DOS\EMM386.EXE NOEMS

DOS=UMB

- 3) (Optional) To load DOS into the high memory area, use the following line instead:

DOS=HIGH, UMB

*NOTE: The computer must have more than 1MB of memory to load DOS into the high memory area. The high memory area (HMA) is the first 64K (minus 16 bytes) of extended memory.*

- 4) (Optional) If using programs that require EXPANDED memory, use the following EMM386 line instead:

DEVICE=C:\DOS\EMM386.EXE RAM

*NOTE: See Setting up CONFIG.SYS to use upper memory blocksPCDGS084.TXT for more information.*



## **Device drivers/TSRs will not load high (upper memory) due to old DOS.**

### **Cause:**

The DOS version being used does not support loading device drivers and TSRs into the upper memory area.

### **Solution:**

Upgrade to DOS 5.0 or later, or load the device drivers and TSRs in conventional memory.



## **Device drivers/TSRs will not load high (upper memory) due to lack of memory.**

### **Cause:**

A 386 computer must have at least 1MB of TOTAL memory to load programs or device drivers into the upper memory area. TOTAL MEMORY includes the standard 640K of conventional memory and the 384K upper memory area or UMA.

### **Solution:**

Add more memory to the computer to bring the total available memory to 1MB (1024K) or greater, or load the device drivers and TSRs in low memory.



## **Device drivers/TSRs will not load high (upper memory) due to CPU class.**

### **Cause:**

Only computers with a 386 or better processor (e.g., 486 or Pentium) can load programs or device drivers into the upper memory area or UMA. EMM386, the memory manager used to load programs or device drivers high, will not run on a computer with a 286 or lower CPU.

### **Solution:**

Upgrade to a computer with a 386 or better CPU or load device drivers and programs in low memory.



## Not compatible with MSCDEX.EXE 2.23; Get latest driver from manufacturer.

### Cause:

If the MS-DOS 6.2 installation program finds the Microsoft Compact Disc Extensions (MSCDEX) in the AUTOEXEC.BAT file, it updates the CD-ROM driver MSCDEX.EXE to version 2.23. It appears this driver version is NOT compatible with the CD-ROM drive unit in this computer. Also, there may be an upper memory conflict with MSCDEX.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Contact CD-ROM drive manufacturer to obtain latest driver.

Do one or more of the following:

- 1) Contact the CD-ROM drive manufacturer to obtain the latest driver.
- 2) If there were no CD-ROM drive problems with the previous version of DOS, replace the MSCDEX version 2.23 driver with the earlier version.
  - a) Locate the earlier driver version and copy it into the DOS directory. Place diskette with old driver on in Drive A. Type the following commands at the DOS prompt:  
C:  
CD\DOS  
RENAME MSCDEX.EXE MSCDEX.223  
COPY A:\MSCDEX.EXE C:\DOS  
*NOTE: This renames the new driver with a 223 extension and leaves it on the drive for later use. It also assumes the old driver is located on a diskette placed in Drive A.*
  - b) SETVER must be added to system to enable previous version to work.
    - 1] Edit CONFIG.SYS.
    - 2] Add the following device driver to CONFIG.SYS, if not present:  
DEVICE=C:\DOS\SETVER.EXE
  - c) Press CTRL+ALT+DEL to reboot the computer for changes to take effect.
- 3) Do the following to check for upper memory conflict:
  - a) Determine whether MSCDEX is being loaded into upper memory.
    - 1] Edit CONFIG.SYS.



- 2] Locate the DEVICE=C:\DOS\MSCDEX.EXE command line.
  - 3] If this command line contains a prefix of LOADHIGH or LH, it is being loaded into high memory.
- b)** Remove the LOADHIGH or LH prefix and save the file.
  - c)** Press CTRL+ALT+DEL to reboot the computer for changes to take effect.
  - d)** Use the CD-ROM and other devices to determine if the conflict still exists.



## **CD-ROM drive does not play audio CDs due to design or software missing.**

### **Cause:**

Some computer CD-ROM drives are capable of playing audio CDs, while others are not. In some cases, special software is required.

### **Solution:**

Consult the CD-ROM user manual for this drives' capabilities. Also check with a local computer store to determine whether or not audio CD software is available for this CD-ROM drive model.



## Using CD-ROM causes other device(s) to malfunction due to memory conflict.

### Cause:

There is a COM port, interrupt (IRQ) or Direct Memory Access (DMA) channel conflict between the CD-ROM drive and the other device(s).

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Run a hardware utility to identify all memory addresses, interrupts (IRQs) and DMA channels in use. Identify the conflict and change setting(s) on the adapter card to eliminate the conflict.

- 1) Choose one of the following methods of conflict resolution (Recommend 'a' as more reliable if source of conflict with the CD-ROM drive is unknown):
  - a) Remove all cards and extra devices from the base unit. Get system operational. Reinstall cards/devices one at a time until offending card/device is isolated.
  - b) Pick and choose which card/device is the problem, change settings and try again.
- 2) If 1a is selected, do the following, if not completed already:
  - a) Edit AUTOEXEC.BAT and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file and reboot the machine.
  - b) Edit CONFIG.SYS and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file and reboot the machine.
  - c) Remove base unit cover.



Photo: Removing cover

- d) Disconnect all cables from the installed cards (except video and controller card).
- e) Remove each card by:
  - 1] Remove the screw from the top notch of the mounting bracket on the card.
  - 2] Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - 3] Place the card on a static-free surface near by, noting which slot it was in.
- f) After appropriate cards/devices are removed, make sure no tools or parts remain inside base unit,

reconnect power and other cables and turn on the computer (it should work fine).

3) Do one of the following:

- a) Run a hardware utility program (e.g., WinSleuth) to identify assigned memory addresses, DMA channels and IRQ assignments.
- b) Run Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

Choose 'IRQ Status...' from the MSD main screen.



Choose MSD IRQ Status

**CAUTION:** *Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- 4) Print out the screen or write down memory addresses, IRQs and DMA assignments.
- 5) (Optional) Create a card/device inventory sheet listing each card/device, vendor, memory address, IRQ, DMA (where applicable) and driver.
- 6) Read the user manual and inspect the next device to make sure it does not use a memory address, interrupt (IRQ) or DMA channel that is already assigned. If it does, select an unused setting and Move Jumpers and/or Change DIP Switches to apply the new setting to the card or device. (Consult card/device user manual for more information).
- 7) Turn the machine off and unplug power cables.
- 8) Install the card and connect any ribbon or power cables.
- 9) Turn on the computer and watch the boot process and the display to make sure the card/device just added creates no conflicts.
- 10) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and add (or uncomment) the device driver for the card/device just installed. Save the file and reboot the machine.
- 11) Rerun the hardware utility and check all assignments to make sure no conflicts exist.
- 12) If the computer locks up or something does not work properly, there is a conflict between the card/device just added and what is already installed. Identify the conflicting setting(s) and change the setting(s) on ONE of the cards/devices (preferably the one just added). Be careful not to initiate additional conflicts by changing a setting.
- 13) Repeat steps 7-12 to install each additional card/device one at a time, until the offender is identified.
- 14) Edit CONFIG.SYS and add (or uncomment) the memory manager (e.g., HIMEM.SYS).

Be sure to exclude from memory manager use any card/device addresses assigned above. For example, to exclude the address C800-CFFF from Windows, enter the following command in the [386enh] section of SYSTEM.INI:

EMMExclude=C800-CFFF

Save the file and reboot the machine. (This prevents Windows from using this portion of memory preventing lockups and crashes.)

- 15) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and add (or uncomment) any desired TSRs or applications one at a time. Save the file and reboot the machine. Make sure they do not create new conflicts.
- 16) If unable to resolve a conflict with a particular card/device, contact the card manufacturer for technical support and assistance.





## Dirty or scratched CD; Clean CD-ROM disk with CD-ROM cleaning kit before using.

### Cause:

When a CD-ROM drive provides data that is inaccurate, the likely cause is a dirty or scratched CD-ROM disk. Also (less likely) the CD-ROM drive's laser beam could be dirty or out of alignment.

### Solution:

Obtain a CD-ROM disk cleaning kit and clean CD-ROM disks occasionally before using them.

Do one or more of the following:

- 1) Clean the CD-ROM disks with items in a CD-ROM cleaning kit.  
***CAUTION:** Do not use other items. They could cause scratches.*
- 2) Obtain a new copy of especially bad (scratched) CD-ROM titles.
- 3) Send the CD-ROM drive to a repair shop for diagnosis, repair and cleaning.



## **CD-ROM system limitation; Add additional system memory or use disk caching.**

### **Cause:**

Most CD-ROM drives provide much slower access and data transfer speeds than hard disk drives. Single speed drives are more like a slow floppy disk drive. Newer models (2X, 3X, and 4X) are much faster.

### **Solution:**

Add additional system memory or use disk caching (especially a cache designed specifically for CD-ROMs).

Do one or more of the following:

- 1) Add additional extended memory to system.
- 2) Obtain a disk caching utility (especially a cache designed specifically for CD-ROMs).
- 3) Obtain a new and faster CD-ROM drive (double speed or better).
- 4) Upgrade the entire computer to one with a faster processor, additional memory and a faster CD-ROM drive.



## Starting MS-DOS.. message flashes too fast due to computer speed.

### Cause:

The computer is too fast to allow a reasonable delay after the 'Starting MS-DOS...' message displays.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Setup a minimal multiple configuration menu to add a long enough delay to use F5 or F8.

- 1) Edit CONFIG.SYS.
- 2) Add the following five lines to CONFIG.SYS:  
[COMMON]  
[MENU]  
MENUITEM=STANDARD, The standard configuration  
MENUDEFAULT=STANDARD,15  
[ONE]

- 3) Save the changes to CONFIG.SYS and exit the editor.

*NOTE: The above statements in CONFIG.SYS will allow a 15 second pause before the system files are processed. The added statements do not affect the content of the rest of CONFIG.SYS. Press ENTER to start the computer during the delay, press F5 to bypass the system files, or press F8 to step through CONFIG.SYS.*

- 4) Press CTRL+ALT+DEL to reboot the computer for this change to take effect.





## Starting MS-DOS.. message displays too fast due to switches set in CONFIG.

### Cause:

The 'f' or 'n' switch is set in CONFIG.SYS. The 'f' switch makes the computer skip the two second delay after the 'Starting MS-DOS...' message. The 'n' switch prevents the F5 or F8 keys from being used to bypass startup commands.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Delete the 'n' or 'f' switches set with the SWITCHES command in CONFIG.SYS.

- 1) Edit CONFIG.SYS.
- 2) Delete the 'n' or 'f' from the 'SWITCHES=' line in CONFIG.SYS.
- 3) Save the changes to CONFIG.SYS and exit the editor.
- 4) Press CTRL+ALT+DEL to reboot the computer for changes to take effect.



## **Cannot load dosshell program due to it not being installed on computer.**

### **Cause:**

DOSSHELL is an optional program included in later versions of DOS and is not installed on this computer.

### **Solution:**

Reinstall DOS and select 'Load DOSSHELL' as an option. Then enter DOSSHELL at the command prompt.



## **Cannot load dosshell program due to loaded version of DOS too old.**

### **Cause:**

The version of DOS currently loaded on this computer is too old. DOSSHELL is included as a DOS program only in version 4.x and later.

### **Solution:**

Upgrade DOS on this computer or do without DOSSHELL.



## Cannot load the dosshell program due to incomplete path statement.

### Cause:

The DOSSHELL program is not within the scope of the current PATH statement (stored in memory).

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Provide the entire path when loading command, or update PATH statement in AUTOEXEC.BAT.

Do one of the following:

- 1) Type entire drive\pathname\filename statement when loading DOSSHELL. Type the following command at the DOS prompt:  
C:\DOS\DOSSHELL
- 2) Edit AUTOEXEC.BAT and make sure the PATH statement contains the DOS directory. EXAMPLE:  
PATH=C:\DOS;



## **Cannot load the dosshell program due to misspelling DOSSHELL.**

**Cause:**

DOSSHELL is misspelled. Misspelling DOSSHELL is easy to do.

**Solution:**

Make sure DOSSHELL is entered as 1 word with two 'SS'.



## Cannot run DOS 5.0 or 6.x on toshiba t1000 laptop due to rom DOS.

### Cause:

Toshiba T1000 laptop uses 256KB ROM DOS drive to boot Toshiba MS-DOS 2.11. This drive is read-only and setup as drive C. Thus, a MS-DOS upgrade cannot be installed to the Toshiba C drive. The second HARD RAM drive cannot be used to boot MS-DOS 5.0 or later, and there is no current ROM DOS upgrade available from Toshiba.

*NOTE: This is NOT the Toshiba T1000 Desktop.*

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Configure the Toshiba T1000 laptop to use the HARD RAM drive as drive C or as a normal RAM drive, and boot MS-DOS 5.0 or later from a diskette.

*NOTE: On the Toshiba T1000 laptop, MS-DOS 5.0 or later must boot from a diskette.*

- 1) Do one of the following to access the HARD RAM drive on the Toshiba T1000 laptop:
  - a) Configure the HARD RAM drive as drive C.
    - 1] Insert an MS-DOS 5.0 (or later) system diskette that has the FDISK program on it in the floppy drive.
    - 2] Boot the computer from the MS-DOS system diskette.
    - 3] Type: FDISK at the DOS prompt.
    - 4] Select fixed disk drive 2 from the FDISK menu.
    - 5] Delete the two non-DOS partitions and the Novell partition (created in the default T1000 setup).
    - 6] Create a PRIMARY DOS partition.

*NOTE: Primary DOS partitions are configured as drive C.*
    - 7] Save the FDISK settings and exit FDISK.
    - 8] Type the following at the DOS prompt to format drive C:  
FORMAT C:
    - 9] The HARD RAM drive can now be used as Drive C.
  - b) Configure the HARD RAM drive as a normal RAM drive.
    - 1] Boot the computer from the ROM DOS.
    - 2] Insert an MS-DOS 5.0 (or later) system diskette that has the FDISK program on it in the floppy

drive.

- 3] Type the following at the DOS prompt:  
COPY EMM.SYS A:
  - 4] Type: SETUP10 at the DOS prompt to run the T1000 SETUP10.EXE program.
  - 5] Configure the HARD RAM drive so that a minimum of 64K is available.
  - 6] Type A: at the DOS prompt to make the MS-DOS 5.0 (or later) system diskette) the default drive.
  - 7] Edit CONFIG.SYS.
  - 8] Add (at least) the following two lines to CONFIG.SYS:  
DEVICE=EMM.SYS  
DEVICE=RAMDRIVE.SYS /A
  - 9] The HARD RAM drive can now be used as a normal RAM drive.
- 2) Boot MS-DOS 5.0 or later from a system diskette in the future to use this configuration.



## Ms-DOS oem setup copies unwanted files to hard disk due to oem defaults.

### Cause:

The MS-DOS 6.x Setup default utility copies all supplied files to the hard disk (including files for options not selected). For example, even if only DOS utilities are selected during Setup, all the files for the Windows Backup, Undelete, and Anti-Virus utilities are copied to the hard drive. This happens even if Windows is not installed on the computer.

### Solution:

The Setup default cannot be changed; but, unwanted files can be deleted.

- 1) Consult the MS-DOS documentation to determine the filenames and pathnames of unwanted files (e.g., the Windows version of the Backup utility if only DOS is being used).
- 2) Change to the directory where the files are stored by entering the following command at the DOS prompt:  
CD <pathname>  
(where <pathname> is the pathname determined in Step 1)
- 3) For each filename that is not needed, enter the following command at the DOS prompt:  
DEL <filename>  
(where <filename> is the exact name of each file determined to be unneeded in Step 1.)

**CAUTION:** Make sure the filename to be deleted is definitely not needed, and carefully enter the exact filename in the above command.





## Using a shell other than COMMAND.COM; Use COMMAND.COM for SHELL.

### Cause:

The MS-DOS 6.x upgrade will not update the SHELL command in CONFIG.SYS on a computer that is using a shell other than COMMAND.COM (e.g., 4DOS or NDOS).

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Use COMMAND.COM for SHELL or upgrade the third party shell.

Do one of the following:

- 1) Change the system configuration to use COMMAND.COM as the default shell.
  - a) Edit CONFIG.SYS.
  - b) Edit the 'SHELL=' line in CONFIG.SYS so that it looks like the following:  
SHELL=C:\DOS\COMMAND.COM
  - c) Save changes to CONFIG.SYS.
  - d) Edit AUTOEXEC.BAT.
  - e) Edit the 'SET COMSPEC=' line in AUTOEXEC.BAT (if there is one) so that it looks like the following:  
SET COMSPEC=C:\DOS\COMMAND.COM
  - f) Save changes to AUTOEXEC.BAT and exit the editor.
  - g) Press CTRL+ALT+DEL to reboot the computer for changes to take effect.
- 2) Contact the third party vendor of the shell being used to obtain the latest command processor upgrade.



## Installing MS-DOS 4.x changes system configuration due to menu choice.

### Cause:

The MS-DOS 4.x INSTALL program changes the system configuration according to the user selection from the 'Specify Function and Workspace' menu.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Reinstall MS-DOS 4.x and select a different 'Specify Function and Workspace' menu choice, or edit AUTOEXEC.BAT and CONFIG.SYS to setup the desired configuration.

Do one of the following:

- 1) Reinstall MS-DOS 4.x and select a different 'Specify Function and Workspace' menu choice.
  - a) Start the MS-DOS 4.x INSTALL program.
  - b) Select the desired choice from the 'Specify Function and Workspace' menu.



[MS-DOS 4.0 Install Function & Workspace Menu.](#)

*NOTE: Each menu choice sets up a specific DOS configuration. MS-DOS 4.0 ConfigurationsPCDGS083.TXT*

- 2) Edit the system files to create the desired configuration.
  - a) [Edit AUTOEXEC.BAT](#)
  - b) Setup the desired configuration by adding, deleting, or editing lines.
  - c) Save the changes to AUTOEXEC.BAT.
  - d) [Edit CONFIG.SYS](#)
  - e) Setup the desired configuration by adding, deleting, or editing lines.
  - f) Save the changes to CONFIG.SYS and exit the editor.
  - g) Press CTRL+ALT+DEL to reboot the computer for changes to take effect.





## Ms-DOS setup is unable to read uninstall diskette on compaq due to BIOS.

### Cause:

This problem occurs on computers that use SmartDrive to cache a diskette in the floppy drive. A bug in the Compaq BIOS prevents the computer from reading the Uninstall disk when SmartDrive is loaded in upper memory.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Load SmartDrive into conventional (low) memory, use read-caching only, or do not load SmartDrive at all.

Do one or more of the following, until the Uninstall disk can be read:

- 1) Load SmartDrive into conventional (low) memory.
  - a) Edit AUTOEXEC.BAT.
  - b) Add the '/L' switch to the line in AUTOEXEC.BAT that loads SMARTDRV.EXE.  
EXAMPLE: The AUTOEXEC.BAT line should look similar to the following:  
SMARTDRV /L A+
  - c) Save the changes to AUTOEXEC.BAT and exit the editor.
  - d) Press CTRL+ALT+DEL to reboot the computer for changes to take effect.
  - e) Run the MS-DOS Upgrade Setup program.
- 2) Configure SmartDrive to use read-caching only.
  - a) Type the following command at the DOS prompt:  
SMARTDRV A  
*NOTE 1: This command activates read caching and deactivates write caching on the floppy drive A.*  
*NOTE 2: Use a different drive letter (not 'A') if the floppy drive is designated by another letter.*
  - b) Run the MS-DOS Upgrade Setup program.
- 3) Configure the computer not to load SmartDrive before running the MS-DOS Upgrade Setup.
  - a) Edit AUTOEXEC.BAT.
  - b) Add a 'REM' statement to the beginning of the line that loads SmartDrive.  
*NOTE 3: This will make MS-DOS treat the line as a comment and SmartDrive will not load.*  
EXAMPLE: The SmartDrive line should now look like the following:

REM C:\WINDOWS\SMARTDRV.EXE /X 2048 128

- c)** Save the changes to AUTOEXEC.BAT and exit the editor.
- d)** Press CTRL+ALT+DEL to reboot the computer for the changes to take effect.
- e)** Run the MS-DOS Upgrade Setup program.



## **Micro Channel Architecture limitation; Change Setup memory recognition feature.**

### **Cause:**

The DOS MEM command may not report extended memory over 16MB on NCR 4000 due to Micro Channel Architecture limitation.

### **Solution:**

Use the NCR Reference Diskette and change the Setup memory recognition feature from to 'Max 64MB' from 'Standard'.

- 1) Insert the NCR Reference Diskette in Drive A.
- 2) Press CTRL+ALT+DEL to reboot computer from a floppy disk.
- 3) Select 'Configuration' at main menu.
- 4) Select 'Change'.
- 5) Select 'Internal Options'.
- 6) Select 'DOS MEMORY REPORTING'.
- 7) Choose 'Max 64 MB'.
- 8) Press F10 to save changes.
- 9) Remove the diskette from Drive A.
- 10) Press ESC several times (to back out of menus) until the computer reboots.



## Ms-DOS oem setup does not boot on Tandy 1000tx 286 due to floppy size.

### Cause:

The floppy drive on the Tandy 1000TX 286 computer is configured as a 360KB drive. The MS-DOS 6.x OEM Disk 1 is a 720KB disk. This disk will not boot on a 360KB drive.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Change the CONFIG.SYS file on OEM Setup Disk 1 so that it sees the floppy drive as a 720KB drive.

- 1) Boot the Tandy T1000TX 286 from the hard drive (or a DOS system diskette, if DOS has not been installed on the hard drive).
- 2) Insert the OEM Setup Disk 1 diskette in Drive A.
- 3) Type 'A:' to make the floppy drive (A:) the default drive.
- 4) Edit CONFIG.SYS (or create a new CONFIG.SYS if one does not exist).
- 5) Add the following line to CONFIG.SYS:  
DRIVPARM=/d:0 /f:2
- 6) Save the changes to CONFIG.SYS and exit the editor.
- 7) Reboot the system with the OEM Setup Disk 1.
- 8) Follow instructions in the MS-DOS 6.x installation program.



## NOMOVEXBDA enabled for MemMaker/BATCH; Remove extra NOMOVEXBDA switches.

### Cause:

This problem is caused by running MEMMAKER /BATCH when the NOMOVEXBDA line is enabled. When the semicolon is removed from the start of the NOMOVEXBDA line in the default options section of the MemMaker file MEMMAKER.INF, MemMaker adds multiple NOMOVEXBDA parameters.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Remove the extra NOMOVEXBDA switches, do not run MemMaker in batch mode when NOMOVEXBDA is enabled or run Custom Mode and choose no for the 'Move Extended BIOS...' option.

Do one of the following:

- 1) Remove the extra NOMOVEXBDA switches from EMM386.EXE line in CONFIG.SYS.
  - a) Edit CONFIG.SYS.
  - b) Go to the EMM386 line in CONFIG.SYS that has extra NOMOVEXBDA switches.  
EXAMPLE: DEVICE = C:\DOS\EMM386.EXE NOEMS NOMOVEXBDA NOMOVEXBDA
  - c) Delete all but one of the 'NOMOVEXBDA' switches.
  - d) Save changes to CONFIG.SYS and exit editor.
- 2) Do not run MemMaker in the batch mode when NOMOVEXBDA line is enabled.
- 3) Run MemMaker in the CUSTOM mode.
  - a) Type: MEMMAKER at the DOS prompt to start MemMaker.
  - b) Select 'Custom Setup' from MemMaker setup options menu.



MemMaker Select Custom Setup

- c) Select 'NO' for the 'Move Extended BIOS Data Area from Conventional to Upper Memory?' option.



MemMaker NO Select Extended BIOS



- d)** Proceed normally with the rest of the MemMaker run.



## Program differences; Change memory manager, load programs in upper memory.

### Cause:

There are 3 non-discernible causes: (1) Some programs change size when they are loaded in upper memory (e.g., SMARTDRV.EXE). (2) Some third party memory managers use upper memory differently. (3) A program configured by MemMaker to load in the upper memory area may not load successfully. All 3 contribute to a MemMaker report with different values (e.g., 48 more conventional and 52 less upper memory free).

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Cause (1) has no work around. To diagnose cause (3), check that all programs configured to load in upper memory load successfully, or change the memory manager used.

Do one or more of the following:

*NOTE: If the MemMaker values do not match because of cause (1) (programs change size when they load in upper memory), there is no workaround for this problem.*

- 1) Check for a device driver or TSR that is not loading successfully into upper memory.

*NOTE: This process will solve cause (3) (problem with device drivers or programs that are not loading correctly in upper memory). It will not bring the total free conventional memory up to the value reported by MemMaker. This is because MemMaker is assuming conventional memory gains realized when these device drivers or programs successfully load in upper memory.*

- a) Print a copy of AUTOEXEC.BAT and CONFIG.SYS by entering the following commands at the DOS prompt:

PRINT AUTOEXEC.BAT

(When prompted for destination, enter the following:)

LPT1 (or LPT2 if printer connected to PORT2)

PRINT CONFIG.SYS

- b) Review AUTOEXEC.BAT and note every line that loads a program into upper memory.

*NOTE: It may help to note the programs that are loading into upper memory on paper.*

EXAMPLE: A line that loads a program into upper memory in AUTOEXEC.BAT might look like the following:

LH DOSKEY FINDFILE=DIR /A /S /B \$\*

- c) Review CONFIG.SYS and note every line that loads a device driver into upper memory.

EXAMPLE: A line that loads a program into upper memory in AUTOEXEC.BAT might look like the following (using the MS-DOS DEVICEHIGH command):

DEVICEHIGH /L:1.12048 = C:\DOS\SETVER.EXE

- d) Type: MEM /CLASSIFY /PAGE at the DOS prompt.
- e) Check the MEM /CLASSIFY Screen for programs from AUTOEXEC.BAT and device drivers from CONFIG.SYS, that were noted in Steps 1b and 1c.
- f) Look for a device driver or program that was noted in Steps 1b or 1c, that shows 0K of upper memory used in the MEM /CLASSIFY screen, or does not appear in the list at all (not loaded).

*NOTE: This means that a program tried and failed to load in upper memory.*

- g) Mark any device driver or program that meets the conditions described in step 1c.
  - h) Do one of the following, depending upon whether handling a device driver or program (TSR):
    - 1] Load TSR programs into conventional memory that will not load into upper memory.
      - a] Edit AUTOEXEC.BAT and remove the 'LH' or 'LOADHIGH' from the start of the line that loads a program marked in step 1b.
      - b] Save changes to AUTOEXEC.BAT and exit the editor.
    - 2] Load device drivers into conventional memory that will not load into upper memory.
      - a] Edit CONFIG.SYS and change the 'DEVICEHIGH' to 'DEVICE' at the start of the line that loads a device driver marked in step 1c.
      - b] Save changes to CONFIG.SYS and exit the editor.
  - i) Press CTRL+ALT+DEL to reboot the computer and make the changes take effect.
- 2) Change to a third party memory manager.

*NOTE: This may allow additional conventional memory gains.*



## Incorrect DOS version: application will not run due application constraint.

### Cause:

Some applications are written for a specific version of DOS, check to see if that specific version is in use. By using SETVER.EXE, MS-DOS can be setup to report the DOS version that an application expects, so that the application will run under later DOS versions.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Load SETVER in CONFIG.SYS and make sure that the application and its DOS version are setup in the SETVER table.

- 1) Edit CONFIG.SYS and add the following line to CONFIG.SYS:  
C:\DOS\SETVER.EXE
  - 2) Save changes to CONFIG.SYS and exit the editor.
  - 3) Press CTRL+ALT+DEL to reboot the computer and activate SETVER.
  - 4) Check the SETVER table to make sure the particular application is not already present.
    - a) Type: SETVER at the DOS prompt.
    - b) Scan the displayed table for the name of the particular application.
    - c) If the application is not in the SETVER table, enter the following at the DOS prompt:  
SETVER <application name> <DOS version expected>  
(where <application name> is the name of the application that requires a specific DOS version, and <DOS version expected> is the version that the application expects in order to run.)  
EXAMPLE: The following line will setup a Novell NetWare DOS 4 shell to run on DOS 6.x:  
SETVER NET4.EXE 4.0
    - d) Type: SETVER at the DOS prompt.
    - e) Scan the displayed table and verify that the application added in Step 4)c) was successfully added to the SETVER table.
- NOTE: Several programs are already known to require a specific DOS version to run successfully.*
- SETVER Expected
- 5) Press CTRL+ALT+DEL to reboot the computer and make the changes to the SETVER table take effect.
  - 6) The applications setup with SETVER.EXE should now work properly.





## Installed new application, now old ones do not work due to config changes.

### Cause:

Installation programs for new applications usually modify AUTOEXEC.BAT and/or CONFIG.SYS to suit their requirements. Unfortunately, this often creates problems for other applications already installed (with their requirements). Fortunately most usually create backups (e.g., AUTOEXEC.BAK, CONFIG.OLD).

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Review new and old versions of AUTOEXEC.BAT and CONFIG.SYS, identify problems, and correct them.

Do one of the following:

- 1) Review new and old versions of AUTOEXEC.BAT and CONFIG.SYS by printing them out.
  - a) Type the following commands at the DOS prompt:  
C:  
CDPRINT AUTOEXEC.BAT  
(When prompted for destination, enter the following:  
LPT1 (or LPT2 if printer is attached to PORT2)  
PRINT AUTOEXEC.OLD (or correct filename)  
PRINT CONFIG.SYS  
PRINT CONFIG.BAK (or correct filename)
  - b) Compare the new and the old versions to determine differences and analyze what happened.
  - c) Edit AUTOEXEC.BAT and Edit CONFIG.SYS and make appropriate changes. Save the files.
  - d) Press CTRL+ALT+DEL to reboot the computer for changes to take effect.
  - e) Load new and old applications and test their operation.
  - f) If one or more applications still do not work, repeat Steps 1-5 until corrected.
- 2) Replace the new AUTOEXEC.BAT and CONFIG.SYS with the old ones by entering the following commands at the DOS prompt:  
COPY AUTOEXEC.OLD AUTOEXEC.BAT  
COPY CONFIG.OLD CONFIG.SYS





## Old applications do not work after installing new appl due to multiconfig.

### Cause:

The automatic update of CONFIG.SYS and AUTOEXEC.BAT by the new application's INSTALL program does not take a multiple configuration setup into account. Lines added by the application's INSTALL program may not be placed in the correct location to be loaded properly at startup.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Edit CONFIG.SYS and AUTOEXEC.BAT, and correctly position the added statements in the right places to correct the INSTALL program's changes to the files. Group commands common to all options (e.g., common device drivers) into common [COMMON] blocks at the beginning or end of files.

Do one or more of the following:

- 1) Group statements that are common to the multiple configurations in a COMMON block.
  - a) Edit CONFIG.SYS.
  - b) Add a common block at the BEGINNING (and optionally at END) of CONFIG.SYS by entering the following line:  
[COMMON]
  - c) Move CONFIG.SYS lines that are found in ALL of the different multiple configuration blocks into one the COMMON blocks.

**CAUTION:** *Make sure commands that load HIMEM.SYS, EMM386.EXE, or COMMAND.COM are included in the first COMMON block, in the above order. The last few CONFIG.SYS lines should look like the following*

EXAMPLE:

[COMMON]

DEVICEHIGH=C:\DOS\SETVER.EXE

DEVICE=C:\DOS\<driver>.SYS

(where <driver> stands for any device driver that might be loaded on the computer.)

- d) Save changes to CONFIG.SYS and exit the editor.
- e) Reinstall the application (if necessary). Review system files again to make sure no inappropriate changes are made.



*NOTE: Further changes to CONFIG.SYS lines in the common block will now take effect in all configurations. Also, applications that make all changes to CONFIG.SYS at the END of the file will not cause a problem. Both factors will help reduce errors caused by an application's INSTALL program.*

- 2) Correct the INSTALL program errors by editing CONFIG.SYS and AUTOEXEC.BAT.
  - a) Edit CONFIG.SYS.
  - b) Find the CONFIG.SYS lines that were changed by the INSTALL program.
  - c) Make sure the changes made to CONFIG.SYS by the application's INSTALL program are executed by DOS during startup.

*NOTE: Move all the new or changed lines to the COMMON block (discussed in step 1), or copy all the new or changed lines to each separate configuration block that will be used to run the application.*
  - d) Save the changes to CONFIG.SYS.
  - e) Edit AUTOEXEC.BAT.
  - f) Find the CONFIG.SYS lines that were changed by the INSTALL program. g) Make sure the changes made to AUTOEXEC.BAT by the application's INSTALL program are recognized by the DOS system during startup.

EXAMPLE: Move all the new or changed lines to the end of AUTOEXEC.BAT: so they are before the 'END' tag and after the last 'GOTO END' statement at the end of a specific configuration block.
  - h) Save the changes to AUTOEXEC.BAT
  - i) Press CTRL+ALT+DEL to reboot the computer and make the changes take effect.
- 3) If the application still does not work correctly, repeat step 2) and carefully check for errors that were missed in CONFIG.SYS or AUTOEXEC.BAT.



## Device or TSR does not work anymore due to memory conflict.

### Cause:

A network card, expansion card or other device is using address space in the UMA that is also used by the device driver or TSR. The upper memory manager is overwriting the device driver or TSR that is not working.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Exclude the memory range used by the overwritten device, card or TSR from use by the upper memory manager.

- 1) Determine the UMA address range used by the card, and if that range is being used, by doing the following:
  - a) Check the documentation for the network or other expansion card to find the memory address range it uses.
  - b) Run a hardware status utility (e.g., Microsoft Diagnostics (MSD) to determine address ranges in use.
    - 1] Type MSD at the DOS Prompt.
    - 2] Choose 'Memory Status from the menu screen.



Choose MSD Memory Status

- 3] Review the memory map.



Memory Map.

- 4] See if the memory range used by the card (determined in step 1)a)) is being used by other programs, device drivers, or ROMs.
  - 2) Edit CONFIG.SYS.
  - 3) Do one of the following, depending on the memory manager being used:
    - a) If the EMM386.EXE memory manager is used, add the 'x' parameter to the 'DEVICE=EMM386.EXE' line, so that it looks like the following:  
DEVICE=EMM386.EXE x=aaaa-bbbb

(where 'aaaa' stands for the starting memory address determined for the card and 'bbbb' stands for the ending memory address.)

*NOTE: This parameter will exclude the memory address range specified by 'aaaa-bbbb'.*

- b)** Setup the other memory manager being used (e.g., QEMM or 386MAX) to exclude the UMA address range used by the card.
  - 1]** Consult the documentation for the memory manager used (e.g., QEMM or 386MAX) to determine the parameter to use in CONFIG.SYS to exclude a memory address range.
  - 2]** Add the memory range exclusion parameter to the line that loads the network or other expansion card device driver.



## **New application does not use old data files due to file incompatibility.**

### **Cause:**

The new application has changed its file structure format from a previous version. This means that it cannot 'open' the old files in their current format. Fortunately, most programs provide an integrated or separate import utility.

### **Solution:**

Read the user manual for the new application to determine how to import data files from previous versions, or from other applications. Run the file import or conversion on all or only required files. Save them in the default format of the new application.



## **New application does not use old data files due to different location.**

### **Cause:**

The new application is looking for data files in a different location (default directory or path) than where they are now located (where old application found them).

### **Solution:**

Open 'Setup' or 'Options' in the new application, and change the item for the default location of the data files to the path/directory where they are located (e.g., C:\WP\DATA). Save this as the new default.



## Brooklyn Bridge scrambles CONFIG.SYS; Manually add Brooklyn Bridge.

### Cause:

The Brooklyn Bridge 3.5 automatic install program scrambles CONFIG.SYS without user permission. It removes all blank lines, inserts a screen dump in the middle of the file and adds DEVICE=BRIDGE1.DEV in an unexpected location. Fortunately, it creates CONFIG.OLD before starting. The Microsoft Corporation has confirmed this to be a problem with Brooklyn Bridge version 3.5 ONLY.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Replace CONFIG.SYS with the backup CONFIG.OLD, and manually add the Brooklyn Bridge device driver to CONFIG.SYS.

- 1) Type the following commands at the DOS prompt:  
C:  
CDCOPY CONFIG.OLD CONFIG.SYS
- 2) Locate file BRIDGE1.DEV, the Brooklyn Bridge device driver.
- 3) Note the <pathname> to BRIDGE1.DEV.
- 4) Edit CONFIG.SYS and add the following line:  
DEVICE=<pathname>\BRIDGE1.DEV  
(where <pathname> is the pathname identified in step 3.)
- 5) Press CTRL+ALT+DEL to reboot the computer.
- 6) Run Brooklyn Bridge.

***CAUTION:*** Do not reinstall Brooklyn Bridge. The Brooklyn Bridge INSTALL program will scramble CONFIG.SYS again.



## **The printer is off-line/turned off; Turn on, press online button so light is lit.**

### **Cause:**

The printer is off-line or turned off.

*NOTE: MS-DOS 4.x only.*

The computer appears to freeze because it keeps trying (and failing) to send data to the printer. The Microsoft Corporation has confirmed this problem with MS-DOS version 4.0x and PC-DOS version 4.00. The problem does not occur in later versions of MS-DOS.

### **Solution:**

Press the online button on the printer.

- 1) Do one of the following:
  - a) If the printer is off, turn the printer switch on.
  - b) Do one of the following until problem solved:
    - 1] If printer is on, press the online button.
    - 2] Turn the printer off, wait 15 seconds and then turn it back on again. Make sure the printer is online.
- 2) Reprint the document.



## Printing to laser freezes system after adding device due memory conflict.

### Cause:

System freezes every time the user attempts to print to a laser printer. Rebooting unfreezes system (until reprinting). This is due to a memory, DMA, or interrupt (IRQ) conflict between the printer and the device recently installed (e.g., scanner, fax modem, mouse, etc.).

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

There is a memory or interrupt conflict between the printer and a recently installed device.

1) Do one of the following:

- a) Run a hardware utility program (e.g., WinSleuth) to identify assigned memory addresses, DMA channels and IRQ assignments.
- b) Run Microsoft Diagnostics (MSD) to identify the port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

Choose 'IRQ Status...' from the MSD main screen.



Choose MSD IRQ Status

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 2) Print out the screen or write down memory addresses, IRQs and DMA assignments.
- 3) (Optional) Create a card/device inventory sheet listing each card/device, vendor, memory address, IRQ, DMA (where applicable) and driver.
- 4) Read the user manual of the recently installed device to determine what memory address, interrupt (IRQ) or DMA channel it is set to use. If using settings already taken by another device, do the following:
- 5) Turn off the machine and unplug the power cables.
- 6) Gain access to the conflicting device (Remove base unit cover, if necessary.)
- 7) Select the unused setting(s) for this device and Move Jumpers and/or Change DIP Switches to apply the new setting to the card or device. (Consult the card/device user manual for more information).



*NOTE: Some newer devices may allow this change to be made through software. Check the user manual to make sure the proper method is used.*

- 8) Reinstall the card or device and connect any ribbon or power cables.
- 9) Turn on the computer, watch the boot process and the display to make sure the card/device just added creates no conflicts.
- 10) Attempt to print to the laser printer to determine if the conflicts are eliminated.
- 11) Rerun the hardware utility and check all assignments to make sure no conflicts exist.
- 12) If the computer locks up or does not work properly, there is a conflict between the card/device just added and what is already installed. Identify the conflicting setting(s) and change the setting(s) on ONE of the cards/devices (preferably the one just added). Be careful not to create additional conflicts by changing a setting.
- 13) Repeat steps 7-12 until the conflict is eliminated.
- 14) If unable to resolve a conflict with a particular card/device and the printer, contact the device and/or printer card manufacturer for technical support and assistance.



## Printing to laser freezes system after adding device due memory conflict.

### Cause:

System freezes every time the user attempts to print to a laser printer. Rebooting unfreezes system (until reprinting). This is due to a memory, DMA, or interrupt (IRQ) conflict between the printer and the device recently installed (e.g., scanner, fax modem, mouse, etc.).

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Reboot the computer, run a hardware status program to determine the memory/IRQ conflict involving last-added device and select a different address/IRQ for that device.

1) Do one of the following:

- a) Run a hardware utility program (e.g., WinSleuth) to identify assigned memory addresses, DMA channels and IRQ assignments.
- b) Run Microsoft Diagnostics (MSD) to identify the port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

Choose 'IRQ Status...' from the MSD main screen.



Choose MSD IRQ Status

**CAUTION:** *Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- 2) Print out the screen or write down memory addresses, IRQs and DMA assignments.
- 3) (Optional) Create a card/device inventory sheet listing each card/device, vendor, memory address, IRQ, DMA (where applicable) and driver.
- 4) Read the user manual of the recently installed device to determine what memory address, interrupt (IRQ) or DMA channel it is set to use. If using settings already taken by another device, do the following:
- 5) Turn off the machine and unplug the power cables.

- 6) Gain access to the conflicting device (Remove base unit cover, if necessary.)
- 7) Select the unused setting(s) for this device and Move Jumpers and/or Change DIP Switches to apply the new setting to the card or device. (Consult the card/device user manual for more information).

*NOTE: Some newer devices may allow this change to be made through software. Check the user manual to make sure the proper method is used.*

- 8) Reinstall the card or device and connect any ribbon or power cables.
- 9) Turn on the computer, watch the boot process and the display to make sure the card/device just added creates no conflicts.
- 10) Attempt to print to the laser printer to determine if the conflicts are eliminated.
- 11) Rerun the hardware utility and check all assignments to make sure no conflicts exist.
- 12) If the computer locks up or does not work properly, there is a conflict between the card/device just added and what is already installed. Identify the conflicting setting(s) and change the setting(s) on ONE of the cards/devices (preferably the one just added). Be careful not to create additional conflicts by changing a setting.
- 13) Repeat steps 7-12 until the conflict is eliminated.
- 14) If unable to resolve a conflict with a particular card/device and the printer, contact the device and/or printer card manufacturer for technical support and assistance.



## System freezes after upgrading to MS-DOS 6.2x due memory address conflict.

### Cause:

EMM386.EXE version 4.48 creates upper memory conflicts because it overwrites memory that it thinks should be free (but may be occupied by other devices) with zeros. This is different than previous versions.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Reboot the computer and bypass the system files. Remove the EMM386 line from CONFIG.SYS, reboot, and run MemMaker to setup a new memory configuration.

- 1) Do the following if the system hangs because of the memory conflict:
  - a) Press CTRL+ALT+DEL to reboot the computer.
  - b) Press F5 as soon as the 'Starting MS-DOS...' message displays.
- 2) Edit CONFIG.SYS.
- 3) Do one of the following to deactivate EMM386:
  - a) Delete the 'DEVICE=EMM386.EXE' line in CONFIG.SYS.
  - b) Type 'REM' at the beginning of the 'DEVICE=EMM386.EXE' line so DOS to treat the line as a comment.
- 4) Save changes to CONFIG.SYS and exit the editor.
- 5) Press CTRL+ALT+DEL to reboot the computer and make the changes take effect.
- 6) Type: MEMMAKER at the DOS prompt to run MemMaker.
- 7) Follow the instructions given in the MemMaker screens to setup a new stable memory configuration.



## Memory address conflict; Remove the EMM386 line from CONFIG.SYS.

### Cause:

EMM386.EXE version 4.48 creates upper memory conflicts because it overwrites memory that it thinks should be free (but may be occupied by other devices) with zeros. This is different than previous versions.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Reboot the computer and bypass the system files. Remove the EMM386 line from CONFIG.SYS, reboot, and run MemMaker to setup a new memory configuration.

- 1) Do the following if the system hangs because of the memory conflict:
  - a) Press CTRL+ALT+DEL to reboot the computer.
  - b) Press F5 as soon as the 'Starting MS-DOS...' message displays.
- 2) Edit CONFIG.SYS.
- 3) Do one of the following to deactivate EMM386:
  - a) Delete the 'DEVICE=EMM386.EXE' line in CONFIG.SYS.
  - b) Type 'REM' at the beginning of the 'DEVICE=EMM386.EXE' line so DOS will treat the line as a comment.
- 4) Save changes to CONFIG.SYS and exit the editor.
- 5) Press CTRL+ALT+DEL to reboot the computer and make the changes take effect.
- 6) Type: MEMMAKER at the DOS prompt to run MemMaker.
- 7) Follow the instructions given in the MemMaker screens to setup a new stable memory configuration.



## Memory conflict after upgrading to DOS 6.2x due to memory address conflict.

### Cause:

EMM386.EXE version 4.48 creates upper memory conflicts because it overwrites memory that it thinks should be free (but may be occupied by other devices) with zeros. This is different than previous versions.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Reboot the computer and bypass the system files. Remove the EMM386 line from CONFIG.SYS, reboot, and run MemMaker to setup a new memory configuration.

- 1) Do the following if the system hangs because of the memory conflict:
  - a) Press CTRL+ALT+DEL to reboot the computer.
  - b) Press F5 as soon as the 'Starting MS-DOS...' message displays.
- 2) Edit CONFIG.SYS.
- 3) Do one of the following to deactivate EMM386:
  - a) Delete the 'DEVICE=EMM386.EXE' line in CONFIG.SYS.
  - b) Type 'REM' at the beginning of the 'DEVICE=EMM386.EXE' line so DOS will treat the line as a comment.
- 4) Save changes to CONFIG.SYS and exit the editor.
- 5) Press CTRL+ALT+DEL to reboot the computer and make the changes take effect.
- 6) Type: MEMMAKER at the DOS prompt to run MemMaker.
- 7) Follow the instructions given in the MemMaker screens to setup a new stable memory configuration.



## Windows w/ NetWare freezes after removing IBM token ring card.

### Cause:

A computer running Windows for Workgroups with Novell NetWare installed as a secondary network, hangs trying to run the NET START command in AUTOEXEC.BAT, because the Token Ring card was removed. The error message 'Microsoft NetBind version 2.1' should display before the computer hangs.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Boot the computer from a diskette, and remove or comment out the network device driver statements from CONFIG.SYS.

- 1) Boot the computer from a DOS system diskette.
- 2) Edit CONFIG.SYS.
- 3) Do one of the following to stop the computer from loading the network device drivers.
  - a) Delete the network device driver lines from CONFIG.SYS.
  - b) Type 'REM' at the beginning of all the device driver lines in CONFIG.SYS so MS-DOS will treat those lines as comments.

*NOTE: Comment lines in CONFIG.SYS are not executed.*

- 4) Undo the changes to CONFIG.SYS if the IBM Token Ring card is reinstalled.



## Windows freezes when stacks overflows due to stacks setting.

### Cause:

There is not enough stack space to handle the hardware interrupt routines.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Change the STACKS setting in CONFIG.SYS to '9,256'.

- 1) Edit CONFIG.SYS.
- 2) Add the following line to CONFIG.SYS (or edit if a STACKS line is already present):  
STACKS=9,256  
*NOTE: The default setting for STACKS is '0,0' on an IBM and '9,128' on all other computers.*
- 3) Save the changes to CONFIG.SYS and exit the editor.
- 4) Press CTRL+ALT+DEL to reboot the computer for the changes to take effect.





## System with DTC controller freezes due to upper memory conflict.

### Cause:

Systems with a DTC hard disk controller may freeze due to memory conflict in the upper memory area. The DTC (Data Technology Corporation) hard disk controller cards use upper memory to store their [BIOS](#), and are causing an upper memory conflict.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Setup the upper memory manager to exclude the UMA area used by the DTC controller BIOS.

- 1) Consult the DTC hard disk controller manual to determine the default memory range used by the DTC BIOS.

*NOTE: The DTC hard disk controller should be using the default memory range for the BIOS unless the DTC card jumpers were moved PCDGS024.TXT when it was installed.*

- 2) Do one of the following:
  - a) Configure EMM386 to exclude the upper memory range used by the DTC controller BIOS.
    - 1] [Edit CONFIG.SYS.](#)
    - 2] Add the 'X' parameter to the EMM386 line in CONFIG.SYS to exclude the upper memory range determined in step 1).
    - 3] The line that loads EMM386.EXE in CONFIG.SYS should now look like the following:  
DEVICE=C:\DOS\EMM386.EXE X=aaaa-bbbb  
(where 'aaaa' stands for the starting address and 'bbbb' stands for the ending address of the DTC BIOS memory range determined in step 1.)
    - 4] Save the changes to CONFIG.SYS and exit the editor.
    - 5] Press CTRL+ALT+DEL to reboot the computer for the changes to take effect.
  - b) Configure the third party memory manager used (e.g., QEMM or 386MAX) to exclude the upper memory range used by the DTC controller BIOS.
    - 1] Consult the documentation for the third party memory manager to determine what parameter to use in CONFIG.SYS to exclude an upper memory range.
    - 2] [Edit CONFIG.SYS.](#)

- 3] Add the parameter determined in step 1)b)1] to the line that loads the third party memory manager.
        - 4] Save the changes to CONFIG.SYS and exit the editor.
        - 5] Press CTRL+ALT+DEL to reboot the computer for the changes to take effect.
- 3) If the system still hangs, repeat Step 2 and make sure no errors in CONFIG.SYS were missed.



## **Application crashes due to application bug.**

**Cause:**

There is some kind of software bug inside the application.

**Solution:**

Refer to a qualified computer technician for further diagnosis or contact the application vender's technical support for assistance.



## **Application crashes due to corrupted application data files.**

**Cause:**

One or more application files are corrupt. The program freezes when those files are run.

**Solution:**

Reinstall the application(s).



## Application crashes due to memory conflict with TSR or another program.

### Cause:

There is a memory conflict between the crashing application and another program in memory (e.g., TSRs).

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Identify the conflicting program and eliminate loading it.

- 1) Press CTRL+ALT+DEL to reboot the computer.
- 2) Edit CONFIG.SYS.
- 3) Comment out all commands that load programs or TSRs by typing 'REM' in front of each line except the first one.
- 4) Save the file and press CTRL+ALT+DEL to reboot the computer.
- 5) Run the application. If there is no problem, reedit AUTOEXEC.BAT, add (uncomment) one program or utility, save the file, reboot the computer and retry the application.
- 6) Repeat Step 5 until computer freezes again. When it does, the item just added back in is causing the conflict with this application.



## **Application crashes due to insufficient system memory for this application.**

### **Cause:**

There is insufficient system memory for this application.

### **Solution:**

Switch to another application or obtain additional memory for computer.



## System freezes, nothing on screen and power is off due to bad power supply.

### Cause:

Base unit power supply is bad.

### Solution:

Replace bad power supply.

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

**CAUTION:** Do not attempt to disassemble or repair the power supply --- simply replace it.

**NOTE:** If removing an old power supply is not required, skip to Step 2 for installation steps.

1) Unplug the old power supply:

a) Remove the base unit cover



Photo: Removing cover.

- b) Unplug all power cables running in trunk from the power supply to peripherals.
- c) Unplug the power cables from the connectors on the mainboard.
- d) Draw a diagram of color coded wiring from the power supply to the power switch for future reference (usually 5 wires: 1-ground, blue, black, brown and white).
- e) Disconnect the wires to the power switch.
- f) Locate and remove screws on the back of the base unit that hold the power supply in place.
- g) Carefully lift the power supply out of the base unit metal sides of the base unit (**CAUTION: be careful not to snag other cables or boards**).

2) Test the power supply before installation.

- a) Make sure the power supply is not connected to anything and the switch is OFF.
- b) Plug into an electrical outlet and turn the power switch on.
- c) Listen for fan operation.
- d) Turn the power supply off and disconnect it from the electrical outlet.
- e) If the power supply does not work, replace it before installation.

3) Insert the power supply into the metal sides of the base unit.

4) Connect the power connectors P8 and P9 to the mainboard.

- 5) Connect the remaining power supply cables to the internal disk drives and other devices.
- 6) If the power supply uses a remote switch, remount the switch.
- 7) Make sure the power supply switch is OFF. Attach the external power cable to the back of the base unit and connect the other end to the power supply (preferably through a surge protector).
- 8) Turn the power switch ON. Make sure the fan is functioning and the computer passes the POST.
- 9) Make sure each connected device (e.g., disk drives) operates properly.
- 10) If a device does not function, turn off the power, unplug the power cable and recheck the power cable connections.
- 11) Repeat steps 7-10 as necessary.
- 12) Replace the base unit cover.





## System freezes, nothing on screen and power is off due to bad power supply.

### Cause:

Base unit power supply is bad.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Remove the base unit cover, unplug the power cables to internal components, unplug the power supply from metal sides of the base unit. Test new supply first by plugging it in and listening for the fan. Insert the power supply, connect P8 and P9 to mainboard, connect the components, turn on the computer and make sure POST completes successfully.

**CAUTION:** Do not attempt to disassemble or repair the power supply --- simply replace it.

**NOTE:** If removing an old power supply is not required, skip to Step 2 for installation steps.

#### 1) Unplug the old power supply:

##### a) Remove the base unit cover



Photo: Removing cover.

- b) Unplug all the power cables running in the trunk from the power supply to peripherals.
  - c) Unplug the power cables from the connectors on the mainboard.
  - d) Draw a diagram of color coded wiring from the power supply to the power switch for future reference (usually 5 wires: 1-ground, blue, black, brown and white).
  - e) Disconnect the wires to the power switch.
  - f) Locate and remove the screws on the back of the base unit that hold the power supply in place.
  - g) Carefully lift the power supply out of the base unit metal sides of the base unit (be careful not to snag other cables or boards.)
- #### 2) Test the power supply before installation.
- a) Make sure the power supply is not connected to anything and the switch is OFF.
  - b) Plug into an electrical outlet and turn the power switch on.
  - c) Listen for fan operation.
  - d) Turn the power supply off and disconnect it from the electrical outlet.
  - e) If the power supply does not work, replace it before installation.

- 3) Insert the power supply into metal sides of the base unit.
- 4) Unplug the power connectors P8 and P9 to the mainboard.
- 5) Plug in the remaining power supply cables to internal disk drives and other devices.
- 6) If the power supply uses a remote switch, remount the switch.
- 7) Make sure the power supply switch is OFF. Attach the external power cable to the back of the base unit and connect the other end to the power supply (preferably through a surge protector).
- 8) Turn the power switch ON. Make sure the fan is functioning and the computer passes the POST.
- 9) Make sure each connected device (e.g., disk drives) operates properly.
- 10) If a device does not function, turn off the power, unplug the power cable and recheck the power cable connections.
- 11) Repeat steps 7-10 as necessary.
- 12) Replace the base unit cover.



## **System freezes, nothing on screen and power is off due no electric power.**

### **Cause:**

Someone disturbed the electrical power by kicking the power cable, turning the surge protector off, unplugging the power cable from the PC or wall receptacle, turning off the wall switch or killing a circuit breaker.

### **Solution:**

Turn all computer component power switches off. Restore power to the system by securing all the power cable connections and/or replacing the fuses/circuit breakers. Turn the computer back on.



## **System freezes, appears to be stuck in loop due to loop in batch file.**

### **Cause:**

There is a continuous loop in the batch file that starts the program.

### **Solution:**

Press CTRL+BREAK to halt the batch file execution. Identify the program and batch file causing the loop.  
Edit the batch file, troubleshoot the loop behavior and eliminate it.



## **System freezes, appears to be stuck in loop due to program bug.**

### **Cause:**

The program or application contains a bug that is causing a continuous loop.

### **Solution:**

Refer to a qualified computer technician for analysis and resolution or contact the application vender's technical support for assistance.



## Computer halts, system has power, but keyboard not due to bad keyboard.

### Cause:

Keyboard is faulty.

### Solution:

Replace the keyboard. Save the file, exit the program, turn off the computer. Unplug the keyboard connector, plug in a new keyboard connector into the socket and turn the computer on.

- 1) (If possible) Save the file and exit the program(s).
- 2) Turn the computer off.
- 3) Trace the keyboard cable to the back of the computer and carefully pull keyboard plug straight out.
- 4) Examine the new keyboard plug for an arrow or notch on the outer surface. This notch should line up at the top of socket on the back of the computer.  
*NOTE: If there is no notch on the plug, simply match the pin pattern on the plug with the pinhole pattern in the socket.*
- 5) Align the plug to match the socket, and carefully insert it into the socket on the back of the computer.  
*NOTE: If the socket is a PS/2 style connector, make sure the keyboard socket is used (not the mouse socket).*  
***WARNING: Do not force the plug into the socket. This could damage the W on the plug or the socket.***
- 6) Turn the keyboard over and look for an XT/AT switch. If present, set the switch to the AT position. (Otherwise skip this step.)
- 7) If the keyboard contains DIP Switches, set them to enable desired options by following the instructions in the owner's manual. (Change DIP Switches).
- 8) Turn the computer on.
- 9) Watch POST. (If the keyboard is not properly switched or connected, the POST will generate a keyboard error)
- 10) If a keyboard error appears, turn the computer off and reseal the keyboard plug and keyboard toggle switch or DIP switches (if applicable). Turn on the computer and try again.



## **Computer halts, system has power, keyboard not work due program conflicts.**

### **Cause:**

Two or more programs are having memory conflicts and causing the computer to freeze or halt.

### **Solution:**

Reboot the computer. Experiment with program combinations to identify which ones are creating the conflict. Try reversing the loading order to see if it solves the problem. If they are loading into high memory area, try loading one in low memory or designating different specific memory addresses.



## **Computer halts, system has power, keyboard not working due to loose cable.**

### **Cause:**

Keyboard cable is loose or is not securely plugged into the socket on the back of base the unit.

### **Solution:**

Trace the keyboard cable to the back of the computer and carefully press it in fully. Make sure it is secure. Press CTRL+ALT+DEL to reboot the computer.





## Computer stops, screen goes blank, disk spins down due to bad power supply.

### Cause:

The base unit power supply is faulty or has gone bad.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Replace the power supply.

**CAUTION:** Do not attempt to disassemble or repair the power supply --- simply replace it.

**NOTE:** If removing an old power supply is not required, skip to Step 2 for installation steps.

1) Unplug the old power supply:

a) Remove the base unit cover



Photo: Removing cover.

- b) Unplug all power cables running in trunk from the power supply to peripherals.
- c) Unplug the power cables from the connectors on the mainboard.
- d) Draw a diagram of color coded wiring from the power supply to the power switch for future reference (usually 5 wires: 1-ground, blue, black, brown and white).
- e) Disconnect the wires to the power switch.
- f) Locate and remove screws on the back of the base unit that hold the power supply in place.
- g) Carefully lift the power supply out of the base unit metal sides of the base unit (**CAUTION: be careful not to snag other cables or boards**).

2) Test the power supply before installation.

- a) Make sure the power supply is not connected to anything and the switch is OFF.
- b) Plug into an electrical outlet and turn the power switch on.
- c) Listen for fan operation.
- d) Turn the power supply off and disconnect it from the electrical outlet.
- e) If the power supply does not work, replace it before installation.

3) Insert the power supply into the metal sides of the base unit.

4) Connect the power connectors P8 and P9 to the mainboard.

- 5) Connect the remaining power supply cables to the internal disk drives and other devices.
- 6) If the power supply uses a remote switch, remount the switch.
- 7) Make sure the power supply switch is OFF. Attach the external power cable to the back of the base unit and connect the other end to the power supply (preferably through a surge protector).
- 8) Turn the power switch ON. Make sure the fan is functioning and the computer passes the POST.
- 9) Make sure each connected device (e.g., disk drives) operates properly.
- 10) If a device does not function, turn off the power, unplug the power cable and recheck the power cable connections.
- 11) Repeat steps 7-10 as necessary.
- 12) Replace the base unit cover.



## **Computer stops, screen goes blank, hard disk spins down due to overheating.**

### **Cause:**

The computer is overheating and shutting down rather than burning up. The vents are not drawing enough fresh, cool air into the base unit due to one or a combination of reasons. (1) Room may be too hot. (2) Vents are blocked off (computer jammed into a tight corner with no ventilation. (3) The air vents are clogged with dust and dirt.

### **Solution:**

Move the computer to an open area with better air circulation and clean dust and dirt from vents. Make sure the vents are not obstructed.



## **Computer stops, screen goes blank, disk spins down due to no power.**

### **Cause:**

There is no electrical power at the wall receptacle where computer is plugged in. Perhaps a fuse is blown.

### **Solution:**

Secure good power at the wall receptacle by replacing a fuse or switching a circuit breaker. If this does not work, move the computer to a good circuit and report any electrical problems to building maintenance.



## **Computer stops, screen goes blank, disk spins down due to loose cables.**

### **Cause:**

The power cables are not securely connected to the surge protector, or the surge protector is not securely plugged into the wall receptacle. Perhaps someone accidentally or unknowingly kicked them.

### **Solution:**

Turn the computer off. Make sure the power cables are securely plugged into the surge protector, the power switch is turned on and the surge protector is securely plugged into the wall receptacle. Turn the computer back on.



## **Computer stops, screen goes blank, hard disk spins down due loose cables.**

### **Cause:**

The computer power cables or surge protector power cable came loose. Perhaps someone accidentally or unknowingly kicked it or turned the power strip off.

### **Solution:**

Turn the computer off. Resecure all the power cables and make sure the surge protector is turned on. Reposition or reroute all cables so they are out of the way and will not be kicked or disturbed. Turn on the computer.



## **Computer stops, screen goes blank, disk spins down due to power outage.**

### **Cause:**

There was a power failure: either a complete one, or a 'brown-out' causing the computer to stop working. The computer started a back up when the power returned, since the switch was left on. Any work in progress (i.e., all files or data not saved to disk) is lost.

### **Solution:**

Some applications automatically save work periodically in special files. Reopen the applications, and attempt to retrieve those files and save them permanently.

*NOTE: For future reference, save your work to a disk often. Also save any work, close applications, and shutdown the computer during thunderstorms.*



## System file error; Bypass the system files with F5 or F8 key & correct errors.

### Cause:

The changes made to CONFIG.SYS or AUTOEXEC.BAT are causing a memory conflict or a system error. Some errors in the system files will cause the system to hang when it is turned on.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Bypass the system files with the F5 or F8 key, correct the errors or undo the changes.

- 1) Press CTRL+ALT+DEL to reboot the computer.
- 2) Wait for the 'Starting MS-DOS...' message to appear.
- 3) Do one of the following:
  - a) MS-DOS 6.x. Press F5 to completely bypass the system files (CONFIG.SYS and AUTOEXEC.BAT).

**CAUTION:** If the system files are completely bypassed, some devices and programs may not function properly because they are not loaded or setup.
  - b) MS-DOS 6.x. Press F8 to step through each line of CONFIG.SYS and AUTOEXEC.BAT sequentially.
    - 1] Carefully examine each line of CONFIG.SYS and AUTOEXEC.BAT for errors.
    - 2] Choose to execute only the desired lines.

EXAMPLE: Skip all of the lines that were changed immediately before the system hang.
  - c) MS-DOS 5.x or earlier. Unfortunately, these DOS versions do not have the F5 by-pass or F8 step command. Instead, attempt to identify the culprit by removing all CONFIG.SYS or AUTOEXEC.BAT commands and replacing them one at a time until the problem occurs (thereby identifying the problem), or replacing the files with old versions.
    - 1] Insert the system recovery boot diskette in Drive A.
    - 2] Press CTRL+ALT+DEL to reboot computer from a floppy disk.
- 4) Do one of the following:
  - a) Replace AUTOEXEC.BAT and CONFIG.SYS with backups of those files from the hard disk or the system recovery diskette.
    - 1] Locate the file used as a backup of CONFIG.SYS (e.g., CONFIG.BAK, CONFIG.ORG).



2] Note the pathname to the backup CONFIG.SYS file.

3] Type the following commands at the DOS prompt:

```
CDRENAME CONFIG.SYS CONFIG.BAD
```

```
COPY <pathname>\<backup filename> CONFIG.SYS
```

(where <pathname> is the pathname noted in step 4)a)2], and <backup filename> is the filename of the backup CONFIG.SYS file)

EXAMPLE: If the backup file for CONFIG.SYS is called 'CONFIG.OLD', and is located in the DOS directory, enter the following command at the DOS prompt:

```
COPY C:\DOS\CONFIG.OLD CONFIG.SYS
```

4] Locate the file used as a backup of AUTOEXEC.BAT (e.g., AUTOEXEC.BAK, AUTOEXEC.ORG) .

5] Note the pathname to the backup AUTOEXEC.BAT file.

6] Type the following commands at the DOS prompt:

```
CDRENAME AUTOEXEC.BAT AUTOEXEC.BAD
```

```
COPY <pathname>\<backup filename> AUTOEXEC.BAT
```

(where <pathname> is the pathname noted in step 4)a)2], and <backup filename> is the filename of the backup AUTOEXEC.BAT file)

EXAMPLE: If the backup file for AUTOEXEC.BAT is called 'AUTOEXEC.OLD', and is located in the DOS directory, enter the following command at the DOS prompt:

```
COPY C:\DOS\AUTOEXEC.OLD AUTOEXEC.BAT
```

7] Press CTRL+ALT+DEL to reboot the computer and make the changes take effect.

b) Undo the changes that were made to the system files by editing.

1] Edit CONFIG.SYS.

a] Correct or delete the changes made previously.

b] Save changes to CONFIG.SYS and exit the editor.

2] Edit AUTOEXEC.BAT.

a] Correct or delete the changes made previously.

b] Save changes to AUTOEXEC.BAT and exit the editor.

3] Press CTRL+ALT+DEL to reboot the computer and make the changes take effect.

*NOTE: For future reference, make sure the backup copies of both AUTOEXEC.BAT and CONFIG.SYS are kept in an alternate directory on the hard disk and copied to the system recovery diskette whenever they are successfully modified.*



## Self-generated memory conflict; Restart and follow MemMaker instructions.

### Cause:

MemMaker causes a self-generated memory conflict when trying to use an upper memory block (in the [UMA](#)) as it is attempting to create an optimum memory configuration.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Note the error messages, reboot the computer, and follow MemMaker instructions.

Try one of the following, in sequence, until problem solved:

- 1) Reboot the computer and let MemMaker complete its work:
  - a) Note any error messages that are displayed.
  - b) Press CTRL+ALT+DEL to reboot the computer.
  - c) MemMaker will detect that the memory optimization is incomplete and restart.
  - d) Read the MemMaker screen that lists possible reasons for the problem, and instructions for continuing or stopping the memory optimization.
  - e) Select the default MemMaker options to continue.
  - f) (Optional) To restore the original CONFIG.SYS and AUTOEXEC.BAT that were used before running MemMaker, enter the following command at the DOS prompt:  
MEMMAKER /UNDO
- 2) If system will not reboot, do the following to return to the original configuration and start over:
  - a) Insert the system recovery boot diskette in Drive A.
  - b) Press CTRL+ALT+DEL to reboot computer from a floppy disk.
  - c) Do one of the following:
    - 1] Type the following commands at the DOS prompt to copy the original AUTOEXEC.BAT and CONFIG.SYS files to the root directory:  
C: (Press ENTER)  
COPY AUTOEXEC.ORG AUTOEXEC.BAT  
COPY CONFIG.ORG CONFIG.SYS
    - 2] Type the following commands at the DOS prompt to copy AUTOEXEC.BAT and CONFIG.SYS from recovery diskette to root:

COPY A:\AUTOEXEC.ORG C:\AUTOEXEC.BAT

COPY A:\CONFIG.ORG C:\CONFIG.SYS

- d) Remove the recovery diskette from Drive A.
- e) Press CTRL+ALT+DEL to reboot the computer.
- f) Rerun MemMaker, using the 'Custom Setup' choice.



[MemMaker Select Custom Setup](#)

*NOTE: Type: **HELP MEMMAKER** at the DOS prompt, or consult the MS-DOS documentation for more information.*



## **Loose cable connection; Plug keyboard cable securely into the back of computer.**

### **Cause:**

Keyboard cable is loose or disconnected.

### **Solution:**

Make sure the keyboard cable is securely plugged into the keyboard socket on the back of the base unit.



## System starts but suddenly halts during startup due to bad device driver.

### Cause:

When startup halts, it most often occurs during execution of the CONFIG.SYS file. When this happens, it has encountered a device driver (software program that runs a device: e.g., mouse, scanner, CD-ROM, etc.) that is invalid or incompatible; or, the device driver file is corrupted.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Reboot the computer and press F8 when booting, to step through commands one at a time and identify culprit. Then, check syntax in CONFIG.SYS and integrity of device driver file.

Do one of the following:

- 1) MS-DOS 6.x.
  - a) Press CTRL+ALT+DEL to reboot the computer.
  - b) Press F8 when display says 'Starting MS-DOS...'. (This will cause the computer to step through execution of each line in CONFIG.SYS one at a time.)
  - c) Press 'Y' to proceed to next command. Repeat this process until the system halts: this shows the bad driver.
  - d) Edit CONFIG.SYS. Do the following:
    - 1] Make sure the command line drive, path, syntax and any optional parameters are listed correctly. (Check DOS online help or manual for specifics). Also, make sure the correct driver is being used (e.g., some drivers come in both .COM and .EXE versions).
    - 2] Locate the device driver file listed in the command line, and make sure the path\directory is accurate (correct if not).
    - 3] Correct the command line containing the driver causing the problem, identified in Step 1 above.
    - 4] Save the file and press CTRL+ALT+DEL to reboot the computer.
  - e) If the computer does not successfully boot without error, do the following:
    - 1] Use a file disk utility to make sure the device driver file is not corrupted or damaged.
    - 2] If the driver is missing or corrupted, reinstall the appropriate driver from the original installation diskettes, following the installation instructions that came with the driver software.
    - 3] Edit CONFIG.SYS and uncomment remaining device drivers.
    - 4] Press CTRL+ALT+DEL to reboot the computer.

- 2) MS-DOS 5.x and earlier. Unfortunately, these DOS versions do not have the F8 step command. Instead, one must attempt to identify the culprit by removing all CONFIG.SYS commands and replacing them one at a time until problem occurs (thereby identifying the problem).
- a) Insert the system recovery boot diskette in Drive A.
  - b) Press CTRL+ALT+DEL to reboot the computer from a floppy disk.
  - c) Edit CONFIG.SYS.
  - d) Comment out all device driver lines (e.g., C:\DOS\HIMEM.SYS) by typing 'REM' in front of each line, except the first one.
  - e) Save the file, and press CTRL+ALT+DEL to reboot the computer.
  - f) If the computer boots, repeat Steps 2a)-2c), uncommenting one line at a time, until a problem occurs. The last command line put back in CONFIG.SYS is the device driver with the problem.
  - g) Make sure the command line drive, path, syntax and any optional parameters are listed correctly. (Check DOS online help or manual for specifics). Also make sure the correct driver is being used (e.g., some drivers come in both .COM and .EXE versions).
  - h) Locate the device driver file listed in the command line and make sure the path\directory is accurate (correct if not).
  - i) Use a file disk utility to make sure the device driver file is not corrupted or damaged.
  - j) If the driver is missing or corrupted, reinstall the appropriate driver from original the installation diskettes, following the installation instructions that came with the driver software.
  - k) Edit CONFIG.SYS and uncomment the remaining device drivers.
  - l) Press CTRL+ALT+DEL to reboot the computer.



## **System starts but suddenly halts during startup due to halt keystrokes.**

### **Cause:**

The user may have pressed one of the following keystroke combinations during the startup process (ESC, CTRL+C, CTRL+BREAK). These keystrokes pause or halt the task currently being executed between commands.

### **Solution:**

Press CTRL+ALT+DEL to reboot the computer. Make sure to keep hands OFF the keyboard until the startup process is complete.



## **Unneeded files, programs, data; Remove unnecessary programs, files, data.**

### **Cause:**

Older hard disk drives are much smaller than the newer ones (20MB drives versus 500MB drives). Also, applications are taking up more disk space. There may be excess temporary files, unneeded or duplicate programs and data on the system.

### **Solution:**

Review the hard disk. Remove any duplicate and unneeded programs, temporary files and data.

Do one or more of the following as desired:

- 1) Review hard disk contents.
- 2) Delete all .TMP and .BAK files.
- 3) Remove duplicate copies of the same programs and data.
- 4) Use a file compression program (e.g., PKZIP) to compress rarely used files and programs and copy them to diskette or store them in compressed form on hard disk (then delete uncompressed files).
- 5) Backup rarely used programs and data files onto a diskette or tape.
- 6) Consider using DoubleSpace to create a compressed drive with more space.
- 7) Consider purchasing an external hard disk drive or upgrading to a larger hard disk (or computer).





## Hard disk drive lights never turn on/off due to drive light jumper.

### Cause:

If the light does not work, the wires may not be attached to the required jumper. If it is a base unit drive light, the light wires are not connected to the mainboard. If the light is always on, that is because a jumper provides this option (that can be changed).

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Reconnect the light wires to the jumper(s). If the light is always on, change the appropriate jumper.



## Wrong jumper selected; Change to the appropriate jumpers.

### Cause:

If the light does not work, the wires may not be attached to the required jumper. If it is a base unit drive light, the light wires are not connected to the mainboard. If the light is always on, that is because a jumper provides this option (that can be changed).

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Reconnect the light wires to the jumper(s). If the light is always on, change the appropriate jumper. .

- 1) Remove the base unit cover
- 2) Gain access to jumpers located on the back of the hard disk drive.
- 3) Consult the hard disk drive manual to determine which jumpers are involved and what settings are required.
- 4) Move Jumpers as necessary.
- 5) Make sure the base unit hard disk drive access light is connected to the appropriate jumper on the mainboard. (Consult the mainboard manual for the exact location.) These console light wires often get mixed up and connected to the wrong jumper when disconnected.
- 6) Reconnect the cables and turn on the computer.
- 7) Make sure the lights work as desired.
- 8) If the lights do not work properly, repeat Steps 3-8.
- 9) Replace the base unit cover



## **File fragmentation; Use DEFRAG/Disk Defragmenter to eliminate file fragmentation.**

### **Cause:**

Files on the disk are fragmented. As some files grow and others are deleted, sectors are made free. When the operating system writes a new file to a disk, the system looks for the first free sector and writes part of the file in the sector. The rest of the file is written to one or more other free sectors on other parts of the disk. Later when the file is read, it takes longer to read the file.

### **Solution:**

Defragment the disk; often!

Do one of the following:

- 1) If it is a normal drive, type DEFRAG at the DOS prompt.
- 2) If it is a DoubleSpace compressed drive, type the following command at the DOS prompt:

DBLSPACE /DEFRAGMENT

*NOTE: Defragment the disk about once a week, depending on the usage. It will take less time to defragment and will speed up hard disk performance.*



## Disk too full; Decrease size of DoubleSpace drive.

### Cause:

There are one or more crosslinked files on the DoubleSpace drive. Several factors contribute to this problem situation including: drive is too full (90% or more), EMM386.EXE using HIGHSCAN parameter, the DoubleSpace drive is too large for this disk, or files are badly fragmented on drive.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Decrease the size of the DoubleSpace drive, free up additional disk space, and defragment the files on the disk.

Do all of the following, if applicable:

- 1) Check EMM386 for HIGHSCAN command and remove it:
  - a) Edit CONFIG.SYS.
  - b) Locate the EMM386.EXE command line and delete the /HIGHSCAN parameter command, if present.
- 2) Decrease the size of the DoubleSpace compressed drive.
  - a) Type DBLSPACE at the DOS prompt (activates the DoubleSpace management utility in menu mode).
  - b) Select 'Change Size' from the 'Drive' menu.
  - c) Choose a new size for the compressed drive.
  - d) Exit DoubleSpace and press CTRL+ALT+DEL to reboot the computer for changes to take effect.
- 3) Free space on the compressed disk by removing the unused files (including .TMP, .BAK files, old, unneeded data files, and programs that are not used).
- 4) Defragment the compressed drive by typing the following command at the compressed drive DOS prompt:  
DBLSPACE /DEFRAGMENT



## System turned off too soon; Wait at least 10 seconds before turning system off.

### Cause:

This is not a problem with DoubleSpace; it is a problem with SMARTDRV.EXE, the disk caching program. Files are lost because the system is turned off after 'saving the files', they are still being held in memory by the cache and have not yet been written to disk.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Wait at least 10 seconds after any disk operations before turning the system off.

Do one of the following:

- 1) Wait at least 10 seconds after any disk operations before turning the system off.
- 2) Disable the write-caching portion of SmartDrive by including the drive parameter after the SmartDrive command in AUTOEXEC.BAT as follows:
  - a) Edit AUTOEXEC.BAT.
  - b) Locate the SmartDrive command line and add drive parameters for each drive to exclude caching disk writes. Example:  
C:\DOS\SMARTDRV.EXE C:
- 3) (Valid only when not using Windows.) Do not use (disable) SmartDrive by commenting the command line out with REM.



## **Disk is aging & losing magnetism; Make copies of programs & files on this disk.**

### **Cause:**

This is not a problem related to DoubleSpace; it is just exaggerated by using DoubleSpace. The disk is aging and losing some magnetism. More and more surface defects are appearing in sectors. The system is having difficulty reading and writing data to this disk. Using DoubleSpace exaggerates this problem.

### **Solution:**

Backup the programs and files on this disk as soon as possible. Use a disk resuscitation program (e.g., SpinRite) to try to revive this deteriorating disk and extend its useful life somewhat. Make arrangements to replace this disk drive soon.



## **DOS constraints; Enter HELP DBLSPACE at C: prompt, refer to DOS manual.**

### **Cause:**

There are several DOS commands that have special DoubleSpace counterparts.

### **Solution:**

Refer to the DOS manual or type HELP DBLESPACE at the DOS prompt.

See [DOS commands not to use with DoubleSpace](#) for more information.



## **Doublespace slows down system due to slow processor.**

### **Cause:**

Running DoubleSpace may seem to provide a slight decline in overall system performance. In fact, this should be offset because less data (compressed) is being read and written to the disk. However, even with a fast hard disk drive, a slow processor or narrow data bus will slow the system down.

### **Solution:**

None required.





## **Using bypass; Reboot without bypassing DoubleSpace, rerun maintenance program.**

### **Cause:**

If loading DoubleSpace is bypassed by pressing CTRL+F5 or CTRL+F8 at the 'Starting MS-DOS...' prompt, DBLSPACE.BIN will not load. If DBLSPACE.EXE (the maintenance program) is run, it acts as if DoubleSpace was never installed, and starts DoubleSpace setup. This does not cause any data loss or other important problems.

### **Solution:**

Reboot (restart) the computer without bypassing DoubleSpace, and rerun the maintenance program to change the DoubleSpace configuration.

- 1) Press CTRL+ALT+DEL to reboot the computer.
- 2) Allow MS-DOS to finish the boot process (including loading DBLSPACE.BIN).
- 3) Type DBLSPACE at the DOS prompt to run the DoubleSpace maintenance utility.
- 4) The maintenance utility will now allow changes to the DoubleSpace configuration.



## **DoubleSpace drivers don't load from ROM; Use the CUSTOMIZ program.**

### **Cause:**

The default PS/1 ROM startup procedure cannot access files on the compressed drive because the DoubleSpace drivers do not load from ROM. Also, the PS/1 configuration settings cannot be changed because the CUSTOMIZ program that changes the settings is located on the now compressed disk.

### **Solution:**

Activate the PS/1 ROM System menu and use it to boot from the hard disk. Use the CUSTOMIZ program to setup the PS/1 to boot from the hard disk.

- 1) Turn on the computer.
- 2) Activate the IBM PS/1 ROM System menu (four windows that allow a choice of four options). (See PS/1 user manual for details.)
- 3) Press ALT+PRINT SCREEN to instruct the PS/1 ROM to boot from the hard disk. (The screen will display a window with arrows pointing to the F1 key.)
- 4) Press the F1 key. (The PS/1 will boot from the hard disk. Wait for the DOS prompt to appear.)
- 5) Type CUSTOMIZ at the DOS prompt.
- 6) Select 'Try Diskette First, Then Try Fixed Disk' for the 'Choose where the computer looks for the operating system' option.
- 7) Select 'From disk' for the 'Read Config.sys' option.
- 8) Select 'From disk' for the 'Read Autoexec.bat' option.
- 9) Save the selected options and exit the CUSTOMIZ program.
- 10) Press CTRL+ALT+DEL to reboot the computer.
- 11) If the computer does not boot properly, repeat Steps 1-10, make sure all options are set correctly.



## **Device driver conflict; Contact Iomega for information about configuring devices.**

### **Cause:**

Running DoubleSpace on a computer with a Bernoulli disk and a ASPI SCSI host adapter causes a device driver conflict. The Bernoulli Disk driver (DOSOAD.SYS) and the SCSI host adapter ASPI device driver (ASPIDRVR.SYS) prevent the DoubleSpace drive from remounting.

### **Solution:**

Contact Iomega for more information about configuring these devices to work properly together.



## Memory address conflict; 'Exclude' Hard Card BIOS address range with EMM386.

### Cause:

The MS-DOS 5.0 version of EMM386 creates a memory address conflict with the Plus Hard Card II XL BIOS. This memory address conflict causes very slow Plus Hard Card II performance.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Exclude the Hard Card BIOS memory address range with EMM386, or set the page frame to use C000 if not using upper memory blocks.

- 1) Check the Plus Hard Card II documentation to determine the memory address range for the Hardcard's XL BIOS.
- 2) Do one of the following, depending on whether UMBs (upper memory blocks) are being used:
  - a) Exclude the Hardcard XL BIOS memory address range with EMM386:

- 1] Edit CONFIG.SYS.

- 2] Add the following line (or edit the existing line) to CONFIG.SYS:

DEVICE=C:\DOS\EMM386.EXE X=aaaa-bbbb

(where 'aaaa' stands for the starting memory address, and 'bbbb' stands for the ending memory address of the memory range for the Hardcard BIOS determined in Step 1)

- 3] Save changes to CONFIG.SYS and exit the editor.

- 4] Press CTRL+ALT+DEL to reboot the computer for changes to take effect.

- b) Set the address of the page frame so it does not conflict with the addresses used by the Hardcard.

*NOTE: Use this step if not using upper memory blocks (UMBs).*

- 1] Edit CONFIG.SYS.

- 2] Add the following line (or edit the existing line) to CONFIG.SYS:

DEVICE=C:\DOS\EMM386.EXE frame=xxxx

(where 'xxxx' stands for the page frame memory address)

EXAMPLE: If the Hardcard is determined to use the address range C000-C800 (from Step 1), the line in CONFIG.SYS might be the following:

DEVICE=C:\DOS\EMM386.EXE frame=C000

- 3] Save changes to CONFIG.SYS and exit the editor.

- 4] Press CTRL+ALT+DEL to reboot the computer for changes to take effect.



## IRQ 12 conflict; Configure Plus Hard Card to use a different IRQ number.

### Cause:

PS/2 style mouse ports use interrupt (IRQ)12. Plus Hard Cards, including the Hard Card II (40 MB and 80 MB versions) and the Hard Card IIXi (50 MB and 105 MB versions) can also use IRQ 12. This causes an Interrupt Request (IRQ) conflict.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Configure the Plus Hard Card to use a different IRQ number, or use the mouse on a serial (COM) port.

Do one of the following:

- 1) Configure the Plus Hard Card to use a different IRQ number.
  - a) Consult the Plus Hard Card documentation for instructions on configuring the card to use another IRQ setting.
  - b) Choose another valid IRQ setting from the options given in the documentation.
  - c) Follow the instructions given in the Plus Hard Card documentation to change the IRQ setting.
- 2) Use the mouse on a serial (COM) port.
  - a) Obtain an adapter that will allow the PS/2 mouse connector to be connected to an unused serial port on the computer.
  - b) Connect the PS/2 mouse to the adapter.
  - c) Connect the adapter to an unused serial port.
  - d) Configure the mouse driver to use the mouse on the serial port.



## Limitation of ROM BIOS; Set up ROM BIOS similar to the one in the computer.

### Cause:

Occurs when surface scan program (e.g., ScanDisk) runs on IDE hard disk type not supported by the computer's ROM BIOS. Data loss can occur when a surface scan program runs and makes the interrupt 25h and 26h calls on a hard disk using the AccuLogic ROM BIOS. AccuLogic has confirmed the problem is due to a limitation of the ROM BIOS of their IDE disk controller.

### Solution:

Setup the computer to use a hard drive that is very similar to the hard drive currently being used, or keep the configuration the same and DO NOT RUN surface scans or a defragmenter on the drive.

- 1) Consult the documentation for the computer, or contact the hardware vendor directly to determine the drive types supported by the ROM BIOS.
- 2) Do one of the following:
  - a) Setup the ROM BIOS to use an IDE drive type very similar to the one in the computer.
    - 1] Run Setup.
    - 2] Select the disk type that most closely matches the drive in the computer from the Setup list.

**CAUTION:** DO NOT set a user defined hard disk type so that the computer believes the hard disk is LARGER than it actually is (e.g., 515MB for a 420MB drive). This may damage the hard disk!
    - 3] Save the settings, and exit Setup.
    - 4] Run the AccuLogic Side 3 Plus IDE controller configuration program (consult the AccuLogic documentation to determine how to do this).
    - 5] Deactivate the AccuLogic ROM BIOS by following the steps prescribed in the AccuLogic documentation.
    - 6] Save the AccuLogic configuration and exit the configuration utility.
    - 7] Press CTRL+ALT+DEL to reboot the computer.
    - 8] The ScanDisk surface scan and the Microsoft DEFRAG (defragmenter) utility should now run properly on the computer.
  - b) Keep the system configuration the same.
    - 1] DO NOT RUN the ScanDisk surface scan utility, the Microsoft DEFRAG utility or any other disk utility program that uses interrupt 25h or 26h on this drive.
    - 2] **WARNING:** If the ScanDisk surface scan program cannot run successfully on the computer, DO NOT INSTALL MS-DOS DoubleSpace.







## **Files supporting virtual memory using hard disk space; No action required by you.**

### **Cause:**

If the amount of available hard disk space is checked before running Windows or a large program and then is checked later while running those programs, there will be a significant (i.e., 3-20MB) drop in available disk space. This is due to the creation of additional temporary files and swap files used to support virtual memory by using available hard disk space.

### **Solution:**

None required.



## **Excessive .TMP files from stopping/restart; Delete all .TMP files.**

### **Cause:**

Memory managers and sophisticated programs often create fairly large temporary files and swap files during use. If the system freezes, crashes, or experiences an unexpected spontaneous reboot (e.g., power fluctuation) these programs are unable to clean up after themselves and can leave large, unneeded files on the disk.

### **Solution:**

Exit all programs and Windows and delete all the .TMP files.

- 1) Locate all the .TMP files by entering the following command at the DOS prompt:  
DIR \*.TMP /S
- 2) Change directories to each directory where .TMP files are located and delete them:  
CD\<pathname>  
DEL \*.TMP



## Sudden drop in hard disk space due to virus.

### Cause:

**WARNING:** Computer VIRUS!

### Solution:

Save any open files, close all open applications and turn computer off immediately!

**CAUTION:** Arrange for local qualified computer technician to diagnose and remove virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

**CAUTION:** Computer viruses are extremely dangerous. Your data may be in danger of being corrupted or lost.

#### 1) Perform immediate shutdown:

- a) Save any open files.
- b) Close all open applications.
- c) Turn the computer off.
- d) Identify and isolate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).

**CAUTION:** Viruses should be diagnosed and repaired by qualified computer technicians using updated virus detection and cleanup software as follows:

#### 2) Detect and remove virus(es).

- a) Insert a bootable, write-protected diskette in the bootable floppy drive (usually drive A), and turn on the computer.
- b) After boot, insert a write-protected diskette that contains a virus detection program in the floppy drive.
- c) Scan all memory and connected drives for viruses (i.e., all hard disks, all network drives, all backups and every floppy diskette in the vicinity).
- d) Delete all infected files through detection/disk clean virus program.
- e) If the virus has infected the boot sector of hard disk, the following command may be useful. Type it at the DOS prompt:  
FDISK /MBR  
(The /MBR switch rebuilds the Master Boot Record on the disk.)
- f) Cold boot the computer (Turn the computer off, wait 15 seconds, and turn it back on again) to remove any lingering viruses from the memory.
- g) Scan all the memory and connected drives for viruses again using most thorough scan pattern (some detectors miss viruses on first pass). Use another virus detector program if available (to be absolutely sure all remnants are gone).

- 3) Check the surrounding environment and notify the appropriate parties:
  - a) Scan all nearby PCs and floppy diskettes for viruses (reinfection of disinfected computer from other previously infected diskettes commonly occurs).
  - b) Notify diskette/transmission providers and receivers. Make sure the owner of the source diskette knows of the infection.
  - c) Report any details (virus name, number of machines affected, suspected damage sustained, and results of cleanup operations) to designated company authority.
- 4) Call for expert help from virus software and/or third party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## **Aging or failing drive; Make copies of all files & programs, replace drive.**

### **Cause:**

Squeaking, grinding, and grating noises are all signs that the drive is about to fail. Intermittent access errors also start to occur more often.

### **Solution:**

Make sure all the files and programs are backed up, run a disk resuscitation program (e.g., SpinRite) and prepare to replace the drive soon.



## Defrag suddenly stops in middle of an operation due to lost file chains.

### Cause:

DEFRAG encountered more lost file chains and clusters than it could handle.

### Solution:

Format a disk and restore files from backups or start over.

*NOTE: For future reference, backup disk before running DEFRAG.*



## Too many lost file chains and clusters; Format and unformat drive.

### Cause:

DEFRAG encountered more lost file chains and clusters than it could handle.

### Solution:

Format and unformat the drive in an attempt to restore the partition table by reading the files from the disk.

- 1) Format the disk by entering the following command at the DOS prompt:

FORMAT x:

(Where x is the logical name of the disk to be formatted.)

- 2) Use a third party file/disk recovery utility to UNFORMAT the drive.

*NOTE: This process attempts to read the disk from the bottom up and reload the partition table with pointers to the files that are actually still on the disk.*

- 3) Check the disk and attempt to run some programs to determine if the files are recovered.



## **Too many lost files & chains; Use a file/disk recovery utility to recover files.**

### **Cause:**

DEFRAG stopped because it encountered more lost files and chains than it could handle.

### **Solution:**

Use a file/disk recovery utility to recover the files and partition table.

- 1) Use a file/disk recovery utility to recover the files and partition table.
- 2) Make sure the files on the drive are backed up.
- 3) Rerun DEFRAG.





## Defrag is stopped in middle of an operation due to unknown causes.

### Cause:

DEFRAG had a false error that left the partition table and files on the disk in a mixed up state.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

The files may be successfully recovered if the system is not touched until an expert can diagnose it.



## **DEFRAG has an unknown problem; Enter DEFRAG at the C: prompt to rerun program.**

### **Cause:**

DEFRAG had a false error and stopped.

### **Solution:**

Type DEFRAG at the DOS prompt to rerun program.



## **Files disappear, will not open or are corrupt due to failing hard disk.**

### **Cause:**

This hard disk is failing and showing signs of aging.

### **Solution:**

Order replacement hard disk soon. Avoid placing mission-critical programs and files on the hard disk.



## **Files disappear, will not open or are corrupt due loss of disk magnetism.**

### **Cause:**

Over time the magnetism on the disk fade and file access errors begin to occur.

### **Solution:**

Refresh the magnetism on the disk using a disk resuscitation program like Spinrite.

- 1) Do one of the following:
  - a) Run a disk resuscitation program (e.g., Spinrite) on this hard disk.  
*NOTE: This will take several to many hours to complete.*
  - b) If such a program is unavailable, do the following:
    - 1] Back up all the data on hard disk.
    - 2] Low-level format the disk.
    - 3] Recreate partition(s).
    - 4] High-level format the disk.
    - 5] Restore all the data from backups.
- 2) Observe the disk read/write performance for any improvement.



## **Power fluctuations; Copy files from original location, from backups or recreate.**

### **Cause:**

Electrical power fluctuations, even minor, barely noticeable brown outs, can create havoc with computer data files. If a write operation is in progress during a change in power, some or all of the file may not be successfully written to a disk.

### **Solution:**

Copy the files from the original locations or backups or recreate them.



## **Files fragmented, lost file chains; Run SCANDISK and correct problems.**

### **Cause:**

Files on the disk are fragmented and many have lost file chains. This means that portions of the file are scattered across the disk drive and one or more portions of the file are lost.

### **Solution:**

Run SCANDISK now and more often in the future to reduce file errors.

Type the following command at the DOS prompt:

SCANDISK x: /AUTOFIX

(Where x is the logical name of the drive with file problems.)



## Files disappear, will not open or are corrupted due to virus.

### Cause:

**WARNING:** Computer VIRUS!

### Solution:

**CAUTION:** *Computer viruses are very dangerous, can be destructive, and spread very easily.*

Save any open files, close all open applications and turn the computer off immediately!

**CAUTION:** *Arrange for a local qualified computer technician to diagnose and remove virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Turn the computer off.
  - d) Identify and isolate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and remove virus(es).
  - a) Insert a bootable, write-protected diskette in the bootable floppy drive (usually drive A), and turn on the computer.
  - b) After boot, insert a write-protected diskette that contains a virus detection program in the floppy drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disks, all network drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.
  - e) If virus has infected the boot sector of hard disk, the following command may be useful. Type at the DOS prompt:  
FDISK /MBR  
(The /MBR switch rebuilds the Master Boot Record on the disk.)
  - f) Cold boot the computer (Turn the computer off, wait 15 seconds, and turn it back on again) to remove any lingering viruses from the memory.
  - g) Scan all the memory and connected drives for viruses again using the most thorough scan pattern (some detectors miss viruses on first pass). Use another virus detector program if available (to be

absolutely sure all remnants are gone).

- 3) Check the surrounding environment and notify the appropriate parties:
  - a) Scan all nearby PCs and floppy diskettes for viruses (reinfection of disinfected computer from other previously infected diskettes commonly occurs).
  - b) Notify diskette/transmission providers and receivers. Make sure the owner of the source diskette knows of the infection.
  - c) Report any details (virus name, number of machines affected, suspected damage sustained, and results of cleanup operations) to designated company authority.
- 4) Call for expert help from a virus software and/or third party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*





## Dates and times on hard disk files have changed due to virus.

### Cause:

**WARNING:** Computer VIRUS! This is almost definite if many .EXE, .COM and .BAT files are changed.

### Solution:

**CAUTION:** Computer viruses are very dangerous, can be destructive, and spread very easily.

Save any open files, close all open applications and turn computer off immediately!

**CAUTION:** Arrange for local qualified computer technicians to diagnose and remove virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Turn the computer off.
  - d) Identify and isolate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and remove virus(es).
  - a) Insert a bootable, write-protected diskette in the bootable floppy drive (usually drive A), and turn on the computer.
  - b) After boot, insert a write-protected diskette that contains a virus detection program in the floppy drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disks, all network drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.
  - e) If virus has infected the boot sector of hard disk, the following command may be useful. Type at the DOS prompt:  
FDISK /MBR  
(The /MBR switch rebuilds the Master Boot Record on the disk.)
  - f) Cold boot the computer (Turn the computer off, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.
  - g) Scan all memory and connected drives for viruses again using the most thorough scan pattern (some detectors miss viruses on first pass). Use another virus detection program if available (to be

absolutely sure all remnants are gone).

- 3) Check the surrounding environment and notify the appropriate parties:
  - a) Scan all nearby PCs and floppy diskettes for viruses (reinfection of disinfected computer from other previously infected diskettes commonly occurs).
  - b) Notify diskette/transmission providers and receivers. Make sure the owner of the source diskette knows of the infection.
  - c) Report any details of the virus (virus name, number of machines affected, suspected damage sustained, and results of cleanup operations) to designated company authority.
- 4) Call for expert help from virus software and/or third party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## **Aging floppy disk drive; Replace floppy drive as soon as possible.**

### **Cause:**

Some floppy disk drives make squeaking or grinding noises when accessed. They read and write data properly and appear to work fine.

### **Solution:**

These sounds are normal for an aging or an older model floppy disk drive. Replace only if the noise is particularly bothersome to the user.

***CAUTION:*** Make sure the source of the noise is definitely the floppy disk drive. A hard disk drive that makes these noises is a warning sign of later problems.



## **Memory manager/cache writing to disk; Nothing for you to do.**

### **Cause:**

A memory manager or cache program is periodically writing information to the diskette that makes it appear as a series of random accesses.

### **Solution:**

No solution required. If this is disturbing the user, disable the cache or memory manager.



## Drive lights flash randomly (no access commands issued) due to virus.

### Cause:

**WARNING:** Computer VIRUS!

### Solution:

**CAUTION:** *Computer viruses are very dangerous, can be destructive, and spread very easily.*

Save any open files, close all open applications and turn computer off immediately!

**CAUTION:** *Arrange for local qualified computer technician to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.*

**CAUTION:** *Viruses should be diagnosed and repaired by qualified computer technicians using updated virus detection and cleanup software*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Turn the computer off.
  - d) Identify and isolate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and remove virus(es).
  - a) Insert a bootable, write-protected diskette in the bootable floppy drive (usually drive A), and turn on the computer.
  - b) After boot, insert a write-protected diskette that contains a virus detection program in Drive A.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disks, all network drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.
  - e) If the virus has infected the boot sector of hard disk, the following command may be useful. Type at the DOS prompt:  
FDISK /MBR  
(The /MBR switch rebuilds the Master Boot Record on the disk.)
  - f) Cold boot the computer (Turn the computer off, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.

- g)** Scan all memory and connected drives for viruses again using most thorough scan pattern (some detectors miss viruses on first pass). Use another virus detection program if available (to be absolutely sure all remnants are gone).
- 3)** Check the surrounding environment and notify the appropriate parties:
  - a)** Scan all nearby PCs and floppy diskettes for viruses (reinfection of disinfected computer from other previously infected diskettes commonly occurs).
  - b)** Notify diskette/transmission providers and receivers. Make sure the owner of the source diskette knows of the infection.
  - c)** Report any details of the virus (which virus, number of machines affected, suspected damage sustained, and the results of cleanup operations) to designated company authority.
- 4)** Call for expert help from virus software and/or third party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## **Diskettes from another computer do not work due to head alignment.**

### **Cause:**

These diskettes cannot be read in this computer because of one of two factors. Either the floppy drive on the other computer is aging and the heads are out of alignment (i.e., data was written off-track so this computer cannot read it), the diskette is bad or the files were corrupted on another computer before copying them to this diskette.

### **Solution:**

Return the diskettes to the source and ask for a new set (preferably on different diskettes written in a different drive or computer).



## Using a low-density drive; Copy files onto a low-density disk.

### Cause:

The drive being used on this computer is a low density (i.e., 360KB or 720KB) drive. The diskette is a high density diskette prepared by a high density (e.g., 1.2MB or 1.44MB) drive. Low density drives cannot read high density diskettes.

### Solution:

Move to a computer with a high density drive and copy the files onto a low density diskette for transfer back to the computer.

(Assuming copying files from Drive A to Drive B.)

- 1) Move to the other computer and insert the data diskette in Drive A and the blank diskette (low density) in Drive B.
- 2) Type the following command at the DOS prompt:  
COPY A:\*. \* B:
- 3) When the files are copied, remove the diskettes and return to the original computer and use the files from the new low density diskette.





## **Diskette from incompatible type computer; Place files on IBM-type formatted disk.**

### **Cause:**

These diskettes do not work in this computer because they are from another type of computer that uses a different diskette format (e.g., Macintosh).

### **Solution:**

Return the diskettes to the source and ask for documents on IBM type formatted diskettes.



## **Light bulb is burned out; Replace the light bulb.**

### **Cause:**

Floppy disk drive access light bulb is burned out.

### **Solution:**

Do nothing, replace bulb, or replace drive.

Do one of the following:

- 1) Do nothing (unless user is particularly disturbed by lack of light).
- 2) Replace bulb (if available).
- 3) Replace floppy disk drive.



## **Data ribbon cable is flipped; Flip the cable connector inside the computer.**

### **Cause:**

The data ribbon cable attached to the floppy disk drive is flipped.

### **Solution:**

Flip the cable connector.

- 1) [Remove the base unit cover.](#)



[Photo: Removing cover](#)

- 2) Unplug the floppy drive cable connector, turn it over, and insert it the other way.
- 3) Turn on the computer.
- 4) Insert the diskette in the drive.
- 5) Run any command that accesses that drive (e.g., DIR\*.\*).
- 6) Observe the drive light to see if it lights.
- 7) [Replace the base unit cover.](#)



[Photo: Replacing cover](#)



## **Floppy disk drive light never lights due to bad bulb or flipped cable.**

### **Cause:**

The floppy disk drive light bulb is burned out or the drive data ribbon cable is flipped.

### **Solution:**

Further diagnosis of this problem is required.



## **System shuts down while accessing a disk due to external cause.**

### **Cause:**

Several factors could cause a shutdown while the system is reading or writing to a disk drive. These include power failure, accidentally unplugging the computer, or a system freeze.

### **Solution:**

Restart the computer, review the files and recreate as necessary.

- 1) Turn the computer off (if system is frozen).
- 2) Turn the computer back on.
- 3) Reenter the application and examine the file(s).
- 4) Recreate all or missing portions of the files as necessary.

*NOTE: For future reference, save work in progress more often, in case this happens again.*



## **Disk formatted incorrectly; Format the disk correctly for high or low density.**

### **Cause:**

Diskette in floppy drive is not formatted.

### **Solution:**

Format the diskette.

- 1) Insert the diskette into Drive A and secure the latch.
- 2) Type one of the following commands at the DOS prompt:

FORMAT A:

(If diskette is same size as drive.)

FORMAT a: /F:720

(If formatting a 3.5 inch, double density (DD) diskette in a 3.5 inch high density drive.)

FORMAT a: /F:360

(If formatting a low density 5.25 inch diskette in a high density 1.2MB drive.)



## **Drive definition in CMOS Setup is lost; Run Setup and enter correct drive type.**

### **Cause:**

The floppy drive definition defined in CMOS Setup is lost.

### **Solution:**

Run Setup and enter the correct type of drive. Reaccess the disk drive.



**Disk not fully inserted; Ensure disk is fully inserted  
and latch closed securely.**

**Cause:**

Diskette is not fully inserted in floppy drive or disk drive latch is not completely closed.

**Solution:**

Insert diskette fully into floppy disk drive and make sure latch is securely closed.





## **Cannot access a floppy disk drive due to entering wrong drive name.**

### **Cause:**

Typed wrong logical drive name. For example, typed Drive A when diskette was located in Drive B. (This often occurs with newer computers with a 3.5 inch Drive A with an added 5 1/4 inch Drive B added (when users were used to the opposite).

### **Solution:**

Use the correct logical drive name where diskette is located.



## How to use disk recovery utility; Use the UNFORMAT command to recover files.

### **Cause:**

User mistakenly formatted a disk.

### **Solution:**

Use the UNFORMAT command to recover files on this disk.

Do one of the following:

- 1) MS-DOS 6.x (and 5.x if using MIRROR utility). Type the following command at the DOS prompt:  
UNFORMAT x:  
(Where x is the logical name of the disk drive or the drive containing the diskette.)
- 2) MS-DOS 5.x if not using the MIRROR utility. Type the following command at the DOS prompt:  
UNFORMAT x: /U  
(Where x is the logical name of the disk drive or the drive containing the diskette.)



## Too many characters with repeating groups due to mismatched parameters.

### Cause:

Communications parameters are set higher than locally acceptable (i.e., baud rate) or one or more of the communications parameters (e.g., connection speed, parity, data bits and stop bit) does not match the set at the distant end.

### Solution:

Identify and match communications parameters at both ends and retry communications. Make sure set baud rate does not exceed modem capability.

*NOTE: Set the same serial communications package configuration and parameters on BOTH local and distant communications devices (and communications software packages) for reliable communications. These include baud rate, parity, data bits, stop bits and buffer settings. The most common settings are: connection speed (e.g., 9600 baud), no parity, 8 data bits and 1 stop bit (e.g., 9600,n,8,1). Refer to the communications package software manual for instructions on setting this configuration through the software (sets these parameters on the modem).*

- 1) Make sure the baud rate setting does not exceed the modem capability (check the modem manual for specifics).
- 2) Contact the distant party and find out what communications parameters they are using.
- 3) Apply these communications parameters on this end by entering them in the communications settings option of the communications package. Save the settings.
- 4) Redial the distant party and retry communications.
- 5) Repeat steps 1-3 until good communication is maintainable.



## Number of characters OK but look funny, wrap clear screen due to settings.

### Cause:

Communications parameters are set higher than locally acceptable (i.e., baud rate) or one or more of the communications parameters (e.g., connection speed, parity, data bits and stop bit) does not match that set at the distant end.

### Solution:

Identify and match the communications parameters at both ends and retry communications. Make sure the set baud rate does not exceed modem capability.

*NOTE: Set the same serial communications package configuration and parameters on BOTH local and distant communications devices (and communications software packages) for reliable communications. These include baud rate, parity, data bits, stop bits and buffer settings. The most common settings are: connection speed (e.g., 9600 baud), no parity, 8 data bits and 1 stop bit (e.g., 9600,n,8,1). Refer to communications package software manual for instructions on setting this configuration through the software (sets these parameters on the modem).*

- 1) Make sure the baud rate setting does not exceed the modem capability (check the modem manual for specifics).
- 2) Contact the distant party and find out what communications parameters they are using.
- 3) Apply these communications parameters on this end by entering them in the communications settings option of the communications package. Save the settings.
- 4) Redial the distant party and retry communications.
- 5) Repeat Steps 1-3 until good communication are maintainable.



## **Data file missing parts or contains garbage due to excessive line noise.**

### **Cause:**

Garbage and/or missing file parts due to excessive line noise.

### **Solution:**

Hang-up and redial to try to get another line. Otherwise check local connections or contact the telephone company.

Do one or more of the following until the problem is solved.:

- 1) Hang-up and redial the connection to attempt to get a different, noise-free line.
- 2) If the problem continues, connect a telephone to this line. Pick up the hand set and listen to line for excessive static and noise. If present, do one or more of the following:
  - a) Check the local telephone line connections to the modem and to the wall connection to make sure they are secure.
  - b) Check the local cable for obvious damage. Replace if it is damaged.
  - c) Remove any electrical appliances (e.g., coffee pot, radios, any appliance with a motor) from near the telephone line.
- 3) If static is still present, contact telecommunications or the telephone company to troubleshoot the remaining portion of the line.



## **Data file missing parts or contains garbage due to loose line connections.**

### **Cause:**

Data line connections are loose.

### **Solution:**

Make sure the data line connections are secure.

- 1) Make sure modem line is securely connected to modem.
- 2) Make sure modem line is securely connected to wall telephone receptacle.
- 3) Redial and try communications.



## **Online session contains garbage or mistyped characters due to line noise.**

### **Cause:**

Garbage and mistyped characters on the screen during online session are a clear sign of excessive line noise.

### **Solution:**

Hang-up and redial to try to get another line. Otherwise check the local connections or contact the telephone company.

Do one or more of the following until the problem is solved.:

- 1) Hang-up and redial the connection to attempt to get a different, noise-free line.
- 2) If the problem continues, connect a telephone to this line. Pick up the hand set and listen to the line for excessive static and noise. If present, do one or more of the following:
  - a) Check the local telephone line connections to the modem and to the wall connection to make sure they are secure.
  - b) Check the local cable for obvious damage. Replace if damaged.
  - c) Remove any electrical appliances (e.g., coffee pot, radios, any appliance with a motor) from near the telephone line.
- 3) If static is still present, contact telecommunications or the telephone company to troubleshoot the remaining portion of the line.



## **Communications errors, numerous retries during file transfers due to noise.**

### **Cause:**

Garbage on screen along with numerous errors during file transfers is a clear sign of excessive line noise.

### **Solution:**

Hang-up and redial to try to get another line. Otherwise check the local connections or contact the telephone company.

Do one or more of the following until problem solved.:

- 1) Hang-up and redial connection to attempt to get a different, noise-free line.
- 2) If the problem continues, connect a telephone to this line. Pick up the hand set and listen to the line for excessive static and noise. If present, do one or more of the following:
  - a) Check the local telephone line connections to the modem and to the wall connection, to make sure they are secure.
  - b) Check the local cable for obvious damage. Replace if damaged.
  - c) Remove any electrical appliances (e.g., coffee pot, radios, any appliance with a motor) from near the telephone line.
- 3) If static is still present, contact telecommunications or the telephone company to troubleshoot the remaining portion of the line.





## **Garbled communications during online session due to line noise.**

### **Cause:**

There is extensive line noise somewhere in the telephone lines between the local and distant station.

### **Solution:**

Eliminate local line noise sources and/or contact telephone company for further diagnosis.

Do one or more of the following until problem solved:

- 1) Make sure the local line connections are secure (to modem and to wall).
- 2) Check the local telephone cable for obvious damage. Replace line if damaged.
- 3) Contact local telecommunications or the telephone company to troubleshoot line noise problem.



## **Garbled communications during online session due to loose data cable.**

**Cause:**

The communications data line connections are loose.

**Solution:**

Secure the communications connection to the modem and also the other end into the telephone jack.



## **Garbled communications during online session due to mismatched protocols.**

### **Cause:**

Communications protocols do not match. There are several communications protocols (e.g., XMODEM). Both the local and distant end must use the same communications protocol to download files.

### **Solution:**

Switch to the communications protocol in use by the distant end.

- 1) Contact the distant end and identify communications (download) protocol in use (e.g., XMODEM).
- 2) Change the local setting and make it match the distant end.
- 3) Redial and retry communications session.



## Protocols & settings don't match; Match protocols & settings with other party.

### Cause:

One or more of the communications parameters (e.g., connection speed, parity, data bits and stop bit) does not match the set at the distant end.

### Solution:

Identify and match the communications parameters at both ends and retry communications.

*NOTE: Set the same serial communications package configuration and parameters on BOTH local and distant communications devices (and communications software packages) for reliable communications. These include baud rate, parity, data bits, stop bits and buffer settings. The most common settings are: connection speed (e.g., 9600 baud), no parity, 8 data bits and 1 stop bit (e.g., 9600,n,8,1). Refer to communications package manual for instructions on setting this configuration through the software (sets these parameters on the modem).*

- 1) Contact the distant party and find out what communications parameters they are using.
- 2) Apply these communications parameters on this end by entering them in the communications settings option of the communications package. Save the settings.
- 3) Redial the distant party and retry communications.
- 4) Repeat Steps 1-3 until good communications are maintainable.



## Modem suddenly stops working in middle of call due to memory shortage.

### Cause:

Windows is running low on memory due to many applications running simultaneously. This leaves insufficient resources for the modem to operate properly.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Close as many other windows as possible and retry communications.

- 1) Close all other Windows applications (if possible).
- 2) Retry communications process.

*NOTE: If this problem continues, change the communications buffer size in the SYSTEM.INI file.*

- a) Edit SYSTEM.INI.
- b) Locate the following line or add it:  
COMxBUFFER=nnnn  
(Where x is the number of the COM port (e.g., COM1)).
- c) Increase the size of the COM buffer. Example: If 128 (default), increase value to 1024, as in:  
COM1BUFFER=1024



## **Protocol mix-up; Don't run DOS program when using Windows communication program.**

### **Cause:**

Using a Windows communications program to run a modem at the same time a DOS-based application is running in a DOS window can cause Windows protocols to get mixed up.

### **Solution:**

Avoid running a DOS-based application in DOS window while using a Windows communications program to run the modem.



## **Excessive line noise; Hang-up and retry call.**

### **Cause:**

Excessive line noise causes modem to stop working during call. Noise could be local or distant.

### **Solution:**

Hang-up and retry the call. If the modem continues to stop, hang up the modem, connect a telephone to this line. Pick up the hand set and listen to the line for excessive static and noise. If present, the problem is likely local. Contact telecommunications department or the telephone company to troubleshoot telephone line.



## **Communication severed; Wait until transmission complete before using extensions.**

### **Cause:**

Someone picked up an extension on same line as modem is operating. This usually severs communication and causes modem to hang-up.

### **Solution:**

Ask other people not to pick up the extension on this line until the modem call is complete. Redial call and continue session or transmission.





## Modem dials and connects, but nothing else happens due Com port conflict.

### Cause:

There is a conflict between COM port assignments. Any one of the following could be true. (1) Two devices connected to same COM port. (2) Two devices connected to COM1/COM3 or COM2/COM4 being used simultaneously. (3) Someone reassigned one or more interrupts (IRQs) for COM ports to non-standard assignments, thereby creating an interrupt conflict.

### Solution:

Identify the COM port conflict and reassign device assignments appropriately.

- 1) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- b) Choose 'Com Ports...' from the MSD main screen.



[MSD Choose COM Ports](#)

- c) Identify the port assignments and write them down. Identify which two devices are using conflicting ports.



[MSD Serial Port Configuration](#)

See [Serial & Parallel Port Configuration Standards](#) or additional information.

*NOTE: A mouse connected to COM1 occasionally interferes with a modem connected to COM3. Try to avoid this combination.*

- 2) Change the modem port assignment to a non-conflicting port via software (if internal modem), or disconnect external modem and reconnect it to the new serial port.
  - 3) Save the new settings.
  - 4) Redial the distant party and retry communications.





## **Modem dials and connects, but nothing else happens due to bad parameters.**

### **Cause:**

One or more of the communications parameters (e.g., connection speed, parity, data bits and stop bit) does not match the set at the distant end.

### **Solution:**

Identify and match the communications parameters at both ends and retry communications.

*NOTE: Set the same serial communications package configuration and parameters on BOTH local and distant communications devices (and communications software packages) for reliable communications. These include baud rate, parity, data bits, stop bits and buffer settings. The most common settings are: connection speed (e.g., 9600 baud), no parity, 8 data bits and 1 stop bit (e.g., 9600,n,8,1). Refer to communications package software manual for instructions on setting this configuration through the software (that sets these parameters on the modem).*

- 1) Contact the distant party and find out what communications parameters they are using.
- 2) Apply these communications parameters on this end by entering them in the communications settings option of the communications package. Save the settings.
- 3) Redial the distant party and retry communications.
- 4) Repeat Steps 1-3 until good communications are maintainable.



## **Modem dials and connects, but does nothing else due to baud rate.**

### **Cause:**

The baud rate set at the local end is too high for the distant end to use. The local rate must match or be less-than distant rate.

### **Solution:**

Identify the distant baud rate and change the local setting to match or be less-than distant rate.

- 1) Contact the distant end and find out the maximum baud rate acceptable (e.g., 2400, 9600, 14400, or 28800).
- 2) Make sure a matching or lesser rate is set in local communications package.
- 3) Redial and try to connect.



**Modem is waiting; Press the Enter key several times to get it started.**

**Cause:**

Sometimes the distant end needs some additional attention to get started.

**Solution:**

Press ENTER several times.



## Call waiting stops transmission; Turn off call waiting before using modem.

### Cause:

Call-waiting is turned on. With call-waiting, when another party dials in, the phone line beeps. The local modem does not like this interruption and hangs up.

### Solution:

Eliminate call waiting, or temporarily turn it off when dialing with modem by preceding call with the following:  
\*70,

Do one of the following:

- 1) Eliminate the call waiting option through the telephone company.
- 2) Temporarily disable call-waiting while using the modem:
  - a) Temporarily. Do one of the following:
    - 1] Touch tone phone. Precede every dial command with the following prefix:  
\*70,<phone number>  
Example: \*70,5551212
    - 2] Rotary phone. Precede every dial command with the following prefix:  
1170,<phone number>  
Example: 1170,5551212
  - b) Change the dialing command in the communications package from ATDT... to one of the following:  
ATDT\*70, (Touch tone)  
ATDT1170, (Rotary)



## **Modem comm settings don't match; Match your comm settings to the other party's.**

### **Cause:**

The communication settings are incorrect and do not match the communications settings in use by the device at the distant end.

### **Solution:**

Find out the communications parameters used at the distant party, setup those same communication parameters in the local communications package, and retry communication.

*NOTE: Serial communications package configuration and parameters on BOTH local and distant communications devices (and communications software packages) must be set identically for reliable communications. These include baud rate, parity, data bits, stop bits and buffer settings. The most common settings are: connection speed (e.g., 9600 baud), no parity, 8 data bits and 1 stop bit (e.g., 9600,n,8,1). Refer to communications package software manual for instructions on setting this configuration by via the software (that sets these parameters on the modem).*

- 1) Contact the distant party and find out what communications parameters they are using.
- 2) Apply these communications parameters on this end by entering them in the communications settings option of the communications package. Save the settings.
- 3) Redial the distant party and retry communications.
- 4) Repeat Steps 1-3 until good communications are maintainable.



## **Settings in comm software or modem are wrong; Correct the settings and retry.**

### **Actions:**

Immediate work-around:

- 1) Type the following at the command line, several times if necessary to hang-up:  
AT H (Press ENTER)
- 2) If this does not work, look up hang-up or disconnect command in the modem manual.

### **Cause:**

The settings in the communications software or the modem are not correct. Most likely, the disconnect code is not set correctly.

### **Solution:**

Open the communications program settings and review this section in both the modem manual and the communications package manual to determine correct setting(s). Change setting(s) and try again.





## **All modem serial ports are in use; Disconnect something and use the empty port.**

### **Cause:**

There are two constraints on the number of serial ports available. First, the number of physical ports available and second, the limit that only two serial ports may be used simultaneously.

### **Solution:**

Determine number of serial port connections available by checking rear of base unit. Decide which pair of devices need to be used together.

- 1) Serial ports (COM1, COM2, COM3, COM4) may be used only in certain pairs (i.e., COM1 and COM3 together OR COM 2 and COM4 together). See [Serial & Parallel Port Configuration Standards](#) for additional information.
- 2) The following options are available:
  - a) If 4 COM port connectors are not available, either add an auxiliary connector off of existing I/O, card or install an I/O card that provides more serial ports than current one.
  - b) Configure, for example 4 devices, in useable pairs, attach them permanently and switch between them using software. For example, mouse and modem on COM1/COM2 respectively. Devices 3 and 4 on COM3/COM4 respectively.
  - c) If the mouse occupies a serial port (e.g., COM1), consider installing a bus mouse.
  - d) Configure, for example 4 devices, in useable pairs, and attach one pair temporarily. Physically disconnect them and connect one or both of the other devices when required.



## Computer acts oddly soon after completing online session due to virus.

### Cause:

**WARNING:** Computer VIRUS!. The virus was likely acquired via the online link.

### Solution:

**CAUTION:** Computer viruses are very dangerous, can be destructive, and spread very easily.

Save any open files, close all open applications and turn the computer off immediately!

**CAUTION:** Arrange for a local qualified computer technician to diagnose and remove the virus(es) as soon as possible, using the most recent versions of special virus detection and cleanup programs.

#### 1) Perform immediate shutdown:

- a) Save any open files.
- b) Close all open applications.
- c) Turn the computer off.
- d) Identify and isolate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).

**CAUTION:** Viruses should be diagnosed and repaired by qualified computer technicians using updated virus detection and cleanup software, as follows:

#### 2) Detect and remove virus(es).

- a) Insert a bootable, write-protected diskette in Drive A and power on the computer.
- b) After boot, insert a write-protected diskette containing a virus detection program in Drive A.
- c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette in the vicinity).
- d) Delete all infected files through detection/disk clean virus program.
- e) If virus has infected the boot sector of hard disk, the following command may be useful. Type at the DOS prompt:  
FDISK /MBR  
(The /MBR switch rebuilds the Master Boot Record on the disk.)
- f) Cold boot the computer (Turn the computer off, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.

- g)** Scan all memory and connected drives for viruses again using most thorough scan pattern (some detectors miss viruses on first pass). Use another virus detector program if available (to be absolutely sure all remnants are gone).
- 3)** Check the surrounding area and notify appropriate parties:
  - a)** Scan all nearby PCs and floppy diskettes for viruses (reinfection of disinfected computer from other previously infected diskettes commonly occurs).
  - b)** Notify diskette/transmission providers and receivers. Make sure the owner of the source diskette knows of the infection.
  - c)** Report details of virus (which virus, number of computers affected, suspected damage sustained, and the results of cleanup operations) to designated company authority.
- 4)** Call for expert help from virus software and/or third party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur. Also, consider downloading files and programs onto diskettes, and scanning them before loading them onto hard disk or forwarding them to others.*



## **MODE command limitation; Use a utility program to read serial port information.**

### **Cause:**

The DOS MODE command does not support reading the settings of a serial port.

### **Solution:**

Use another method (i.e., utility program) to read serial port information.



## Can't read interrupt 14H; Use a utility program to read serial port information.

### Cause:

Not all ROM BIOS versions allow interrupt 14H to be used to read serial port settings. For example, the standard IBM BIOS does not allow this, but the Advanced IBM BIOS (ABIOS) does.

*NOTE: A BIOS services are only available on IBM PS/2 systems.*

### Solution:

Use another method (i.e., utility program) to read serial port information. If necessary, the BIOS may be upgraded to one that supports interrupt 14H.



## Serial communications used to work, but not now due to faulty serial cable.

### Cause:

The serial cable is faulty. The cable is damaged or one or more pins may be bent, damaged or broken.

### Solution:

Replace the serial cable.

- 1) Turn the computer base unit off and unplug the power cable.
- 2) Unplug the old serial cable:
  - a) Go to the rear of the distant device and disconnect the connector clips or screws from the data cable running to computer. Note type and location of the connector.
  - b) Trace this cable to the rear of the computer base unit, unscrew the connector screws and carefully unplug the serial cable. Note type and location of the connector.
- 3) Install a new serial cable:
  - a) Align the one end of the data cable serial connector so the pin-shape matches the socket shape, and connect it to the selected serial port socket on back of base unit, determined above. **(WARNING: Do not force connection! Pin or socket damage may result)** Secure connection with attached screws.
  - b) Extend the serial cable to the distant end device, and align the other end of the data cable serial connector so the pin-shape matches the socket shape. Connect it to the selected serial port socket on back of the device. **(WARNING: Do not force connection! Pin or socket damage may result.)** Secure connection with attached screws.
- 4) Turn on the computer system and other devices.
- 5) Open a communications package and make sure the proper serial port is selected (e.g., COM1 or COM2, etc.).
- 6) Set the same serial communications package configuration and parameters on BOTH ends: i.e., both the printer and computer (DOS ) serial port. These include baud rate, parity, data bits, stop bits and buffer settings.
- 7) Resend/receive serial communications.
- 8) Examine the transmission for errors.





## **Modem serial cable loose; Secure serial cable at both ends and retry.**

### **Cause:**

Serial cable is loose at one or both of the connectors.

### **Solution:**

Trace the serial cable to the back of the base unit or external modem, make sure it is securely attached and the retaining screws are tightened. Also check the distant end of cable. Retry communications.





## **Incompatible; Setup different boot configurations for Interlink & Xircom.**

### **Cause:**

Interlink (MS-DOS 6.x) does not work with Xircom Parallel Port Multiplexor (PPX) unless it is attached to the logical port assigned the hardware interrupt (IRQ). Interlink cannot be physically attached to the same port because Xircom is there; thus, they cannot be used together.

### **Solution:**

Use the MS-DOS 6.x multiple-configuration menu to establish 2 different boot configurations appropriate to Interlink and Xircom, respectively.



## Intel EtherExpress card conflicts with scanner due to default port address.

### Cause:

The default I/O port for many scanners is 300. This is also the default port shipped on the Intel EtherExpress network card (shipped with Windows for Workgroups (3.1, 3.11). The two create an address conflict.

### Solution:

Change the port on the network card to one that is not used.

1) Identify the port conflict and alternative address:

- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- b) Choose 'Com Ports...' from the MSD main screen.



[MSD Choose COM Ports](#)

- c) Identify the port assignments and write them down.



[Example: MSD COM Ports](#)

- d) Choose 'LPT Ports...' from the MSD main screen.



[Choose MSD LPT Ports](#)

- e) Identify the port assignments and write them down.



[Example: MSD LPT Ports Configuration](#)

- f) Identify the interrupt (IRQ) assignments using the IRQ Status screen and write them down.



Example: MSD IRQ Status

**CAUTION:** *Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- 2) Change the Base I/O Port address:
  - a) Open 'Network' under 'Control Panel'.
  - b) Choose the 'Adapters' button.
  - c) Select the EtherExpress card from the 'Network Adapters In Use' list.
  - d) Choose 'Setup' button.
  - e) Change the Base I/O Port address to an address that will not conflict with scanner, or other installed or attached devices.
  - f) Close all open windows.



## Adapter card does not work due to bad adapter card.

### Cause:

Adapter card is bad.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Replace the adapter card. Remove the base unit cover, set jumpers/DIP switches on the card, insert the card in the empty slot, connect the ribbon cables (if applicable), install the driver, turn on and test computer system and peripherals, replace the base unit cover and update the rescue diskette.

- 1) Remove the base unit cover.



Photo: Removing cover

- 2) Remove the old adapter card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the adapter card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Place the card in a static-resistant envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 3) Install the new adapter card:
  - a) Remove the adapter card from its box and the protective anti-static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
  - c) Read the adapter card manual and identify which, if any, settings must be changed on the card for this particular computer.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo: Moving jumpers



Photo: DIP Switches

- e) Identify a free expansion slot of proper size, and remove the rear metal slot cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the adapter card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
  - h) If the adapter card attaches to another device, connect the two devices using the supplied ribbon cable. Check the manual to verify connector orientation, and gently insert the cable connector into the card connection and the other device.
- 4) Install the drivers and test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Plug in the necessary cables (power, keyboard, video), and plug in power cable.
  - c) Turn on the computer and related peripherals one at a time.
  - d) Install the driver software for the card from a diskette that came with the card, following the installation/setup instructions in the card's manual.
  - e) Test the application software that uses the drivers and adapter card to make sure proper configuration.
  - f) Replace base unit cover.
  - g) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.



## Adapter card not seated right; Remove and re-insert adapter card.

### Cause:

Adapter card is loose or not completely seated in bus slot.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Reseat the adapter card.

- 1) Remove the base unit cover:



Photo: Removing cover

- a) Turn the computer and all peripherals off.
  - b) Turn the surge protector off and unplug the power cable from the wall socket.  
**WARNING:** Make sure all components are turned off and power cable is disconnected.
  - c) Pull the base unit out slightly so that the rear panel is accessible.
  - d) Carefully unplug all the cables from the back of the base unit.
    - 1] Check each cable for screw or finger-screw connections. Unscrew the connectors.
    - 2] Note the location and orientation of each connector during removal. (If necessary, draw a wiring diagram, or tag the end of each cable to note its proper destination.
    - 3] Carefully unplug each cable. **WARNING:** Do not force or bend connectors to avoid costly damage to the connectors or pins.
  - e) Remove the screws from the top and sides of the back edge of the base unit. Store them together in a safe location.
  - f) Grasp the cover along the sides with two hands. SLOWLY and GENTLY slide the cover forward and off. Set it aside.  
**CAUTION:** Watch carefully to make sure parts of cover DO NOT catch on power or ribbon cables inside the base unit.
  - g) Ground yourself by touching the metal sides of the base unit with a finger.
- 2) Locate the non-working adapter card.

- 3) Touch the metal sides of the base unit to ground any static and, grasping the adapter card by its edges, press straight down firmly and evenly to make sure card is fully seated in bus slot. Avoid side-to-side movements (circuit boards crack easily).
- 4) Reconnect the power cables and turn on the computer.
- 5) Run a program that uses the adapter card.
- 6) If adapter card appears not to work, reseal adapter card:
  - a) Turn off the computer and unplug the power and data cables.
  - b) Make sure any cables connected to the non-working adapter card are disconnected.
  - c) Remove the screw from the top notch of the mounting bracket on the card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the adapter card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - e) Grasping the adapter card by its edges, reinsert the bottom of the card (part with the gold-striped bars) into the same slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - f) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
  - g) Reconnect any cables to the adapter card socket on the back of the adapter card. Secure connector with attached screws.
  - h) Make sure no parts or tools remain in the metal sides of the base unit.
  - i) Replace the necessary cables (power, keyboard, mouse, etc.), and plug the power cable into the surge protector or a wall outlet.
  - j) Turn on the computer.
  - k) Run a program that uses adapter card to determine if the adapter card is operational.



## Memory address or IRQ conflict; Identify conflicts and change settings.

### Cause:

There is a memory address and/or interrupt (IRQ) conflict involving the adapter card.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Run a hardware utility to identify all memory addresses, interrupts (IRQs) and DMA channels in use. Identify conflict and change setting(s) on adapter card to eliminate conflict.

- 1) Choose one of the following methods of conflict resolution (Recommend 'a' as more reliable if source of conflict is unknown):
  - a) Remove all the cards and extra devices from the base unit. Make the computer operational. Reinstall the cards/devices one at a time, until the offending card/device is isolated.
  - b) Pick and choose the card or device believed to cause the problem, change the settings and try again.
- 2) If Step 1a is selected, do the following, if not already completed:
  - a) Edit AUTOEXEC.BAT and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file and reboot the computer.
  - b) Edit CONFIG.SYS and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file and reboot the computer.
  - c) Remove the base unit cover.



Photo: Removing cover

- d) Disconnect all the cables from the installed cards (except the video and controller card).
- e) Remove each card by doing the following:
  - 1] Remove the screw from the top notch of the mounting bracket on the card.
  - 2] Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - 3] Place the card on a static-free surface nearby, noting which slot it was in.
- f) After the appropriate cards/devices are removed, make sure no tools or parts remain inside base unit, reconnect the power and other cables and turn on the computer (it should work fine).



3) Do one of the following:

- a) Run a hardware utility program (e.g., WinSleuth) to identify assigned memory addresses, DMA channels and IRQ assignments.
- b) Run Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt:

C:\DOS\MSD

Choose 'IRQ Status...' from the MSD main screen.



Choose MSD IRQ Status

4) Print out the screen or write down memory addresses, IRQs and DMA assignments.

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- 5) (Optional) Create a card/device inventory sheet listing each card/device, vendor, memory address, IRQ, DMA (where applicable) and driver.
- 6) Read the user manual, and inspect the next device to make sure it does not use a memory address, interrupt (IRQ) or DMA channel that is already assigned. If it does, select an unused setting and Move Jumpers and/or Change DIP Switches to apply the new setting to the card or device. (Consult card/device user manual for more information).
- 7) Turn off the computer and unplug the power cables.
- 8) Install the card and connect any necessary ribbon or power cables.
- 9) Turn on the computer. Watch the boot process and the display to make sure the card/device just added creates no conflicts.
- 10) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and add (or uncomment) only the device driver for the card or device just installed. Save the file and reboot the computer.
- 11) Rerun the hardware utility, and check all assignments to make sure no conflicts exist.
- 12) If the computer locks up (freezes), or something does not work properly, there is a conflict between the card/device just added and what is already installed. Identify the conflicting setting(s) and change the setting(s) on ONE of the cards/devices (preferably the one just added). Be careful not to create additional conflicts by changing a setting.
- 13) Repeat steps 7-12 to install each additional card/device one at a time, until the offender is identified.
- 14) Edit CONFIG.SYS and add (or uncomment) the memory manager (e.g., HIMEM.SYS). Be sure to exclude from memory manager use any card/device addresses assigned above. For example, to exclude the address C800-CFFF from Windows, enter the following command in the [386ENH] section of SYSTEM.INI:  
  
EMMExclude=C800-CFFF  
  
Save the file and reboot the computer. (This prevents Windows from using this portion of memory, and prevents system freezes and crashes.)
- 15) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and add (or uncomment) any desired TSRs or applications one at a time. Save the file and reboot the computer. Make sure they do not create new conflicts.
- 16) If unable to resolve a conflict with a particular card/device, contact the card manufacturer for technical support and assistance.





## Jumpers and/or DIP switches set wrong; Set jumpers and DIP switches properly.

### Cause:

The adapter card has jumpers and/or DIP switches that are not set properly for this installation.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Change the jumpers and DIP Switches, following the instructions that came with the adapter card.

- 1) Remove the base unit cover.



Photo: Removing cover

- 2) Remove the adapter card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the adapter card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Lay the adapter card on a static-free surface.
  - d) Locate the jumpers or DIP switches on the card, and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
  - e) Read the expansion card manual and check that the jumpers or DIP switches are set properly.
  - f) Move Jumpers and/or Change DIP Switches, if necessary.



Photo: Moving jumpers



Photo: DIP Switches

- g) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely

seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily).

**h)** Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.

**3)** Reconnect the power cables and turn on the computer.

**4)** Run a program that uses the adapter card.



## **Adapter card does not work due to multiple possible causes.**

### **Cause:**

Several potential internal problem possibilities exist, including: incorrectly set jumpers or DIP switches, memory address or interrupt (IRQ) conflicts, unseated adapter card, or bad adapter card.

### **Solution:**

Further diagnose the adapter card operability problem.



## **Adapter card software not completely installed; Install adapter card software.**

### **Cause:**

The driver software that came with the adapter card was not installed at all, or is not installed completely.

### **Solution:**

Install the adapter card software.

Try running/rerunning the adapter card software installation:

- 1) Insert the installation diskette in Drive A.
- 2) Do one of the following:
  - a) Follow installation instructions that came with the software diskette for adapter card.
  - b) Type one of the following commands at the DOS prompt:  
A:SETUP  
OR  
A: INSTALL
- 3) Follow the instructions in installation program.
- 4) Press CTRL+ALT+DEL to reboot computer for changes to take effect.
- 5) Run an application that uses the adapter card.



## Adapter card does not work due to bad adapter card.

### Cause:

The adapter card is bad.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Replace the adapter card with a new one. Remove the base unit cover, set jumpers/DIP switches on card, insert the card in the empty slot, connect the ribbon cables (if applicable), install the driver, turn on and test the computer system and peripherals, replace the cover and update the rescue diskette.

- 1) Remove the base unit cover.
- 2) Remove the old adapter card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the adapter card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Place the card in an anti-static envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 3) Install the new adapter card:
  - a) Remove the adapter card from its box and the protective anti-static envelope.
  - b) Locate the jumpers or DIP switches on the card, and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
  - c) Read the adapter card manual, and identify which, if any, settings must be changed on the card for this particular computer.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo: Moving jumpers



Photo: DIP Switches

- e) Identify a free expansion slot of proper size, and remove the rear metal slot cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the adapter card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
  - h) If the adapter card attaches to another device, connect the two devices using the supplied ribbon cable. Check the manual to verify connector orientation, and gently insert the cable connector into the card connection and the other device.
- 4) Install the drivers and test the new configuration:
- a) Make sure no parts or tools remain in the metal sides of the base unit.
  - b) Replace the necessary cables (power, keyboard, video) and plug in the power cable.
  - c) Turn on the computer and related peripherals one at a time.
  - d) Install the driver software for the card from the diskette that came with the card, following the installation/setup instructions in the card's manual.
  - e) Test the application software that uses the drivers and adapter card to make sure proper configuration.
  - f) Replace the base unit cover.
  - g) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.





## Adapter card does not work due to unseated/loose adapter card.

### Cause:

Adapter card is not completely and/or properly seated in the bus slot.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Remove the base unit cover, reseal the adapter card, turn on the computer and rerun an application that uses the adapter card.

- 1) Remove the base unit cover:
  - a) Turn the computer and all peripherals off.
  - b) Turn the surge protector off and unplug the power cable from the wall socket.

**WARNING:** Make sure all components are turned off and power cable is disconnected.
  - c) Pull the base unit out slightly so that the rear panel is accessible.
  - d) Carefully unplug all the cables from the back of the base unit.
    - 1] Check each cable for screw or finger-screw connections. Unscrew the connectors.
    - 2] Note the location and orientation of each connector during removal. (If necessary, draw a wiring diagram, or tag the end of each cable to note its proper destination.
    - 3] Carefully unplug each cable. **WARNING:** Do not force or bend connectors to avoid costly damage to the connectors or pins.
  - e) Remove the screws from the top and sides of the back edge of the base unit. Store them together in a safe location.
  - f) Grasp the cover along the sides with two hands. SLOWLY and GENTLY slide the cover forward and off. Set it aside.

**CAUTION:** Watch carefully to make sure parts of cover DO NOT catch on power or ribbon cables inside the base unit.
  - g) Ground yourself by touching the metal sides of the base unit with a finger.
- 2) Locate the non-working adapter card.
- 3) Touch the metal sides of the base unit to ground any static and, grasping the adapter card by its edges, press straight down firmly and evenly to make sure card is fully seated in bus slot. Avoid side-to-side movements (circuit boards crack easily).
- 4) Reconnect the power cables and turn on the computer.

- 5) Run a program that uses the adapter card.
- 6) If adapter card appears not to work, reseal adapter card:
  - a) Turn off the computer and unplug the power and data cables.
  - b) Make sure any cables connected to the non-working adapter card are disconnected.
  - c) Remove the screw from the top notch of the mounting bracket on the card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the adapter card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - e) Grasping the adapter card by its edges, reinsert the bottom of the card (part with the gold-striped bars) into the same slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - f) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
  - g) Reconnect any cables to the adapter card socket on the back of the adapter card. Secure connector with attached screws.
  - h) Make sure no parts or tools remain in the metal sides of the base unit.
  - i) Replace the necessary cables (power, keyboard, mouse, etc.), and plug the power cable into the surge protector or a wall outlet.
  - j) Turn on the computer.
  - k) Run a program that uses adapter card to determine if the adapter card is operational.



## Adapter card does not work due to memory address or IRQ conflict.

### Cause:

The adapter card does not appear to work due to a card memory address or interrupt (IRQ) conflict.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Run a hardware utility to identify all memory addresses, interrupts (IRQs) and DMA channels in use. Identify the conflict and change setting(s) on adapter card to eliminate the conflict

- 1) Choose one of the following methods of conflict resolution (Recommend 'a' as more reliable if source of conflict is unknown):
  - a) Remove all cards and extra devices from the base unit. Make the computer operational. Reinstall the cards/devices one at a time until offending card/device is isolated.
  - b) Pick and choose the card or device that is believed to cause the problem, change settings and try again.
- 2) If Step 1a was selected, do the following, if not already completed:
  - a) Edit AUTOEXEC.BAT, and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file and reboot the computer.
  - b) Edit CONFIG.SYS, and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file and reboot the computer.
  - c) Remove the base unit cover.
  - d) Disconnect all the cables from installed cards (except the video and controller card).
  - e) Remove each card by doing the following:
    - 1] Remove the screw from the top notch of the mounting bracket on the card.
    - 2] Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
    - 3] Place the card on a nearby static free surface (e.g., an anti-static bag) nearby, noting which slot it was in.
  - f) After appropriate cards/devices are removed, make sure no tools or parts remain inside base unit, reconnect power and other cables and turn on the computer (it should work fine).
- 3) Do one of the following:

- a) Run a hardware utility program (e.g., WinSleuth) to identify assigned memory addresses, DMA channels and IRQ assignments.
- b) Run Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

Choose 'IRQ Status...' from the MSD main screen.



Choose MSD IRQ Status

**CAUTION:** *Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- 4) Print out the screen or write down memory addresses, IRQs and DMA assignments.
- 5) (Optional) Create a card/device inventory sheet listing each card/device, vendor, memory address, IRQ, DMA (where applicable) and driver.
- 6) Read the user manual and inspect the next device to make sure it does not use a memory address, interrupt (IRQ) or DMA channel that is already assigned. If it does, select an unused setting and Move Jumpers and/or Change DIP Switches to apply the new setting to the card or device. (Consult card/device user manual for more information).
- 7) Turn off the computer and unplug the power cables.
- 8) Install the card and connect any necessary ribbon or power cables.
- 9) Turn on the computer. Watch the boot process and the display to make sure the card/device just added does not create a conflict.
- 10) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and add (or uncomment) only the device driver for the card/device just installed. Save the file and reboot the computer.
- 11) Rerun the hardware utility and check all assignments to make sure no conflicts exist.
- 12) If the computer locks up or something does not work properly, there is a conflict between the card/device just added and what is already installed. Identify the conflicting setting(s) and change the setting(s) on ONE of the cards/devices (preferably the one just added). Be careful not to create additional conflicts by changing a setting.
- 13) Repeat steps 7-12 to install each additional card/device, one at a time until the offender is identified.
- 14) Edit CONFIG.SYS and add (or uncomment) the memory manager (e.g., HIMEM.SYS).

Be sure to exclude from memory manager use any card/device addresses assigned above. For example, to exclude the address C800-CFFF from Windows, enter the following command in the [386ENH] section of SYSTEM.INI:

EMMExclude=C800-CFFF

Save the file and reboot the computer. (This prevents Windows from using this portion of memory, and prevents system freezes and crashes.)

- 15) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and add (or uncomment) any desired TSRs or applications one at a time. Save the file and reboot the computer. Make sure no new conflicts are created.
- 16) If unable to resolve a conflict with a particular card/device, contact the card manufacturer for technical support and assistance.





## **Adapter card does not work due to possible IRQ conflict, unseated/bad card.**

### **Cause:**

There are several possible problems that require further diagnosis by an on-site technician: IRQ/Address conflict, adapter card is not seated completely, or adapter card is bad.

### **Solution:**

Continue diagnosis of the adapter card malfunction.



## Adapter card's driver installed wrong; Install adapter card driver properly.

### Cause:

Adapter card does not work because it came with software that is not being loaded from AUTOEXEC.BAT or CONFIG.SYS. It is likely that a recent change (e.g., newly installed device or application) changed one or both of these files and disabled the loading of the driver for this adapter card. It is also possible that the loading sequence is now incorrect.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Make necessary adjustments in AUTOEXEC.BAT and/or CONFIG.SYS to correctly load driver.

*NOTE: Consult the documentation for the adapter card to assist with the steps below.*

- 1) Edit AUTOEXEC.BAT and locate, correct, and/or replace adapter card driver command line.
- 2) Edit CONFIG.SYS and locate, correct and/or replace adapter card driver command line.  
Make sure the sequence of command lines is correct (e.g., HIMEM.SYS should be first).
- 3) Save the file(s).
- 4) Press CTRL+ALT+DEL to reboot computer for changes to take effect.
- 5) Run an application using the adapter card to test.
- 6) If the adapter card still does not work, repeat steps 1-5, look for errors that may have been missed.



## Adapter card will not fit due to card is too long-empty slot-no switch.

### Cause:

The adapter card is too long for the empty slot (i.e., the slot is sized for only a 1/2 size card). Also, some cards are full-length and others are half-length. A half-length card fits anywhere length-wise, and full-length cards will not fit in the half-size slots available in many computers. Another card cannot be switched into this short slot.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

It is not possible to install this card into this computer, given current configuration. Decide whether to do without the new card, or which other card to remove to install the new one.

Proceed, as follows, to replace an existing card with the new one:

- 1) Remove the base unit cover



Photo: Removing cover.

- 2) Remove the old expansion card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Place the card in a static-resistant envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 3) Install new expansion card:
  - a) Remove the expansion card from its box and the protective anti-static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
  - c) Read the expansion card manual and identify which, if any, settings must be changed on the card for this particular computer.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.





Photo: Moving jumpers



Photo: DIP Switches

- e) Identify a free expansion slot of proper size, and remove the rear metal slot cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
  - h) If the expansion card attaches to another device, connect the two devices using the supplied ribbon cable. Check the manual to verify connector orientation, and gently insert the cable connector into the card connection and the other device.
- 4) Install the drivers and test the new configuration:
- a) Make sure no parts or tools remain in the metal sides of the base unit.
  - b) Replace the necessary cables (power, keyboard, video), and plug in the power cable.
  - c) Turn on the computer and related peripherals one at a time.
  - d) Install the driver software for the card from the diskette that came with the card, following the installation/setup instructions in the card's manual.
  - e) Test the application software that uses the drivers and expansion card to make sure proper configuration.
  - f) Replace the base unit cover.
  - g) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.



## Card too long for slot; Switch slots with another adapter card or get new card.

### Cause:

The adapter card is too long for empty slot (i.e., slot is sized for only a 1/2 size card). Also, some cards are full-length and others are half-length. A half-length card fits anywhere length-wise, and full-length cards will not fit in the half-size slots available in many computers.

### Solution:

Switch the candidate card to the empty slot and insert the new adapter card into the slot just made free.

- 1) [Remove the base unit cover](#)



[Photo: Removing cover.](#)

- 2) Find the card in the bus slot to make free for new adapter card, and move it:
  - a) Remove the screw from the top notch of the mounting bracket on the card, and the screw and rear metal slot cover from destination slot.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Insert the bottom of the card (part with the gold-striped bars) into the empty slot. Press down firmly until card is completely seated (especially if it is an EISA card).
  - d) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
- 3) Install the new adapter card:
  - a) Remove the adapter card from its box and the protective anti-static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
  - c) Read the adapter card manual and identify which, if any, settings must be changed on the card for this particular computer.
  - d) [Move Jumpers](#) and/or [Change DIP Switches](#), if necessary.



[Photo: Moving jumpers](#)



Photo: DIP Switches

- e) Identify a free expansion slot of proper size, and remove the rear metal slot cover.
- f) Touch the metal sides of the base unit to ground any static and, grasping the adapter card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated (especially if it is an EISA card).

Avoid side-to-side movements when positioning the card (circuit boards crack easily).

- g) Insert the screw, previously removed from the rear metal slotcover, into the topnotch of the mounting bracket on the card and the screw hole, and tighten it securely.
- h) If the adapter card attaches to another device, connect the two devices using the supplied ribbon cable. Check the manual to verify connector orientation, and gently insert the cable connector into the card connection and the other device.

4) Install the drivers and test the new configuration:

- a) Make sure no parts or tools remain in the metal sides of the base unit.
- b) Replace the necessary cables (power, keyboard, video) and plug in the power cable.
- c) Turn on the computer and related peripherals one at a time.
- d) Install the driver software for the card from the diskette that came with the card, following the installation/setup instructions in the card's manual.
- e) Test an application software that uses the drivers and adapter card to make sure proper configuration.
- f) Replace the base unit cover.
- g) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, SYSTEM.INI, WIN.INI and .GRP files.



## Connector tabs don't match slot; Move adapter cards to put into right size slot.

### Cause:

The right size bus slots for this card are already occupied by other installed adapter cards.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Move an adapter card in the correct size bus slot to the empty slot (make sure it will fit), and place the new card in the slot just made available.

- 1) Remove the base unit cover.



Photo: Removing cover

- 2) Find the card in bus slot to make free for new adapter card and move it:
  - a) Remove the screw from the top notch of the mounting bracket on the card and the screw and rear metal slot cover from destination slot.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Insert the bottom of the card (part with the gold-striped bars) into the empty slot. Press down firmly until card is completely seated (especially if it is an EISA card).
  - d) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
- 3) Install the new adapter card:
  - a) Remove the adapter card from its box and the protective anti-static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
  - c) Read the adapter card manual and identify which, if any, settings must be changed on the card for this particular computer.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo: Moving jumpers



Photo: DIP Switches

- e) Identify a free expansion slot of proper size, and remove the rear metal slot cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the adapter card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
  - h) If the adapter card attaches to another device, connect the two devices using the supplied ribbon cable. Check the manual to verify connector orientation and gently insert the cable connector into the card connection and the other device.
- 4) Install the drivers and test the new configuration:
- a) Make sure no parts or tools remain in the metal sides of the base unit.
  - b) Replace the necessary cables (power, keyboard, video), and plug in the power cable.
  - c) Turn on the computer and related peripherals one at a time.
  - d) Install the driver software for the card from the diskette that came with the card, following the installation/setup instructions in the card's manual.
  - e) Test an application software that uses the drivers and adapter card to make sure proper configuration.
  - f) Replace the base unit cover.
  - g) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.



## **Adapter card does not fit due to wrong card type for this computer bus.**

### **Cause:**

The adapter card is the wrong type for the bus in this computer. Adapter cards vary in size and shape to fit different bus architectures and slot lengths. The most important fit issue is the width of the data path, and the length and positioning of the connector tabs. 8-bit cards have a single connector tab, and 16-bit cards have 2 connector tabs.

### **Solution:**

Return the card to the source and request the right card type to match this bus. Note type of bus slots on bus, and check hardware manual for this computer to verify bus type (e.g., ISA, EISA, or PCI).



## **Same hp driver, different settings/ports, same output due to driver bug.**

### **Cause:**

There is a bug in the HPPCL5A.DRV driver for Windows 3.10 and 3.11. Normally, one can install the same print driver twice to maintain two different configurations for easy selection. In this case, when installing the driver the second time (even with different settings) it overwrites the first driver. Microsoft Corporation has confirmed this as a bug and is researching the problem.

### **Solution:**

Workaround: Select a closely related driver (e.g., HP LaserJet IIID for the HP LaserJet III) and install and configure it as the second option.



## **Suddenly stops printing before end of document due to unseated toner.**

### **Cause:**

Toner cartridge inside the laser printer is not seated correctly or completely.

### **Solution:**

Open the laser printer and reseal the toner cartridge.

- 1) Grasp the cartridge and lift it straight out.
- 2) Reinsert the cartridge back into the printer gently and make sure it is fully seated.
- 3) Close the door, turn the printer on and reprint the document.





## **Suddenly stops printing before end of document due to paper jam.**

### **Cause:**

Laser printer has a paper jam or something else obstructing the paper path.

### **Solution:**

Remove the paper jam.

- 1) Open the top cover of the printer.
- 2) Check the paper path for a paper jam (refer to paper path diagrams on inside cover of the printer for key areas).
- 3) If a paper jam is located, carefully remove the jammed paper, ensuring to remove all of it.  
***WARNING: Internal printer components can be extremely hot!***
- 4) Reinsert the paper and realign it if necessary.
- 5) Close the printer cover.
- 6) Press the printer On Line button to place the printer on line.
- 7) If the printer does not come back on line, there still may be a paper jam somewhere. Repeat Steps 1-6.
- 8) Resend the document to the printer.



## **Incorrect page breaks; Remove incorrect page breaks & page-end codes.**

**Cause:**

Document contains errant page breaks causing confusion and the printer to stop.

**Solution:**

Edit the document and remove all the errant page breaks and page-end codes.



## **Suddenly stops printing before end of document due to wrong paper size.**

### **Cause:**

There is an inconsistency on paper length between the application and the paper loaded in the printer.

### **Solution:**

Open application 'Printer Setup' and correct the paper length.

- 1) Open 'Printer Setup' in the application (or Windows).
- 2) Make sure the paper size selection in the application is set properly and matches the paper loaded in the printer paper tray.
- 3) Make sure the tray containing the desired paper is selected.
- 4) Make sure the printer is on line.
- 5) Resend the document to the printer.



## **Suddenly stops printing before end of document due to manual feed setting.**

### **Cause:**

The application is set for 'Manual Paper Feed'. This means that the printer is expecting someone to feed it paper one sheet at a time.

### **Solution:**

Either feed the printer paper one sheet at a time or remove 'Manual Paper Feed' option choice.

Check application for manual paper feed:

- 1) Open 'Printer Setup' in the application (or Windows).
- 2) Make sure 'Manual Paper Feed' is NOT selected.
- 3) If 'Manual Paper Feed' is selected, do one of the following:
  - a) Uncheck it and reprint the document.
  - b) Manually feed the printer paper until it is done .
- 4) Make sure the printer is on line.
- 5) Resend the document to the printer.



## **Printer stopped; Turn computer off and on, then turn printer off and on.**

### **Cause:**

Either the computer port was hung or the printer memory was hung.

### **Solution:**

Cold boot the computer and turn the printer off and back on.

- 1) Exit all the applications and Windows.
- 2) Turn the computer off. Wait 15 seconds. Turn computer back on.
- 3) Reenter the application.
- 4) Turn the printer off. Wait 15 seconds. Turn printer back on. Make sure printer is on line.
- 5) Reprint the document.



## **Suddenly stops printing before end of document due to no paper in printer.**

### **Cause:**

Printer tray is out of paper.

### **Solution:**

Add paper to the printer.

- 1) Go to the printer.
- 2) Remove the paper tray.
- 3) Add more paper, fanning it prior to insertion to separate sheets.



## **Substantial wait produces only half page due insufficient printer memory.**

### **Cause:**

Printer does not have enough on-board memory (RAM) to print this particular complex document/page.

### **Solution:**

Simplify the document, print at a lower resolution or add more memory to the printer.

Do one or more of the following:

- 1) Simplify the document. The document contains multiple fonts or very complex graphics. Try to use only 1-2 fonts and/or simplify the complex graphics.
- 2) Print at a lower resolution. Choose draft quality, when possible, instead of high-resolution.
- 3) Add additional memory to the printer. Most laser printers come with 1-2MB of memory. Complex graphics often require 6-8MB of memory.



## **Erratic power on laser printer due to faulty printer power supply or fans.**

### **Cause:**

The laser printer has bad or failed internal component(s). One or more of the following components are bad: printer power supply, upper ventilation fan, or lower ventilation fan.

### **Solution:**

Further diagnose the problem and repair faulty component(s).

*NOTE: This should be done by a qualified printer technician or repair shop.*





## Erratic power on laser printer due to poor ventilation in area/vents.

### Cause:

The laser printer is having a difficult time breathing! Either the air vents are clogged with dust, lint or other objects or the printer is positioned in a poorly ventilated area. This lack of circulating air is causing the internal components to overheat and shut the printer down. The printer works again after a while because it has cooled down somewhat.

### Solution:

Move the laser printer and let it cool off. Clean out all vents.

- 1) Turn printer off and let cool for 1 hour.
- 2) Move the printer to an open space with plenty of circulation.
- 3) Inspect all air vents for dirt, dust and other obstructions. Look for vents on the rear and sides of the printer. Clean vents and remove obstructions.
- 4) Plug in the power cable and turn the power switch on. Let the printer run for 30 minutes.
- 5) Reposition the printer, ensuring the vents are not blocked and there is plenty of room around the back of the printer for good air circulation.

*NOTE: Make sure room temperature is not constantly hot.*

- 6) Turn on the printer and reprint the documents.



## Erratic power on laser printer due to damaged printer power cable.

### Cause:

Laser printer power cable is damaged.

### Solution:

Replace the cable.

- 1) Disconnect the old power cable from the laser printer and the electrical socket.
- 2) Plug the new power cable into both the laser printer and the electrical socket. Make sure both ends are plugged in securely.

***WARNING: Avoid damaging (i.e., smashing or crushing) the power cable when moving furniture.***



## **Erratic power on laser printer due to loose power cable.**

**Cause:**

One or both ends of power cable on laser printer is loose.

**Solution:**

Secure both ends of the printer power cable.

- 1) Make sure the printer power cable is securely plugged in to the surge protector or wall receptacle.
- 2) If the printer has detachable power cable, make sure it is securely connected to printer.



## **Fancy fonts/formatting are missing from page due to wrong printer/driver.**

### **Cause:**

Either using the wrong print driver or attempting to print to the wrong printer.

### **Solution:**

Open 'Printer Setup' in the application or Windows and make sure the proper printer and driver are selected.

- 1) Open 'Printer Setup' within the application or in Windows.
- 2) Make sure the correct printer driver for this printer is installed and active.
- 3) Examine all other print options (e.g., form feed) to make sure they are set properly.
- 4) Reprint the document.



## Unwanted blank spots in random locations due to dirty corona wire.

### Cause:

The transfer corona wire inside the printer is dirty.

### Solution:

Clean the corona wire.

- 1) Turn the laser printer off.
- 2) Open the top of the printer by pressing the button to release the latch.

*NOTE: Some printers require removing the paper tray first.*

**CAUTION:** *If the laser printer has been on for an extended time period, several internal components are extremely HOT! Either let printer cool for 15 minutes or be extremely careful not to get burned.*

- 3) Locate the corona wire (near where the paper enters the printer). Consult the printer user manual for assistance.
- 4) Use a cotton swab with some isopropyl (rubbing) alcohol to wipe the corona wire clean.

**CAUTION:** *Do not put extreme pressure on the wire; it breaks easily.*

- 5) Close the lid until the latch clicks.

**CAUTION:** *Do not force the lid closed. If the lid will not close, the toner cartridge is NOT seated properly.*

- 6) Refill and reinstall the paper tray(s).
- 7) Turn the laser printer on and watch the POST. Normally this concludes with the printer generating a sample print page with the manufacturer's logo.
- 8) Print several pages (5) of a document before judging the print quality substandard.



## **Unwanted blank spots in random locations due to damp/poor quality paper.**

### **Cause:**

Two paper-related factors can cause these random spots. First, the paper may be damp; moisture content is too high. Second, the ream of paper may be defective; toner cannot adhere to paper in some places.

### **Solution:**

Replace with fresh paper from another ream.

Check the type of paper in use:

- 1) Remove the paper from the paper tray or bin.
- 2) Select a 16-24 pound copier paper from a fresh ream and fan the paper to separate it.
- 3) Insert the selected paper into the paper tray and return the tray to the printer.
- 4) Make sure the printer is on line.
- 5) Reprint the document.



## **Squashed or stretched images or text due to bad printer drive motor.**

### **Cause:**

The drive motor in the laser printer is bad. It is varying the transport speed of the paper as it travels along the paper path.

### **Solution:**

Repair/replace the laser printer drive motor.

*NOTE: This task must be done by a qualified printer technician.*



## **Squashed or stretched images or text due to dirty/clogged paper path.**

### **Cause:**

The path that the paper takes through the printer is dirty or clogged causing varying transport speed as the paper moves through the printer, producing these squashed or stretched images.

### **Solution:**

Open the printer, clean the paper path and reprint the document.

To clean the paper path:

- 1) Open the top cover of the printer.
- 2) Wipe the paper path with a clean, soft cloth to collect bits of toner (refer to the paper path diagrams on the inside cover for key areas).

***WARNING: Internal printer components can be extremely hot!***

- 3) Reinsert and realign the paper if necessary.
- 4) Close the printer cover.
- 5) Press the printer On Line button to place the printer on line.
- 6) Reprint the document.





## **Squashed or stretched images or text due to heavy or wrong paper.**

### **Cause:**

The type of paper being used in laser printer is inappropriate for this printer. Paper that is heavy stock, glossy, shiny, porous, or textured causes varying transport speed as the paper moves through the printer, producing these squashed or stretched images.

### **Solution:**

Remove the paper in use and replace it with 16-24 pound copier paper and reprint.

- 1) Remove the paper from the paper tray or bin.
- 2) Examine the type of paper in use. The following types should be avoided: heavy stock, glossy, shiny, porous, or textured.
- 3) Select a 16-24 pound copier paper and fan the paper to separate it.
- 4) Insert the selected paper into the paper tray and return the tray to the printer.
- 5) Make sure the printer is on line.
- 6) Reprint the document.



## **Squashed or stretched images or text due to heavy or wrong paper.**

### **Cause:**

The type of paper being used in laser printer is inappropriate for this printer. Paper that is heavy stock, glossy, shiny, porous, or textured causes varying transport speed as the paper moves through the printer, producing these squashed or stretched images.

### **Solution:**

Remove the paper in use and replace it with 16-24 pound copier paper and reprint.

- 1) Remove the paper from the paper tray or bin.
- 2) Examine the type of paper in use. The following types should be avoided: heavy stock, glossy, shiny, porous, or textured.
- 3) Select a 16-24 pound copier paper and fan the paper to separate it.
- 4) Insert the selected paper into the paper tray and return the tray to the printer.
- 5) Make sure the printer is on line.
- 6) Reprint the document.



## **Laser printer prints blank pages due to incorrect printer software setup.**

### **Cause:**

The printer software is incorrectly setup on the computer. A page eject or other setting is wrong.

### **Solution:**

Open 'Printer Setup' in Windows and look for a 'Page Eject' or similar option and change the setting.

Check printer setup:

- 1) Open 'Printer Setup' within the application or in Windows.
- 2) Make sure correct printer driver for this printer is installed and active.
- 3) Examine all other print options (e.g., page eject, form feed) to make sure they are set properly.
- 4) Reprint the document.



## **Laser printer prints blank pages due to application page eject option set.**

### **Cause:**

The page eject option within this application is turned on. This means that it automatically sends a page eject command to the printer after printing every document.

### **Solution:**

Turn off the page eject option inside the application.

- 1) Open 'Options' or 'Printer Setup' within this application.
- 2) Locate a 'Page Eject' or similarly worded option and make sure it is turned off.
- 3) Reprint the document.



## **Laser printer prints blank pages due to extra blank pages in document.**

### **Cause:**

There are extra blank pages inserted in the middle or at the end of this document.

### **Solution:**

Remove or delete the extra blank pages from within the document using the application.



## **Laser printer prints blank pages due to unknown problem with printer unit.**

### **Cause:**

There is an unknown problem with the printer unit itself.

### **Solution:**

The printer needs diagnosis and repair by a qualified printer technician.

Work-around: If available, send the document to another online printer or attach a substitute printer to the computer.



## **Laser printer prints blank pages due to incorrect software printer driver.**

### **Cause:**

The software printer driver installed and/or selected for this printer is incorrect. This printer is expecting a different software driver.

### **Solution:**

Open 'Printer Setup' and choose the correct driver or obtain and install it from printer diskette.

- 1) Select the 'Start' button to access the Windows 'Start' menu.
- 2) Select 'Settings' and select 'Printers'. (The 'Printers' group window appears.)
- 3) [Update or add device to Windows.](#)
- 4) Examine all other print options (e.g., form feed) to make sure they are set properly.
- 5) Reprint the document.



## Paper misaligned, damp or obstructed; Examine paper path in printer.

### Cause:

Perhaps the paper is misaligned, damp, stuck together or there may be an obstruction along the paper path.

### Solution:

Open the printer cover and look at the entrance, primary roller, and exit point for the paper, if there is an obstruction, remove it and close the cover.

- 1) Turn the laser printer power switch off.
- 2) Remove the paper.
- 3) Open the top cover of the laser printer.

***WARNING: Internal printer components can be extremely hot!***

- 4) Look inside to locate and remove the piece(s) of paper causing the jam. Even if one is found, look around for others. Laser printer paper jams generally occur in one of 3 locations:
  - a) Where the paper enters the printer. Carefully remove the paper tray. Look both inside the printer compartment and in from the paper tray slot. Look for sheets that may have fed only partially into the printer. Remove it by tugging gently so as not to tear it.
  - b) Where paper curls around one or more rollers. Carefully lift all flaps and levers. Sometimes the toner cartridge must be removed. Lift it straight out and set it aside.
  - c) The back or top of the printer where completed pages emerge. Gently work it back and forth to remove it.
- 4) Replace toner cartridge, if removed, and make sure that it is properly inserted.
- 5) Some printers require opening and closing each cover and latch prior to recycling. Complete this task, if necessary.
- 6) Close the top cover of the printer until it clicks in place.
- 7) Refill and replace the paper tray(s).
- 8) Make sure the control panel returns to normal (e.g., 00 READY) and press the On Line button.
- 9) If the jam message re-occurs, press the Reset button.
- 10) If the jam message re-occurs again or the printer jams on the first or second page, it is likely that a scrap of paper remains somewhere on the paper path inside the printer. Repeat steps 1-7 until the problem is solved. (See the printer's user manual (Trouble-shooting Paper Jams section) for further guidance.

*NOTE: For future reference, persistent paper jams indicate that the wrong kind of paper is being used in this printer. Use a light-weight 16-24 pound copier paper. Avoid glossy and shiny or porous and textured paper. It may help to fan the paper prior to inserting them into the paper tray to separate the sheets.*







## How to print on envelopes with a laser printer.

### Cause:

Normal envelopes and laser printers do not get along well together. Problems include taking a crooked path, varying thickness, poor glue heat tolerance, narrow size, too many sharp curves in paper path and envelope cupping.

### Solution:

Feed envelopes straight using as straight a path as possible. Make sure envelopes are flat.

Try one or more of the following to feed envelopes through the laser printer:

- 1) Make sure envelopes are completely flat. Run the starting end through 2 fingers several times to flatten them.
- 2) Make sure envelopes are entering the printer straight.
- 3) Simplify the paper path by eliminating extra curves and rollers. Most printers can eject paper straight out back, eliminating a sharp curve.
- 4) Try tucking the envelope flap inside.
- 5) Try other types, sizes and higher quality envelopes.

*NOTE: For future reference, special quality laser printer envelopes are available and may eliminate these problems.*



## Glue from labels melted; Recover missing labels, clean glue from printer.

### Cause:

When normal or ordinary labels are sent through a laser printer the high concentrated heat used to fuse toner to paper melts the label glue and spreads the sticky substance all over the inside of the printer. This causes printer paper jams.

### Solution:

DO NOT use ordinary labels. Attempt to recover all missing labels and clean sticky glue from the paper path and inside the printer. Use labels designed specifically for laser printers.

- 1) Count the labels missing from the label sheets that have been fed through printer.
- 2) Go to printer, turn power switch off and disconnect power cable.
- 3) Open all covers to the printer.
- 3) Immediately begin to remove all labels from within the printer prior to the glue cooling. Locate and peel labels off carefully, recovering as much glue as possible.  
***WARNING:** Internal printer components can be extremely hot!*
- 4) Use a clean, dry rag to remove as much of the sticky glue as possible. Try a small amount of nail polish remover, if necessary.
- 5) After removing all labels and sticky glue, close cover, plug in power cable and turn on printer.
- 6) Print several test pages, using regular paper. Make sure that pages emerge complete and intact. Analyze as follows:
  - a) If paper jams or tears, all labels and glue are not removed.
  - b) If paper emerges with splotches, blank spots, or smeared images and text, the glue has adhered to the drum.
- 7) If either Step 6a or 6b is true, repeat Steps 2-6 as often as required.
- 8) If paper jams continue to occur, or if the printer smells like something is burning, an entire sheet of labels may be stuck inside, STOP using printer and turn it off. Send the printer to a repair shop or have it cleaned and serviced by a qualified printer technician.





## White streaks, faded text or areas due to dirty corona wire.

### Cause:

The corona wire inside the laser printer is dirty. It is located near where the paper enters printer.

### Solution:

Clean the corona wire.

- 1) Turn the laser printer off.
- 2) Remove all paper.
- 3) Open the top by pressing the button to release the latch.  
***CAUTION:** If laser printer has been on for an extended time period, several internal components are extremely HOT! Either let the printer cool for 15 minutes or be extremely careful not to get burned.*
- 4) Locate the corona wire (located near the paper entry location). Consult the printer's user manual for assistance.
- 5) Use a cotton swab with some isopropyl (rubbing) alcohol to wipe corona wire clean.  
***CAUTION:** Do not put extreme pressure on wire; it breaks easily.*
- 6) Close the lid until the latch clicks.  
***CAUTION:** Do not force lid closed. If lid will not close, toner cartridge is NOT seated properly.*
- 7) Refill and reinstall the paper tray(s).
- 8) Turn on the laser printer and watch the POST. Normally this concludes with the printer generating a sample print page with the manufacturer's logo.
- 9) Print several pages (5) of a document before judging the print quality substandard.



## **White streaks, faded text and areas due to low or shifted toner.**

### **Cause:**

The toner in the toner cartridge is running low and/or is shifted in different areas.

### **Solution:**

Readjust toner in toner cartridge.

Try extending the usable life of the old cartridge by several hundred pages prior to discarding or recycling it and installing a new one as follows:

- 1) Grasp the cartridge and lift it straight out.
- 2) Grasp the cartridge in the center with one hand and hold it out at full arms-length away from the body over the floor (this minimizes the chances of getting toner dust on clothes and documents).
- 3) Gently tip the cartridge back and forth from side to side (about 45 degrees each way) about 6 times to redistribute the toner evenly throughout the length of the cartridge.
- 4) Reinsert the old cartridge back into the printer gently, close the door, turn the printer on and run several test prints. If quality problems continue after the fifth printed page, repeat this procedure again.



## **White streaks, faded text or areas due to print density adjusted too low.**

### **Cause:**

The print density (darkness) control is adjusted too light.

### **Solution:**

Adjust the print density (darkness) control higher (darker).

Adjust print density:

- 1) Turn laser printer off and unplug electrical power cord.
- 2) Remove all paper.
- 3) Open the top cover.
- 4) Locate print density adjustment. This adjustment may be called 'Darkness'. (Look for knob inside the printer compartment. Check user manual for specifics.)
- 5) Adjust print density to a higher (darker) setting.
- 6) Close the printer cover.
- 7) Reinsert paper and realign it if necessary.
- 8) Press the printer's 'On Line' button to place printer on line.
- 9) Resend the document to the printer.



## Paper has black spots, splotches, lines streaks due to low toner cartridge.

### Cause:

Toner cartridge in laser printer is low or defective.

### Solution:

Replace toner cartridge. Turn laser printer off, remove all paper and open the printer's top latch. Remove old cartridge. Unpack new toner cartridge and insert it into printer. Pull plastic tab to remove protective strip, close printer top, refill paper tray, turn on the printer and print documents.

- 1) Turn laser printer off.
- 2) Remove all paper.
- 3) Open the top cover by pressing the button to release the latch.  
***CAUTION:** If the laser printer has been on for an extended time period, several internal components are extremely HOT! Either let the printer cool for 15 minutes or be extremely careful not to get burned.*
- 4) Remove the old cartridge:
  - a) Grasp the cartridge and lift it straight out.
  - b) (Optional) Clean dust, dirt and toner from visible parts inside the printer. Consult the printer's owner manual for specific locations and instructions on cleaning materials and techniques.
- 5) Install the new cartridge:
  - a) Remove toner cartridge from container and carefully remove all packing material.
  - b) Orient toner cartridge (refer to diagram) and carefully insert it into opening below printer door until firmly seated.  
***CAUTION:** Do not force or jam cartridge. It will fit properly one way.*
  - c) Locate the plastic tab used to seal the cartridge during shipment. Hold the cartridge in place with one hand. Grasping the tab with the other hand, pull the long plastic film strip straight and steadily away from the cartridge. (This uncovers the opening to the toner.) Discard the plastic strip.
  - d) Making sure the toner cartridge is fully seated, close the lid until the latch clicks.  
***CAUTION:** Do not force lid closed. If the lid will not close, toner cartridge is NOT seated properly.*
- 6) Refill and reinstall the paper tray(s).
- 7) Turn on laser printer and watch the POST. Normally this concludes with the printer generating a sample print page with the manufacturer's logo.
- 8) Print several pages (5) of a document before judging the print quality substandard.



- 9) Recycle or discard the old toner cartridge (following local disposal instructions.)



## **Paper has black spots, splotches, lines or streaks due to shifting toner.**

### **Cause:**

When toner cartridges are used for some time, the remaining toner shifts causing some areas to print fine while other areas create black spots, splotches, lines or streaks. Releveling the toner in the toner cartridge provides a short-term fix.

### **Solution:**

Readjust the toner in the cartridge and reprint documents.

Try extending the usable life of the old cartridge by several hundred pages prior to discarding or recycling it and installing a new one as follows:

- 1) Grasp the cartridge and lift it straight out.
- 2) Grasp the cartridge in the center with one hand and hold it out at full arms-length away from the body over the floor. (This minimizes the chances of getting toner dust on clothes and documents).
- 3) Gently tip the cartridge back and forth from side to side (about 45 degrees each way) about 6 times to redistribute the toner evenly throughout the length of the cartridge.
- 4) Reinsert the old cartridge back into the printer gently, close the door, turn the printer on and run several test prints. If quality problems continue after page 5, repeat this procedure again.

*NOTE: This is really a temporary fix. The toner cartridge is running low on toner. Expect to install a new toner cartridge within a few hundred more pages when these or related symptoms reappear.*



## Paper has black spots, splotches, lines, streaks due to dirty fusing roller.

### Cause:

The fusing roller is dirty with accumulated toner dust. It transfers and bonds the toner to the paper.

### Solution:

Clean the fusing roller.

- 1) Turn off the printer.
- 2) Remove the paper.
- 3) Open the top cover.

***WARNING: Internal printer components can be extremely hot!***

- 4) Locate the fusing roller cleaning pad near the rear of the printer compartment, sometimes under a plastic flap and remove it (usually not fastened). Refer to the printer's user guide to determine the location of the fusing roller.
- 3) Use the cloth end of the cleaning pad to wipe the accumulated toner residue off the fusing roller.
- 4) Replace the cleaning pad back into its groove.
- 5) Wipe any bits of toner dust from inside the compartment.
- 6) Close the printer cover.
- 7) Reinsert paper and realign it if necessary.
- 8) Press the printer's 'On Line' button to place the printer on line.
- 9) Resend the document to the printer.



## Paper has black spots, splotches, lines or streaks due to dirty paper path.

### Cause:

The paper path is dirty with toner dust.

### Solution:

Open printer lid and clean toner from paper path.

Clean paper path:

- 1) Turn off the printer.
- 2) Remove the paper.
- 3) Open the top cover.

***WARNING: Internal printer components can be extremely hot!***

- 4) Wipe down the paper path with a clean, soft rag to collect bits of toner accumulated in the path. (Refer to paper path diagrams on inside cover for key areas.)
- 5) Reinsert paper and realign it if necessary.
- 6) Close the printer cover.
- 7) Press the printer's 'On Line' button to place the printer on line.
- 8) Resend the document to the printer.



## **Paper has black spots, splotches, lines or streaks due to heavy paper.**

### **Cause:**

The toner has difficulty adhering to heavy stock (> 24 pound) paper, creating spots, splotches, lines or streaks.

### **Solution:**

Use standard copier (16-24 pound) paper.



## **Paper has black spots, splotches, lines, streaks due to scratches on drum.**

### **Cause:**

The photosensitive drum that transfers the toner to the paper is scratched.

### **Solution:**

If the images are small or barely noticeable, the user can leave the drum as is. (This will not hurt the printer.)

If the images are too dark or too large to accept, contact a qualified printer technician to have the drum changed.

Do one of the following:

- 1) Leave the drum as is if images are small or barely noticeable.
- 2) Replace the drum cartridge.

*NOTE: This task should be done by a qualified printer technician.*



## **Paper has black spots, splotches, lines, streaks due to scratches on drum.**

### **Cause:**

The photosensitive drum that transfers the toner to the paper is scratched.

### **Solution:**

If the images are small or barely noticeable, the user can leave the drum as is. (This will not hurt the printer.)

If the images are too dark or too large to accept, contact a qualified printer technician to have the drum changed.

Do one of the following:

- 1) Leave the drum as is if images are small or barely noticeable.
- 2) Replace the drum cartridge.

*NOTE: This task should be done by a qualified printer technician.*



## Paper has black spots, splotches, lines or streaks due to dirty corona wire.

### Cause:

The corona wire inside the laser printer is dirty. It is located near where the paper enters printer.

### Solution:

#### Solution:

Clean the corona wire.

- 1) Turn the laser printer off.
- 2) Remove all paper.
- 3) Open the top by pressing the button to release the latch.

***CAUTION:** If laser printer has been on for an extended time period, several internal components are extremely HOT! Either let the printer cool for 15 minutes or be extremely careful not to get burned.*

- 4) Locate the corona wire (located near the paper entry location). Consult the printer's user manual for assistance.
- 5) Use a cotton swab with some isopropyl (rubbing) alcohol to wipe corona wire clean.

***CAUTION:** Do not put extreme pressure on wire; it breaks easily.*

- 6) Close the lid until the latch clicks.

***CAUTION:** Do not force lid closed. If lid will not close, toner cartridge is NOT seated properly.*

- 7) Refill and reinstall the paper tray(s).
- 8) Turn on the laser printer and watch the POST. Normally this concludes with the printer generating a sample print page with the manufacturer's logo.
- 9) Print several pages (5) of a document before judging the print quality substandard.





## Entire page is black due to defective toner cartridge.

### Cause:

When an entire page emerges from the laser printer black, the toner cartridge is either not properly seated or it is defective.

### Solution:

Replace defective toner cartridge. Turn laser printer off, remove all paper and open the printer's top latch. Remove old cartridge. Unpack new toner cartridge and insert it into printer. Pull plastic tab to remove protective strip, close printer top, refill paper tray, turn on the printer and print documents.

- 1) Turn laser printer off.
- 2) Remove all paper.
- 3) Open the top cover by pressing the button to release the latch.

**CAUTION:** *If the laser printer has been on for an extended time period, several internal components are extremely HOT! Either let the printer cool for 15 minutes or be extremely careful not to get burned.*

- 4) Remove the old cartridge:
  - a) Grasp the cartridge and lift it straight out.
  - b) (Optional) Clean dust, dirt and toner from visible parts inside the printer. Consult the printer's owner manual for specific locations and instructions on cleaning materials and techniques.
- 5) Install the new cartridge:
  - a) Remove toner cartridge from container and carefully remove all packing material.
  - b) Orient toner cartridge (refer to diagram) and carefully insert it into opening below printer door until firmly seated.

**CAUTION:** *Do not force or jam cartridge. It will fit properly one way.*

- c) Locate the plastic tab used to seal the cartridge during shipment. Hold the cartridge in place with one hand. Grasping the tab with the other hand, pull the long plastic film strip straight and steadily away from the cartridge. (This uncovers the opening to the toner.) Discard the plastic strip.
  - d) Making sure the toner cartridge is fully seated, close the lid until the latch clicks.
- CAUTION:** *Do not force lid closed. If the lid will not close, toner cartridge is NOT seated properly.*
- 6) Refill and reinstall the paper tray(s).
- 7) Turn on laser printer and watch the POST. Normally this concludes with the printer generating a sample print page with the manufacturer's logo.
- 8) Print several pages (5) of a document before judging the print quality substandard.
- 9) Recycle or discard the old toner cartridge (following local disposal instructions.)





## Entire page is black due to unseated toner cartridge.

### Cause:

The toner cartridge inside the laser printer is not properly seated.

### Solution:

Reseat the toner cartridge and reprint the document.

Reseat toner cartridge:

- 1) Turn laser printer off.
- 2) Remove all paper.
- 3) Open the top cover of the printer by pressing the button to release the latch.

***CAUTION:** If the laser printer has been on for an extended time period, several internal components are extremely HOT! Either let the printer cool for 15 minutes or be extremely careful not to get burned.*

- 4) Reseat the toner cartridge or grasp the cartridge and lift it straight out and reinsert it. Make sure it is fully seated.
- 5) Close the door, turn the printer on, replace the paper and print another page.



## **Paper too moist; Remove paper and replace with new ream of paper.**

### **Cause:**

Paper emerges from the laser printer with creases and curls either because of the paper thickness or because of excessive moisture content absorbed from the air.

### **Solution:**

Remove stack of paper and turn it over or replace with a freshly opened stack.

Do one of the following:

- 1) Remove the stack of paper from the laser printer paper tray and turn it over. Try reprinting the document.
- 2) Replace the stack of paper with a fresh one (just opened). If fresh paper is unavailable, dry some out by placing it in a microwave for a few seconds.
- 3) Try a different kind of paper (higher quality).

*NOTE: For future reference, store paper in a cool dry location away from dust and ambient humidity. Do not open paper until ready to use it, especially during rainy, humid weather.*



## How to clean up toner spilled inside a laser printer.

### Cause:

Accidentally dumped toner dust inside laser printer while removing or inserting toner cartridge. Also, spills are common when transporting printer with installed toner cartridge in a car.

### Solution:

Determine severity of toner spill and take appropriate, immediate clean-up action.

- 1) Turn printer power switch off and unplug power cord from socket.
- 2) Determine severity of toner spill as follows and take appropriate action given below:
  - a) Minor.
  - b) Intermediate.
  - c) Major.

***WARNING:*** *Never blow on toner dust inside the printer. It just spreads it into unreachable spots and makes matters worse. Also, avoid getting toner dust on clothes because it stains (soak only in COLD water).*

- 3) Use the appropriate clean-up action depending on the severity of the spill determined in Step 2).
  - a) Minor spill cleanup: Use a soft, damp rag to pat the area and pick up loose particles. Use a small, soft artist paint brush to sweep particles from hard to reach spots. Reuse rag to blot remaining dust.
  - b) Intermediate spill cleanup: Employ a soft, damp rag to pat the area and pick up loose particles. Use a mini-vacuum cleaner with a narrow nozzle to remove major piles of toner dust.
  - c) Major spill cleanup:

***NOTE:*** *This task should be done by a qualified printer technician. (Be sure to remove toner cartridge prior to transporting printer.)*



## **Ozone gas released by printer; Replace ozone filter.**

### **Cause:**

Laser printers release ozone gas. They use a filter to capture most of it. When one can smell the gas, the filter is worn and should be replaced. Filters on some printers may be replaced by the user, others must be done by a technician.

### **Solution:**

Read the printer's user manual to determine if the ozone filter is user replaceable. If it is, obtain new filter and replace it.

- 1) Read the printer's user manual to determine if the ozone filter is user replaceable.
- 2) Do one of the following:
  - a) If it is user replaceable, obtain a new filter and replace the old one, following the instructions in the user manual.
  - b) If it is NOT user replaceable, send the printer to the repair shop or have it serviced by a qualified printer technician.



## **Where are all the built-in fonts? due to confusion between typeface & font.**

### **Cause:**

The terms 'fonts' and 'typeface' are often confused. What is often referred to as a font is actually a typeface (e.g., CG Times, Helvetica) or a family of letters. CG Times Bold and CG Times Italic are different fonts within the typeface. Therefore 30+ fonts (user focus) may comprise only 8 typefaces.

### **Solution:**

Note the difference. Other typeface families (each containing several fonts) are available in software form and may be purchased separately from 3-party providers.



## **Dirty and/or sticky internal components; Loosen edges of paper before inserting.**

### **Cause:**

The internal components of the laser printer are dirty. There is also a possibility the paper is sticking together. Running regular gummed labels through a laser printer is a key source of the problem because the high heat melts the gum labels.

### **Solution:**

For a quick work-around, grasp ream of paper loosely with both hands and flick the edges like a deck of cards. This loosens the paper so that it will slide through the printer the easier.

- 1) Loosen paper prior to insertion using the above procedure as a quick work-around.
- 2) Clean and service the laser printer as soon as possible.

*NOTE: This task should be done by a qualified printer technician.*

*NOTE: For future reference, make sure that only specially marked packages of heat-insensitive file labels are used in the laser printer.*





## **Cannot change PRN from LPT1 using MODE command due to DOS constraint.**

### **Cause:**

MS-DOS is internally configured at boot time to direct PRN output to LPT1. There is a mistaken notion that the MODE LPT command can be used to redirect PRN output to another parallel port (e.g., from LPT1 to LPT2). This is NOT true. The MODE LPT command only redirects PRN output to serial ports. The MODE LPTn version of the command merely cancels redirection and returns output back to LPT1.

### **Solution:**

Connect output device to LPT1, a serial port or obtain and use a public domain utility to switch the addresses for LPT1 and LPT2, if necessary.



## **Printer does not print anything due to application printer setup problems.**

### **Cause:**

Printer setup configuration within this application is incorrect for this printer and computer configuration.

### **Solution:**

Open the application's 'Printer Setup' and consult the application manual for instructions on setting up this printer for use inside this application.



## **Incorrect print driver/settings; Correct the print driver/settings.**

**Cause:**

The Windows printer driver and or settings are incorrect.

**Solution:**

Select the appropriate printer driver and/or enable the correct printer settings in 'Printer Setup'.

- 1) Open 'Printer Setup' within the application or in Windows.
- 2) Make sure that the correct printer driver for this printer is installed and active.
- 3) Examine all other print options (e.g., form feed) to make sure they are set properly.
- 4) Reprint the document.



## Printer does not print anything due to bad printer data cable.

### Cause:

Printer data cable is bad and should be replaced.

### Solution:

Replace printer data cable.

- 1) Turn off the computer base unit and disconnect the power cable.
- 2) Disconnect the old printer cable:
  - a) Go to the rear of the printer and disconnect connector clips or screws from the data cable running to the computer. Note the type and location of the connector.



Photo: Connect parallel printer cable to printer

- b) Trace this cable to the rear of the computer base unit and unscrew connector screws and carefully remove the printer cable.



Photo: Connect parallel printer cable to base unit

- 3) Connect the new printer cable:
  - a) Attach an identical new printer cable to the same port from which the old one was removed on the back of the base unit.

*NOTE: The cable can only be attached one way. Secure the connector screws.*
  - b) Carry the other end of this cable to the rear of the printer, and connect it to the same port where the old one was removed.

*NOTE: The cable can only be attached one way. Secure the connector clips or screws.*

**WARNING: Do not force the connection. The pins and/or the connector may become damaged.**
- 4) Turn on the power to the computer system and printer.
- 5) Open the application and reprint the document.





## Wrong port connection/setting; Change data cable connection or port assignment.

### Cause:

Either the printer cable is not connected to the correct port (e.g., 25-pin parallel port, LPT1) on the back of the base unit or the printer port assignment inside the software application or Windows is incorrect and does not match the port where the data cable is connected.

### Solution:

Change either the printer data cable connection or the port assignment in 'Printer Setup'.

Do one of the following:

- 1) Reconnect the printer data cable to the correct port on the rear of the base unit (i.e., LPT1):
  - a) Turn off the computer system and printer.
  - b) Trace the cable from the rear of the printer to the back of the computer base unit and unscrew the connector screws and carefully remove the printer cable.
  - c) Connect the printer cable to the desired port (i.e., usually 25-pin parallel port labeled 'Printer' or 'LPT1').



[Photo: Connect parallel printer cable to base unit](#)

***WARNING: Do not force the connection. The pins and/or the connector may become damaged.***

- d) Turn on the power to the computer system and printer.
  - e) Open the application and reprint the document.
- 2) Change the printer port assignment inside the software application or Windows:
  - a) Open 'Printer Setup' within application or Windows. Identify which printer port this application is using.
  - b) [Update or add device to Windows.](#)
  - c) Designate this printer as the primary (default) printer.
  - d) Attempt to print a document to the printer.





## **Printer does not print anything due to improper A/B switch setting.**

### **Cause:**

There is an A/B Switch Box on the data line between the computer and the printer. If this switch is not set in the correct position, the document data stops at the switch. Setting the switch properly provides an open path for document data from the computer to the printer.

### **Solution:**

Set the A/B Switch to the proper setting to enable printing.

- 1) Locate the A/B Switch Box.
- 2) Turn the switch to the proper setting to route printer data from this computer to the desired printer.





## Printer data cable loose; Secure printer data cable.

### Cause:

The data cable between the computer base unit and printer is loose or not connected at all.

### Solution:

Secure both ends of the printer data cable.

- 1) Turn off the computer system and printer.
- 2) Secure the printer cable connections:
  - a) Make sure the printer cable is securely connected to the printer port (usually 25-pin parallel port) on the back of the base unit.



Photo: Connect parallel printer cable to base unit

- b) Trace the same cable to the back of the printer unit and make sure that it is securely connected to the printer port (usually parallel Centronics port). Attach side clips on Centronics connector.



Photo: Connect parallel printer cable to printer

- 3) Turn on the power to the computer system and printer.
  - 4) Open the application and reprint the document.



## Printer does not print anything due to faulty printer.

### **Cause:**

The printer is faulty. A printer that will not generate a stand-alone test print page has internal faults.

### **Solution:**

Diagnose and repair/replace printer.

*NOTE: This should be done by a qualified printer technician.*



## Paper jam in printer; Remove the paper jam.

### Cause:

There is a paper jam in printer preventing it from printing any additional documents.

### Solution:

Open printer, remove paper jam, recycle printer, make sure it is on line and reprint document.

- 1) Go to printer and open top.
- 2) Check the paper path for a paper jam (refer to paper path diagrams on inside cover for key areas).
- 3) If paper jam is located, carefully remove jammed paper, making sure to remove all of it.  
***WARNING: Internal printer components can be extremely hot!***
- 4) Reinsert paper and realign it if necessary.
- 5) Close the printer cover.
- 6) Press the printer's 'On Line' button to place printer on line.
- 7) If the printer does not come back on line, there still may be a paper jam somewhere. Repeat Steps 1-6.
- 8) Resend the document to the printer.



## **Paper is wrong size, type or location; Use correct size, type & tray for paper.**

### **Cause:**

Printer does not have any paper or paper is the wrong type, size or is in the wrong location (i.e., different paper tray).

### **Solution:**

Load sufficient paper of correct type and size in the correct location.

- 1) Make sure the printer has paper, forms or envelopes loaded.
- 2) Check the size and type of paper currently loaded in the printer (including what tray if a laser printer).
- 3) Open 'Printer Setup' in application or Windows.
- 4) Make sure the selected paper size, type of paper and location (i.e., tray) matches what is currently installed in the printer.
- 5) If there are differences, do one of the following:
  - a) If printer contains desired paper size and type, change settings in 'Printer Setup'.
  - b) If 'Printer Setup' contains desired paper size and type, reload the printer with paper of this size and type in the designated location.
- 6) Make sure the printer is on line.
- 7) Resend the document to the printer.



## **Printer off-line or data in buffer; Press on line button, then form feed button.**

### **Cause:**

Printer is off line or page print buffer has data in it.

### **Solution:**

Press On Line button to make sure printer is on line and/or press Form Feed to clear print buffer.

- 1) Make sure the printer is on line. Check the on line light and press the 'On Line' button until the light is lit.
- 2) Press the 'Form Feed' button.



## **Printer does not print at all due to bad printer power supply.**

### **Cause:**

The power supply inside the printer is bad.

### **Solution:**

Replace the printer power supply or replace the printer.

*NOTE: This task should be done by a qualified printer technician.*



## **Blown printer fuse; Replace printer fuse.**

### **Cause:**

The fuse in the printer unit is loose or blown.

### **Solution:**

Reseat or replace the printer fuse.

- 1) Read the printer's manual to determine the location and type of printer fuse.
- 2) Turn off the printer and disconnect the printer power cable.
- 3) Locate the fuse well on the printer (usually inside or on back panel) and check the fuse.
- 4) Replace the blown fuse or reseat the good one. Make sure it is fully seated.
- 5) Close the printer case.
- 6) Reconnect the printer power cable and turn on the printer.
- 7) Try to reprint the document.



## **No power at wall outlet; Correct blown fuse or circuit breaker, move printer.**

### **Cause:**

There is no electrical power at the surge protector or receptacle where printer is plugged in.

### **Solution:**

Plug surge protector into good electrical receptacle or return good electrical power at the receptacle by flipping the circuit breaker or replacing the fuse.

- 1) Do one of the following:
  - a) If the printer is plugged into a surge protector, make sure the surge protector is plugged in and the switch is turned on and the light is lit (or it is OK if the computer is currently running from this same surge protector).
  - b) If the printer is connected to a wall receptacle, make sure there is power at the receptacle. Observe that another appliance plugged into this receptacle is operational or plug a lamp into this receptacle and see if it works.
- 2) If the power receptacle is not working, replace the blown fuse or flip the circuit breaker or move the printer to a working outlet.
- 3) Turn on the printer and try to reprint the document.





## **Printer does not print anything due to loose/unplugged printer power cable.**

### **Cause:**

Printer power cable is loose or not connected to power source.

### **Solution:**

Plug the printer power cable securely into a good power source.

- 1) Plug the printer power cable securely into the surge protector or wall receptacle.
- 2) If the printer has a detachable power cable, make sure it is securely connected to printer.



## **Printer does not print anything due to printer power switch turned off.**

### **Cause:**

Printer power switch is turned off.

### **Solution:**

Turn on the printer power switch.

- 1) Locate the printer power switch. Try one of the following locations:
  - a) Along the left or right side of the printer.
  - b) Somewhere on the rear of the printer.
  - c) Sometimes in the front or along the top.
- 2) Make sure the printer power switch is turned to the 'ON' position (one or more lights should appear on the display).
- 3) Try to reprint the document.



## **Printer has no power due to bad printer power supply.**

### **Cause:**

The power supply inside the printer is bad.

### **Solution:**

Replace the printer power supply or replace the printer.

*NOTE: This task should be done by a qualified printer technician.*



## **Printer has no power due to blown printer power fuse.**

### **Cause:**

Printer has a blown power fuse.

### **Solution:**

Replace the blown printer power fuse with a new one.

- 1) Read the printer manual to determine the location and type of the printer fuse.
- 2) Turn off the printer and disconnect the printer power cable.
- 3) Locate the fuse well on the printer (usually located inside or on the back panel).
- 4) Remove the old blown fuse.
- 5) Insert a new replacement fuse. Make sure it is fully seated.
- 6) Close the printer case.
- 7) Reconnect the printer power cable and turn on the printer.
- 8) Try to reprint the document.



## **Printer has no power due to no electrical power at receptacle.**

### **Cause:**

There is no electrical power at the receptacle being used.

### **Solution:**

Replace the fuse or flip the circuit breaker to return power. Alternatively, move the printer to a good power source.

Check for a good power supply:

- 1) Do one of the following:
  - a) If the printer is plugged into a surge protector, make sure the surge protector is plugged in and the switch is turned on and the light is lit (or it is OK if the computer is currently running from this same surge protector).
  - b) If the printer is connected to a wall receptacle, make sure there is power at the receptacle. Check that another appliance plugged into this receptacle is operational or plug a lamp into this receptacle and see if it works.
- 2) If the power receptacle is not working, check for a blown fuse or circuit breaker or move printer to a working outlet.
- 3) Turn on the printer and try to reprint the document.



## **Printer has no power due to loose or unconnected printer power cable.**

### **Cause:**

Printer power cable is loose or not plugged into power the receptacle and/or printer.

### **Solution:**

Secure the printer power cable to both the power receptacle and the printer (if applicable).

- 1) Make sure the printer power cable is securely plugged into the surge protector or wall receptacle.
- 2) If the printer has a detachable power cable, make sure it is securely connected to printer.



## **Printer has no power due to printer power switch is turned off.**

### **Cause:**

Printer power switch is turned off.

### **Solution:**

Turn on the printer power switch.

- 1) Locate the printer power switch. Try one of the following locations:
  - a) Along the left or right side of the printer.
  - b) Somewhere on the rear of the printer.
  - c) Sometimes in front or along the top.
- 2) Make sure the printer power switch is turned to the ON position (one or more lights should appear on the display).
- 3) Try to reprint the document.



## **Printer has power, but does not print due to faulty printer.**

### **Cause:**

Printer is faulty or defective.

### **Solution:**

Printer needs to be repaired or replaced.

*NOTE: This task should be done by a qualified printer technician.*





## **Printer has power, but will not print due to defective computer port.**

### **Cause:**

The port (usually the parallel port) on the computer that the printer cable is connected to is defective.

### **Solution:**

***CAUTION:*** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Diagnose/replace parallel port and/or I/O card.



## Printer power on, but does not print due to faulty printer data cable.

### Cause:

Printer data cable is faulty.

### Solution:

Replace the printer data cable.

- 1) Turn off the computer base unit and disconnect the power cable.
- 2) Disconnect the old printer cable:
  - a) Go to the rear of the printer and disconnect the connector clips or screws from the data cable running to the computer. Note the type and location of the connector.



Photo: Connect parallel printer cable to printer

- b) Trace this cable to the rear of the computer base unit and unscrew the connector screws and carefully remove the printer cable.



Photo: Connect parallel printer cable to base unit

- 3) Connect the new printer cable:
  - a) Attach an identical new printer cable to the same port from which the old one was removed on the back of the base unit. The cable can only be attached one way. Secure connector screws.
  - b) Carry the other end of this cable to the rear of the printer, and connect it to the same port where the old one was removed. It can also only be attached one way. Secure connector clips or screws.

***WARNING: Do not force connection. The pins and/or the connector may become damaged.***

- 4) Turn on the power to the computer system and printer.
- 5) Open the application and reprint the document.





## **Printer has power, but will not print due to printer off line.**

### **Cause:**

Printer is off line.

### **Solution:**

Press the 'On Line' button on the printer.



## Printer has power, but does not print due to cable to wrong port.

### Cause:

The port on the rear of the base unit that the printer cable is connected to and the port the printer is assigned to in the software application (or Windows) do not match. Example: The cable is connected to LPT2 while the software is using LPT1 or vice versa.

### Solution:

Either reconnect the printer data cable to the correct port or change the printer port designation in the software.

Do one of the following:

- 1) Reconnect the printer data cable to the correct port on the rear of the base unit (i.e., LPT1):
  - a) Turn off the computer system and printer.
  - b) Trace the cable from the rear of the printer to the back of the computer base unit, unscrew the connector screws and carefully remove the printer cable.
  - c) Connect the printer cable to the desired port (i.e., usually 25-pin parallel port labeled 'Printer' or 'LPT1').



[Photo: Connect parallel printer cable to base unit](#)

***WARNING: Do not force the connection. The pins and/or the connector may become damaged.***

- d) Turn on the power to the computer system and printer.
  - e) Open the application and reprint the document.
- 2) Change the printer port assignment inside the software application or in Windows:
  - a) Open 'Printer Setup' from within the application or Windows. Identify which printer port this application is using.
  - b) [Update or add device to Windows.](#)
  - c) Designate this printer as the primary (default) printer.
  - d) Attempt to print a document to the printer.





## **Printer has power, but does not print due to loose printer data cable.**

### **Cause:**

The data cable connecting the printer to the computer is loose or not securely connected to either the printer, the computer or both.

### **Solution:**

Secure the printer data cable connections.

- 1) Turn off the computer system and printer.
- 2) Secure the printer cable connections:
  - a) Make sure the printer cable is securely connected to the printer port (usually 25-pin parallel port) on the back of the base unit.



Photo: Connect parallel printer cable to base unit

- b) Trace the same cable to the back of the printer unit and make sure it is securely connected to the printer port (usually parallel Centronics port). Attach the side clips on the Centronics connector.



Photo: Connect parallel printer cable to printer

- 3) Turn on the power to the computer system and the printer.
- 4) Open the application and reprint the document.



## Printer cable is too short to reach due to limitation of parallel cables.

### Cause:

Parallel communications technology (the medium most often used in connecting printers to computers) has a length limit of 15-25 feet. Parallel cables longer than that generally do not work. Serial printer cables offer effective data transfer at distances up to 100-200 feet and are a good choice for remote printers. However, they transmit data more slowly than parallel cables.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Obtain a slightly longer parallel cable or switch to serial communications.

Do one of the following:

- 1) Carefully move the printer closer to the computer.
- 2) Obtain a slightly longer parallel printer cable and replace the existing short one, as follows:
  - a) Turn off the computer base unit and disconnect the power cable.
  - b) Disconnect the old printer cable:
    - 1] Go to the rear of the printer and disconnect the connector clips or screws from the data cable running to the computer. Note the type and location of the connector.



printer

Photo: Connect parallel printer cable to

- 2] Trace this cable to the rear of the computer base unit and unscrew the connector screws and carefully remove the printer cable.



Photo: Connect parallel printer cable to base unit

- c) Connect the new printer cable:
  - 1] Attach an identical new printer cable to the same port from which the old one was removed on the back of the base unit. The cable can only be attached one way. Secure the connector screws.



- 2] Carry the other end of this cable to the rear of the printer, connect it to the same port where the old one was removed. The cable can only be attached one way. Secure the connector clips or screws.

***WARNING:** Do not force the connection. The pins and/or the connector may become damaged.*

- d) Turn on the power to the computer system and the printer.
  - e) Open the application and reprint the document.
- 3) Switch to serial communications for printing documents at remote printers.



## **New application does not print due to incomplete printer setup in program.**

### **Cause:**

The new application is not configured for this printer. Either this printer is not selected or the print driver is not installed within this application.

### **Solution:**

Open 'Printer Setup' from within the application and select the current printer or run the 'Install' program to add the printer driver for this printer to the application. Once the printer is added, select it from within the application.



## **Printer unable to print particular font; Select another font printer can print.**

### **Cause:**

This application permits choosing this font, but the printer cannot print it.

### **Solution:**

Select another font or select another printer that can print the desired font.

Do one of the following:

- 1) Accept the document the way it is printed.
- 2) Select another printer that can print this font.
- 3) Choose other acceptable fonts that are available in this application that will print on the printer for this computer.



## **Screen and printing fonts differ; See if screen and printing fonts are the same.**

### **Cause:**

Some applications have two sets of fonts: screen or display fonts and printing fonts. It is possible that the screen font is slightly different from the print font of the same name. Also, it could be that only the screen fonts were installed (print fonts were not).

### **Solution:**

Check 'Font Setup' in the application to determine if screen (or viewing) fonts correspond to printing fonts, and that the printing fonts are actually installed. If they are not displayed or not installed incorrectly, reinstall them, following the instructions accompanying the application or fonts package.



## **Software overrides fonts set on printer; Select and set desired fonts in software.**

### **Cause:**

Some software programs automatically override fonts set on the printer. In other words, the desired font is set on the printer, but the application has other settings. When a document prints, the application sends temporary font switches to the printer for the document. This overrides any fonts set on the printer. Afterwards, the printer returns to its own (user supplied) settings.

### **Solution:**

Select and set desired fonts from within the application while the document is open. Then save the document to retain those font settings with this document. Reprint the document.



## **Document created using other fonts; Use original computer/use different fonts.**

### **Cause:**

The document was created on another computer. The fonts used in creating the document are not installed on this computer.

### **Solution:**

Use the other computer, use other fonts or install the desired fonts on the current printer.

Do one of the following:

- 1) Accept the document the way it is printed.
- 2) Use the original computer to finish and reprint the document.
- 3) Choose other acceptable fonts available within the current application on the current computer.
- 4) Obtain the printer and fonts diskette(s) from the application installation disks or CD and install the desired fonts on the current computer.



## **Dirty printer rollers; Clean printer rollers with lint free cloth & cotton swabs.**

### **Cause:**

The paper rollers inside the printer are dirty. This causes the paper to be smudged as it rolls over the rollers.

### **Solution:**

Do one of the following:

- 1) If the rollers are easily accessible and the user is so inclined, clean the rollers with a lint-free cloth and cotton swabs.
- 2) Have the printer cleaned and serviced by a qualified printer technician.



## Paper misfeed; Remove paper, line it up and re-insert it.

### Cause:

The smudged output is caused by the paper misfeeding through the printer.

### Solution:

Remove paper, realign and reinsert it.

- 1) Go to printer and open the top cover.
- 2) Check the paper path for a paper misfeed (refer to the paper path diagrams on the inside cover for key areas).
- 3) If the paper appears to be angled incorrectly, it may be misfeeding through the printer. Carefully remove the paper and reinstall it, making sure it is correctly aligned.

***WARNING: Internal printer components can be extremely hot!***

- 4) Close the printer cover.
- 5) Press the printer 'On Line' button to place the printer on line.
- 6) Resend the document to the printer.





## Output smudged due to low toner in laser printer.

### Cause:

The toner supply is low in the laser printer toner cartridge.

### Solution:

Turn off the laser printer and open the top cover. Remove the old cartridge. Unpack the new toner cartridge and insert it into the printer. Pull the plastic tab to remove the protective strip, close the printer top, refill the paper tray, turn on the printer and print the documents.

- 1) Turn off the laser printer.
- 2) Carefully remove the paper and paper trays.
- 3) Open the top by pressing the button to release the latch.

**CAUTION:** *If the laser printer has been on for an extended time period, several internal components will be extremely HOT! Either let the printer cool for 15 minutes or be extremely careful to prevent burns.*

- 3) Remove the old cartridge:
  - a) Carefully reach inside the printer and grasp the cartridge and lift it straight out until it disengages.
  - b) (Optional) Clean dust, dirt and toner from visible parts inside the printer. Consult the owner's manual for specific locations, and instructions on cleaning materials and techniques.
- 4) (Optional) Consider extending the usable life of the old cartridge by several hundred pages before discarding or recycling it and installing a new one, as follows:
  - a) Remove the cartridge (see Step 3).
  - b) Carefully reach inside the printer and grasp the cartridge in the center with one hand, and hold it out at a full arms-length away from the body. (This minimizes the chances of getting toner dust on clothes and documents).
  - c) Gently tip the cartridge back and forth from side to side (about 45 degrees each way) about 6 times to redistribute the toner evenly throughout the length of the cartridge.
  - d) Reinsert the old cartridge back into the printer gently, close the door, turn on the printer and run several test prints. If quality problems continue after the fifth page, repeat this procedure again. If problems do not clear up, recycle or discard the old cartridge and install a new one.
- 5) Install a new cartridge:
  - a) Remove the new toner cartridge from its container and carefully remove all packing material.
  - b) Orient the toner cartridge (refer to diagram), and carefully insert it into the opening below the printer door until it is firmly seated.

**CAUTION:** *Do not force or jam the cartridge. It will fit properly one way ONLY.*
  - c) Locate the plastic tab used to seal the cartridge during shipment. Hold the cartridge in place with one

hand and grasp the tab with the other hand. Pull the long plastic film strip straight and steadily away from the cartridge (this uncovers the opening to the toner). Discard the plastic strip.

- d)** Close the lid until the latch clicks to make sure the toner cartridge is fully seated.

***CAUTION:** Do not force the lid closed. If lid will not close, the toner cartridge is NOT seated properly.*

- 6)** Refill and reinstall the paper tray(s).
- 7)** Turn on the laser printer and watch the POST. Normally this concludes with the printer generating a sample print page.
- 8)** Print several pages of a document before judging the print quality substandard.
- 9)** Recycle or discard the old toner cartridge (following local disposal instructions.)



## Ribbon worn or low on ink; Replace ribbon or ink cartridge.

### Cause:

The toner or ink supply in the cartridge is low, or the ribbon needs to be changed.

### Solution:

Consider replacing the ink cartridge or ribbon.

- 1) Turn off the power to the printer.
- 2) Carefully remove the paper and paper tray(s).
- 3) Open the top cover.

#### To Install a New Ribbon:

- 1] Carefully reach inside the printer and grasp the ribbon cartridge (not the ribbon itself). Lift until it disengages.

*NOTE: Try gently rocking the ribbon cartridge back and forth to disengage it.*

**CAUTION:** *In order not to damage the print head, carefully slide the printer ribbon out from behind the print head.*

- 2] Unpack the new printer ribbon cartridge.
- 3] If the ribbon appears loose, to take up the slack, gently turn (wind) the tension knob on the cartridge in the direction of the arrow provided.
- 4] Place the ribbon cartridge into position inside the printer. Do not install it yet.
- 5] Slide the ribbon in position behind the print head. Slide it back and forth slightly to make sure it moves freely and that it is in the correct place.
- 6] Once ribbon is correctly positioned, press down firmly on the ribbon cartridge to seat it. Make sure it is fully seated and level.
- 7] Once again, turn the ribbon tension knob on the cartridge in the direction of the arrow to remove the slack from the exposed part of the ribbon. Make sure it slides freely past the print head.
- 8] Wash your hands before handling any paper.

#### To Install a New Cartridge:

- 1] Carefully Reach inside the printer and remove the black ink cartridge from the print head (see the printer's user manual for specifics).
- 2] Place the black ink cartridge in a safe place, preferably inside the cartridge storage case.
- 3] Unpack the color ink cartridge.

- 4] Following the instructions in the printer's user manual, do the following:
  - a] Prepare the ink cartridges.
  - b] Install the cartridges in the printer.
- 4) If the printer has a black/color switch, set the switch/lever to the correct position. (See the printer's user manual for specifics).
- 5) Replace the paper and paper tray(s).
- 6) Turn on the printer. Make sure the print head moves freely and properly to correct initial position.

*NOTE: If the print head does not move freely, it is possible that the ribbon/cartridge is not installed correctly. Refer to the printer's user manual and repeat Step 3.*
- 7) Replace top cover.
- 8) Replace the paper.
- 9) Reprint the document.



## Printer does not print all available colors due to no color installed.

### Cause:

A color ribbon or cartridge is not installed. A colored ribbon or cartridge must be installed to print in color.

### Solution:

Install a colored ribbon or cartridge and reprint the document.

- 1) Turn off the power to the printer.
- 2) Remove all paper.
- 3) Open the top cover.

#### To Install a New Color Ribbon:

- 1] Carefully reach inside the printer and grasp the ribbon cartridge (not ribbon itself). Lift until it disengages.

*NOTE: Try gently rocking the ribbon cartridge back and forth to disengage it.*

**CAUTION:** *In order not to damage the print head, carefully slide the printer ribbon out from behind the print head.*

- 2] Unpack the new printer ribbon cartridge.
- 3] If the ribbon appears loose, to take up the slack, gently turn (wind) the tension knob on the cartridge in the direction of the arrow provided.
- 4] Place the ribbon cartridge into position inside the printer. Do not install it yet.
- 5] Slide the ribbon in position behind the print head. Slide it back and forth slightly to make sure it moves freely and that it is in the correct place.
- 6] Once ribbon is correctly positioned, press down firmly on the ribbon cartridge to seat it. Make sure it is fully seated and level.
- 7] Once again, turn the ribbon tension knob on the cartridge in the direction of the arrow to remove the slack from the exposed part of the ribbon. Make sure it slides freely past the print head.
- 8] Wash your hands before handling any paper.

#### To Install a New Cartridge:

- 1] Carefully Reach inside the printer and remove the black ink cartridge from the print head (see the printer's user manual for specifics).
- 2] Place the black ink cartridge in a safe place, preferably inside the cartridge storage case.
- 3] Unpack the color ink cartridge.

- 4] Following the instructions in the printer's user manual, do the following:
  - a] Prepare the ink cartridges.
  - b] Install the cartridges in the printer.
- 4) If the printer has a black/color switch, set the switch/lever to the correct position. (See the printer's user manual for specifics).
- 5) Replace the paper and paper tray(s).
- 6) Turn on the printer. Make sure the print head moves freely and properly to correct initial position.

*NOTE: If the print head does not move freely, it is possible that the ribbon/cartridge is not installed correctly. Refer to the printer's user manual and repeat Step 3.*
- 7) Replace top cover.
- 8) Replace the paper.
- 9) Make sure application and 'Printer Setup' are set to print color.
- 10) Reprint the document.



## Printer does not print all available colors due to aging ribbon/cartridge.

### Cause:

The installed color ribbon or cartridge is aging and not printing all colors brilliantly (especially if seeing less red, yellow, blue or black colors).

### Solution:

Install a new colored ribbon or cartridge and reprint the document.

- 1) Turn off the power to the printer.
- 2) Remove all paper.
- 3) Open the top cover.

#### To Install a New Color Ribbon:

- 1] Carefully reach inside the printer and grasp the ribbon cartridge (not ribbon itself). Lift until it disengages.

*NOTE: Try gently rocking the ribbon cartridge back and forth to disengage it.*

***CAUTION:** In order not to damage the print head, carefully slide the printer ribbon out from behind the print head.*

- 2] Unpack the new printer ribbon cartridge.
- 3] If the ribbon appears loose, to take up the slack, gently turn (wind) the tension knob on the cartridge in the direction of the arrow provided.
- 4] Place the ribbon cartridge into position inside the printer. Do not install it yet.
- 5] Slide the ribbon in position behind the print head. Slide it back and forth slightly to make sure it moves freely and that it is in the correct place.
- 6] Once ribbon is correctly positioned, press down firmly on the ribbon cartridge to seat it. Make sure it is fully seated and level.
- 7] Once again, turn the ribbon tension knob on the cartridge in the direction of the arrow to remove the slack from the exposed part of the ribbon. Make sure it slides freely past the print head.
- 8] Wash your hands before handling any paper.

#### To Install a New Cartridge:

- 1] Carefully Reach inside the printer and remove the black ink cartridge from the print head (see the printer's user manual for specifics).
- 2] Place the black ink cartridge in a safe place, preferably inside the cartridge storage case.

- 3] Unpack the color ink cartridge.
- 4] Following the instructions in the printer's user manual, do the following:
  - a] Prepare the ink cartridges.
  - b] Install the cartridges in the printer.
- 4) If the printer has a black/color switch, set the switch/lever to the correct position. (See the printer's user manual for specifics).
- 5) Replace the paper and paper tray(s).
- 6) Turn on the printer. Make sure the print head moves freely and properly to correct initial position.

*NOTE: If the print head does not move freely, it is possible that the ribbon/cartridge is not installed correctly. Refer to the printer's user manual and repeat Step 3.*
- 7) Replace top cover.
- 8) Replace the paper.
- 9) Make sure application and 'Printer Setup' are set to print color.
- 10) Reprint the document.





## **Printer prints, but pages missing due to someone hit off line or form feed.**

### **Cause:**

Someone pressed the on line/off line button or the form feed button during the print job. They were impatient to retrieve their own document, and the printer looked frozen (although busy slowly printing this complex document), so they pressed form feed or another button to speed things up. This canceled the rest of this document.

### **Solution:**

Make sure the printer is on line and ready. Resend the document to the printer and watch to make sure no one touches the printer until this document finishes printing.



## Printer prints, but pages missing due to printer paper jam.

### Cause:

Paper is jammed in printer.

### Solution:

Open the printer top, remove the jammed paper(s), realign/reinsert paper if necessary, and reprint document.

Check for a paper jam:

- 1) Go to printer and open the top cover.
- 2) Check the paper path for a paper jam (refer to paper path diagrams on inside cover for key areas).
- 3) If a paper jam is located, carefully remove jammed paper, making sure to remove all of it.  
***WARNING:** Internal printer components can be extremely hot!*
- 4) Reinsert paper and realign it if necessary.
- 5) Close the printer cover.
- 6) Press the printer's 'On Line' button to place the printer on line.
- 7) If the printer does not come back on line, there still may be a paper jam somewhere. Repeat Steps 1-6.
- 8) Resend the document to the printer.



## **Paper defined doesn't match paper in printer; Match paper size/type/tray.**

### **Cause:**

The paper definition (size, type, location (i.e., tray)) in this application (or Windows) does not match that currently loaded in printer.

### **Solution:**

Change the paper size/type/location in either the printer or the application until they match.

Check the paper size and location:

- 1) Check the size and type of paper currently loaded in the printer (including which tray if using a laser printer).
- 2) Open 'Printer Setup' in the application (or Windows).
- 3) Make sure the selected paper size, type of paper and location (i.e., tray) matches what is currently installed in the printer.
- 4) If there are differences, do one of the following:
  - a) If the printer contains the desired paper size and type, change settings in 'Printer Setup'.
  - b) If 'Printer Setup' contains desired paper size and type, reload the printer with paper of this size and type in the designated location.
- 5) Make sure the printer is on line.
- 6) Resend the document to the printer.



## **Incorrect printer setup/driver; Select matching print options and correct driver.**

### **Cause:**

The printer driver or setup options currently selected in application (or Windows) do not match the printer in use.

### **Solution:**

Open 'Printer Setup' and select correct printer driver and set other print options to match this printer's capabilities.



## Printer prints, but pages missing due to printer paper jam.

### Cause:

Paper is jammed in printer.

### Solution:

Open printer top, remove the jammed paper(s), realign/reinsert paper if necessary, and reprint document.

Check for a paper jam:

- 1) Go to printer and open the top cover.
- 2) Check the paper path for a paper jam (refer to paper path diagrams on inside cover for key areas).
- 3) If a paper jam is located, carefully remove jammed paper, making sure to remove all of it.  
***WARNING:** Internal printer components can be extremely hot!*
- 4) Reinsert paper and realign it if necessary.
- 5) Close the printer cover.
- 6) Press the printer's 'On Line' button to place the printer on line.
- 7) If the printer does not come back on line, there still may be a paper jam somewhere. Repeat Steps 1-6.
- 8) Resend the document to the printer.



## **Printer prints, but pages missing due to incorrect printer setup.**

### **Cause:**

The wrong driver is currently selected for this printer, or one or more other printer setup options are not set correctly for this application/environment.

### **Solution:**

Open 'Printer Setup' and select the correct printer driver for this printer and/or other options.

Check printer setup:

- 1) Open 'Printer Setup' within the application or in Windows.
- 2) Make sure the correct printer driver for this printer is installed and active.
- 3) Examine all other print options (e.g., form feed) to make sure they are set properly.
- 4) Reprint the document.



## **Printer prints, but pages missing due to application problem with form feed.**

### **Cause:**

This application has an internal problem and is not generating a final form feed when printing documents. This can also occur when printing to a laser printer (with page buffer) from the DOS prompt using the PRINT command. All pages print except the last page, if the buffer is full. Form Feed must be pressed to eject this page.

### **Solution:**

If this occurs within an application (not at the DOS prompt) try pressing the 'Form Feed' button on the printer.



## **Printer prints, but pages missing due to someone hit off line or form feed.**

### **Cause:**

Someone pressed the on line/off line button or the form feed button during the print job.

### **Solution:**

Make sure printer is on line and press the 'Form Feed' button. Resend the document to the printer if necessary.





## **Printed page looks half finished due to insufficient printer memory.**

### **Cause:**

Printer does not have enough on-board memory (RAM) to print this particular document/page.

### **Solution:**

Simplify the document, print at a lower resolution or add more memory to the printer.

Do one or more of the following:

- 1) Simplify the document. The document contains multiple fonts or very complex graphics. Try to use only 1-2 fonts and/or simplify the complex graphics.
- 2) Print at a lower resolution. Choose draft quality, when possible, instead of high-resolution.
- 3) Add additional memory to printer. Most laser printers come with 1-2MB of memory. Complex graphics often require 4-6MB of memory. This should be done by a qualified technician.



## Page looks blotchy due to printer requires servicing.

### **Cause:**

Blotchy printing includes large patches of ink sporadically on the page, or big empty white spots. The printer needs to have a maintenance check that includes cleaning, adjusting and tuning by a service technician.

### **Solution:**

Printer needs maintenance services, including cleaning, adjustment and tuning.

*NOTE: This maintenance service should be done by a qualified printer technician.*



## **Voluminous garbage output when printing due to wrong printer driver.**

### **Cause:**

Voluminous garbage is often generated when the wrong printer driver (e.g., PostScript) is selected within an application program. For example, PostScript generates pages and pages of 'garbage-looking' output for a single page document.

### **Solution:**

Enter 'Printer Setup' feature in the application being used (or Windows) and select a compatible printer driver that matches the printer's capability, or install the required printer driver if it is not present.



## **Program line feed setting causes overwrite; Change program line feed setting.**

### **Cause:**

The printed output from this application does not contain line feeds due to the program line feed setting.

### **Solution:**

Locate the line feed setting in the application program's installation or setup options, and change the setting.



## Printer line feed DIP switch causes overwrite; Locate DIP switch and flip it.

### Cause:

The line feed DIP Switch on the printer is set not to use line feeds. The problem is either with the computer, or the printer is not sending a line feed control character when one is needed.

### Solution:

Locate the DIP switch that controls line feeds and flip it.

- 1) Read the printer's user manual to determine the following:
  - a) Where the DIP switches are located.
  - b) Which DIP switch controls line feed.
- 2) Turn off the power to the computer system and printer.
- 3) Locate the DIP switch panel on the printer. (Look on rear panel or inside the top cover.)
- 4) Record the current setting of each DIP switch on a notepad.
- 5) Locate the DIP switch number to change.
- 6) Change DIP Switch.
- 7) Turn on the computer system and printer unit.
- 8) Open one or more applications and run one or more test print jobs.
- 9) If printer fails to operate properly, it is likely that the wrong (or another) DIP switch was changed. Reset the DIP switches to the original settings (recorded in Step 3) and try again.



## **Program line feed setting causes double-space; Change program line feed setting.**

### **Cause:**

The printed output from this application is double-spaced due to the program line feed setting.

### **Solution:**

Locate the line feed setting in the application program's installation or setup options, and change the setting.



## **Printer line feed DIP switch causes double space; Locate DIP switch and flip it.**

### **Cause:**

The line feed DIP Switch on the printer is set to double-space lines. The problem is that both the computer and the printer are sending a line feed control character when only one is needed.

### **Solution:**

Locate the DIP switch that controls line feed and flip it.

- 1) Read the printer's user manual to determine the following:
  - a) Where the DIP switches are located.
  - b) Which DIP switch controls line feed.
- 2) Turn off the power to the computer system and printer.
- 3) Locate the DIP switch panel on the printer. (Look on rear panel or inside the top cover.)
- 4) Record the current setting of each DIP switch on a notepad.
- 5) Locate the DIP switch number to change.
- 6) Change DIP Switch.
- 7) Turn on the computer system and printer unit.
- 8) Open one or more applications and run one or more test print jobs.
- 9) If printer fails to operate properly, it is likely that the wrong (or another) DIP switch was changed. Reset the DIP switches to the original settings (recorded in Step 3) and try again.



## Printer data cable defective; Replace printer data cable.

### Cause:

Printer data cable faulty.

### Solution:

Replace printer data cable.

- 1) Turn off the computer base unit and disconnect the power cable.
- 2) Disconnect the old printer cable:
  - a) Go to the rear of the printer and disconnect connector clips or screws from the data cable running to the computer. Note the type and location of the connector.



Photo: Connect parallel printer cable to printer

- b) Trace this cable to the rear of the computer base unit and unscrew connector screws and carefully remove the printer cable.



Photo: Connect parallel printer cable to base unit

- 3) Connect the new printer cable:
  - a) Attach an identical new printer cable to the same port from which the old one was removed on the back of the base unit.

*NOTE: The cable can only be attached one way. Secure the connector screws.*
  - a) Carry the other end of this cable to the rear of the printer, and connect it to the same port where the old one was removed.

*NOTE: The cable can only be attached one way. Secure the connector clips or screws.*

**WARNING: Do not force the connection. The pins and/or the connector may become damaged.**
- 4) Turn on the power to the computer system and printer.
- 5) Open the application and reprint the document.







## Printer data cable loose; Secure printer data cable.

### Cause:

Printer data cable is loose.

### Solution:

Secure printer data cable.

- 1) Turn off the computer system and printer.
- 2) Secure the printer cable connections:
  - a) Make sure the printer cable is securely connected to the printer port (usually 25-pin parallel port) on the back of the base unit.



[Photo: Connect parallel printer cable to base unit](#)

- b) Trace the same cable to the back of the printer unit and make sure it is securely connected to the printer port (usually parallel Centronics port). Attach the side clips on the Centronics connector.



[Photo: Connect parallel printer cable to printer](#)

- 3) Turn on the power to the computer system and the printer.
- 4) Open the application and reprint the document.



## Randomly garbled printer output, no errors on screen due to virus(es).

### Cause:

**WARNING:** Computer VIRUS!

### Solution:

**CAUTION:** *Computer viruses are very dangerous, can be destructive, and spread very easily.*

Save any open files, close all open applications (including Windows) and turn off the computer immediately!

**CAUTION:** *Arrange for a qualified computer technician to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Close Windows.
  - d) Turn off the computer.
  - e) Identify and segregate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and eradicate virus(es).
  - a) Insert a bootable, write-protected diskette in the appropriate drive and turn on the power to the computer.
  - b) After the system boots, insert a write-protected diskette containing a virus detection program in the drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.
  - e) If a virus has infected the boot sector of the hard drive, the following command may be useful. Enter it at the DOS prompt:  
FDISK /MBR  
(The /MBR switch of the FDISK command rebuilds the Master Boot Record on the hard disk.)
  - f) Cold boot the computer (Turn off the computer, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.

- g)** Scan all memory and connected drives for viruses again using the most thorough scan pattern (some detectors miss viruses on the first pass). Use another virus detector program if available (to be absolutely sure all remnants of the virus(es) are gone).
- 3)** Check surrounding environment and notify anyone who has shared these disks or files:
  - a)** Scan all nearby PCs and floppy diskettes for viruses (re-infection of the disinfected computer from other previously infected diskettes commonly occurs).
  - b)** Notify anyone who has used the infected disks. Make sure the owner of the source diskette knows of the infection.
- 4)** Call for expert help from virus software and/or 3rd party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## Printer is slow due to multiple causes.

### Cause:

There are a number of factors that contribute to slow printing: including complex documents, high-resolution, downloading fonts, using non-TrueType fonts, too little RAM and disk space on the computer, and too little memory in printer.

### Solution:

Simplify documents, print in draft mode when possible, install and use available printer fonts, use TrueType fonts, make sure there is sufficient RAM and disk space, and add memory to printer.

Try one or more of the following, when possible, to speed up printing:

- 1) Simplify documents. Using multiple fonts with complex graphics increases printing time. Stick to 1-2 fonts and keep graphics simple.
- 2) Print in draft mode instead of high-resolution when draft quality is acceptable. This will dramatically increase printing speed.
- 3) Each printer has a set of built-in fonts and sizes. Printers also have optional accessories called font cartridges that provide additional fonts to the printer. These printer-installed fonts are made known to applications through the printer driver. Make sure these fonts are installed and use them whenever possible, because they will print much faster than fonts downloaded to the printer via software from the computer.
- 4) Use TrueType fonts in Windows because they print faster.
- 5) Make sure plenty of RAM memory and hard drive space is available to Windows for print spooling. Limited memory and disk space slows printing.
- 6) Add more memory to the printer. This is especially true when often attempting to print complex graphics on a laser printer. Most laser printers come with 1-2MB of memory. Usually, 4-6MB or more is required to print an entire page of complex, full-size graphics. A printer with this much memory will also print more quickly.
- 7) If using Windows with a HP LaserJet printer, consider using the Microsoft Windows Printing System add-on-kit to speed printing.



## Computer makes a constant whining noise due to aging power supply fan.

### Cause:

The fan unit in the power supply, inside the base unit, is aging and beginning to make a lot of noise. The user may continue to use the computer (if they can tolerate the sound) without causing damage. Unfortunately, repair requires replacing the power supply.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Replace power supply.

Remove the base unit cover, disconnect the power cables to the internal components, remove the power supply from metal sides of the base unit. Test the new supply by plugging it in and listening for fan. Insert power supply, connect P8 and P9 to mainboard, connect components, power up and make sure POST completes successfully.

**CAUTION:** Do not attempt to disassemble or repair the power supply; simply replace it.

**NOTE:** If removing an old power supply is not required, skip to Step 8 for installation steps.

### REMOVING POWER SUPPLY

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Remove all power cables running in the trunk from the power supply to the peripherals.
- 3) Remove all power cables from the connectors on the mainboard.
- 4) Draw a diagram of the color coded wiring from the power supply to the power switch for future reference. (There are usually 5 wires: 1-ground, blue, black, brown and white.
- 5) Disconnect the wires to the power switch.
- 6) Locate and remove the screws on the back of the base unit that hold the power supply in place.
- 7) Carefully lift the power supply out of the base unit metal sides of the base unit (be careful not to snag any other cables or boards).

### INSTALLING POWER SUPPLY

- 8) Test the power supply before installation.
  - a) Make sure the power supply is not connected to anything and the switch is OFF.

- b) Plug the power supply into an electrical outlet and turn on the power switch.
  - c) Listen for the fan operation.
  - d) Turn off the power supply and disconnect it from the electrical outlet.
  - e) If the power supply does not work, replace it before installation.
- 9) Insert the power supply into the metal sides of the base unit. Connect power connectors P8 and P9 to the mainboard. Connect the remaining power supply cables to the internal disk drives. If the power supply uses a remote switch, remount the switch. Make sure the power supply switch is OFF. Attach the external power cable to the back of the base unit and connect the other end to the power supply (preferably through a surge protector). Turn the power switch to the ON position. Make sure the fan is functioning and the computer passes the POST. Make sure each connected device (e.g., disk drives) operates properly. If a device does not function, turn off the power, disconnect the power cable and recheck the power cable connections. Repeat steps 14)-16), as necessary. Replace base unit cover.

**CyberMedia<sup>®</sup>**

Photo: Replacing cover



## Computer makes a constant whining noise due to aging power supply fan.

### Cause:

The fan unit in the power supply, inside the base unit, is aging and beginning to make a lot of noise. The user may continue to use the computer (if they can tolerate the sound) without causing damage. Unfortunately, repair requires replacing the power supply.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Replace power supply.

Remove the base unit cover, disconnect the power cables to the internal components, remove the power supply from metal sides of the base unit. Test the new supply by plugging it in and listening for fan. Insert power supply, connect P8 and P9 to mainboard, connect components, power up and make sure POST completes successfully.

**CAUTION:** Do not attempt to disassemble or repair the power supply; simply replace it.

**NOTE:** If removing an old power supply is not required, skip to Step 8 for installation steps.

### REMOVING POWER SUPPLY

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Remove all power cables running in the trunk from the power supply to the peripherals.
- 3) Remove all power cables from the connectors on the mainboard.
- 4) Draw a diagram of the color coded wiring from the power supply to the power switch for future reference. (There are usually 5 wires: 1-ground, blue, black, brown and white.
- 5) Disconnect the wires to the power switch.
- 6) Locate and remove the screws on the back of the base unit that hold the power supply in place.
- 7) Carefully lift the power supply out of the base unit metal sides of the base unit (be careful not to snag any other cables or boards).

### INSTALLING POWER SUPPLY

- 8) Test the power supply before installation.
  - a) Make sure the power supply is not connected to anything and the switch is OFF.
  - b) Plug the power supply into an electrical outlet and turn on the power switch.



- c) Listen for the fan operation.
  - d) Turn off the power supply and disconnect it from the electrical outlet.
  - e) If the power supply does not work, replace it before installation.
- 9) Insert the power supply into the metal sides of the base unit. Connect power connectors P8 and P9 to the mainboard. Connect the remaining power supply cables to the internal disk drives. If the power supply uses a remote switch, remount the switch. Make sure the power supply switch is OFF. Attach the external power cable to the back of the base unit and connect the other end to the power supply (preferably through a surge protector). Turn the power switch to the ON position. Make sure the fan is functioning and the computer passes the POST. Make sure each connected device (e.g., disk drives) operates properly. If a device does not function, turn off the power, disconnect the power cable and recheck the power cable connections. Repeat steps 14)-16), as necessary. Replace base unit cover.



Photo: Replacing cover



## Computer has no customary whirring sound (from fan) due to dead fan.

### Cause:

The fan unit inside the power supply inside the base unit is dead. Unfortunately, repair requires replacing the power supply.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Replace power supply.

Remove the base unit cover, disconnect the power cables to the internal components, remove the power supply from metal sides of the base unit. Test the new supply by plugging it in and listening for fan. Insert power supply, connect P8 and P9 to mainboard, connect components, power up and make sure POST completes successfully.

**CAUTION:** Do not attempt to disassemble or repair the power supply; simply replace it.

**NOTE:** If removing an old power supply is not required, skip to Step 8 for installation steps.

### REMOVING POWER SUPPLY

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Remove all power cables running in the trunk from the power supply to the peripherals.
- 3) Remove all power cables from the connectors on the mainboard.
- 4) Draw a diagram of the color coded wiring from the power supply to the power switch for future reference. (There are usually 5 wires: 1-ground, blue, black, brown and white.
- 5) Disconnect the wires to the power switch.
- 6) Locate and remove the screws on the back of the base unit that hold the power supply in place.
- 7) Carefully lift the power supply out of the base unit metal sides of the base unit (be careful not to snag any other cables or boards).

### INSTALLING POWER SUPPLY

- 8) Test the power supply before installation.
  - a) Make sure the power supply is not connected to anything and the switch is OFF.
  - b) Plug the power supply into an electrical outlet and turn on the power switch.

- c) Listen for the fan operation.
  - d) Turn off the power supply and disconnect it from the electrical outlet.
  - e) If the power supply does not work, replace it before installation.
- 9) Insert the power supply into the metal sides of the base unit. Connect power connectors P8 and P9 to the mainboard. Connect the remaining power supply cables to the internal disk drives. If the power supply uses a remote switch, remount the switch. Make sure the power supply switch is OFF. Attach the external power cable to the back of the base unit and connect the other end to the power supply (preferably through a surge protector). Turn the power switch to the ON position. Make sure the fan is functioning and the computer passes the POST. Make sure each connected device (e.g., disk drives) operates properly. If a device does not function, turn off the power, disconnect the power cable and recheck the power cable connections. Repeat steps 14)-16), as necessary. Replace base unit cover.



Photo: Replacing cover



## Computer has no customary whirring sound (from fan) due to dead fan.

### Cause:

The fan unit in the power supply inside the base unit is dead. Unfortunately, repair requires replacing the power supply.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Replace power supply.

Remove the base unit cover, disconnect the power cables to the internal components, remove the power supply from metal sides of the base unit. Test the new supply by plugging it in and listening for fan. Insert power supply, connect P8 and P9 to mainboard, connect components, power up and make sure POST completes successfully.

**CAUTION:** Do not attempt to disassemble or repair the power supply; simply replace it.

**NOTE:** If removing an old power supply is not required, skip to Step 8 for installation steps.

### REMOVING POWER SUPPLY

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Remove all power cables running in the trunk from the power supply to the peripherals.
- 3) Remove all power cables from the connectors on the mainboard.
- 4) Draw a diagram of the color coded wiring from the power supply to the power switch for future reference. (There are usually 5 wires: 1-ground, blue, black, brown and white.
- 5) Disconnect the wires to the power switch.
- 6) Locate and remove the screws on the back of the base unit that hold the power supply in place.
- 7) Carefully lift the power supply out of the base unit metal sides of the base unit (be careful not to snag any other cables or boards).

### INSTALLING POWER SUPPLY

- 8) Test the power supply before installation.
  - a) Make sure the power supply is not connected to anything and the switch is OFF.
  - b) Plug the power supply into an electrical outlet and turn on the power switch.

- c) Listen for the fan operation.
  - d) Turn off the power supply and disconnect it from the electrical outlet.
  - e) If the power supply does not work, replace it before installation.
- 9) Insert the power supply into the metal sides of the base unit. Connect power connectors P8 and P9 to the mainboard. Connect the remaining power supply cables to the internal disk drives. If the power supply uses a remote switch, remount the switch. Make sure the power supply switch is OFF. Attach the external power cable to the back of the base unit and connect the other end to the power supply (preferably through a surge protector). Turn the power switch to the ON position. Make sure the fan is functioning and the computer passes the POST. Make sure each connected device (e.g., disk drives) operates properly. If a device does not function, turn off the power, disconnect the power cable and recheck the power cable connections. Repeat steps 14)-16), as necessary. Replace base unit cover.



Photo: Replacing cover



## **Blue-white smoke comes out vents, acrid smell due to blown power supply.**

### **Actions:**

STOP! Turn computer power off IMMEDIATELY!!!

Then disconnect all power cables from computer and DO NOT turn computer back on or attempt to use it.

### **Cause:**

A power surge or faulty wiring has blown the base unit power supply, and perhaps other base unit internal components.

### **Solution:**

***CAUTION:*** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

DO NOT reconnect the computer to electrical power or attempt to use the computer or diagnose its status yourself.



## NETX.EXE and LOADHIGH in remove boot configuration due to virtual drive A.

### Cause:

Receive non-passable error: Insert disk with /COMMAND.COM in drive A. This occurs because referenced drive is the virtual drive A established by the remote boot procedure. Also, the extra '/L' syntax in the LOADHIGH command contributes to the problem.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Remove '/L' from both the remote boot image and the matching AUTOEXEC.BAT file in login or home directory.

- 1) Edit AUTOEXEC.BAT and remove the '/L:0' portion of the command. EXAMPLE

LOADHIGH /L:0 NETX.EXE

Change to read:

LOADHIGH NETX.EXE

- 2) Make the same change in the remote boot image (typically NET\$DOS.SYS) and recreate it.
- 3) Reboot the computer.



## **TSR or device driver problem; Contact the program manufacturer for assistance.**

### **Cause:**

There is an undetermined problem with the program (TSR) or device driver.

### **Solution:**

Use a file/disk recovery utility to examine the integrity of the file. There is no solution in this Knowledge base. Contact the program vendor for technical assistance.





## Program or device driver can't run in high memory; Load and run in low memory.

### Cause:

This particular program (TSR) or device driver is not capable of running in upper memory.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Load and run the program or device driver in conventional (low) memory.

- 1) Edit AUTOEXEC.BAT and locate the line for the program (TSR).
- 2) Edit CONFIG.SYS and locate line with the device driver.
- 3) Remove the LOADHIGH= (AUTOEXEC.BAT) or DEVICEHIGH= (CONFIG.SYS) prefix from the front of the command line.
- 4) Save the file and reboot the computer.
- 5) Enter MEM /C /P at the DOS prompt to list programs by memory location.



## Size switch problem; Remove the size switch from the command line.

### Cause:

Sometimes a size switch on a program (TSR) or device driver causes problems when attempting to load the program/device driver into upper memory.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Remove the size switch from the command line for the program or device.

Determine if the program/device driver attempting to load high includes a size switch.

- 1) Edit AUTOEXEC.BAT and locate the line for the program (TSR).
- 2) Edit CONFIG.SYS and locate the line with the device driver.
- 3) If the program/TSR or device driver has a size switch following it (on the same line), write that switch down for reference and remove it (temporarily).
- 4) Save the file and reboot the computer.
- 5) Enter MEM /C /P at the DOS prompt to list programs by memory location. Determine if applicable programs/device drivers are loading high (in the UMA).



## Commands loaded into high memory; Remove the LOADHIGH or DEVICEHIGH prefix.

### Cause:

HIMEM.SYS, EMM386.EXE and SMARTDRV.EXE must be loaded into conventional (low) memory.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Remove the LOADHIGH or DEVICEHIGH prefix from these commands.

Determine if the system is attempting to load one of the following commands into high memory:

- 1) Edit AUTOEXEC.BAT and locate the line containing the command SMARTDRV, if present. It should NOT be preceded with the LOADHIGH command.
- 2) Edit CONFIG.SYS and locate lines with HIMEM.SYS (or another memory manager) and EMM386.EXE.  
EXAMPLE

DEVICE=C:\DOS\HIMEM.SYS

DEVICE=C:\EMM386.EXE

DEVICE=C:\DOS\SMARTDRV.SYS (DOS 5.0 ONLY)

They should NOT be preceded with a DEVICEHIGH prefix.

- 3) If any of these commands are preceded with LOADHIGH= (AUTOEXEC.BAT) or DEVICEHIGH= (CONFIG.SYS) remove this prefix.
- 4) Save the files and reboot the computer.
- 5) Enter MEM /C /P at the DOS prompt to list programs by memory location.



## Zenith SuperSport 80286 with 1MB cannot load DOS high due hardware design.

### Cause:

Zenith SuperSport 80286 with 1MB of memory cannot load DOS high (DOS versions 5.0 or later) due to an incompatible hardware design. This system was designed to provide 640KB for the base, 128KB for video/ROM BIOS, and 256KB reserved for expanded memory. Using additional expanded memory is NOT possible.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

To use the existing 256KB of extended memory, load the Zenith memory manager.

- 1) Edit CONFIG.SYS.
- 2) Add the following line to CONFIG.SYS:  
DEVICE=C:\DOS\EMM.SYS
- 3) Save the file.
- 4) Press CTRL+ALT+DEL to reboot the computer for change to take effect.
- 5) (Optional) Do one or both of the following:
  - a) Load other devices in this upper memory area by prefacing the device driver command in CONFIG.SYS with DEVICEHIGH.
  - b) Load other programs (TSRs) in this upper memory area by prefacing the load command in AUTOEXEC.BAT with LOADHIGH.



## QEMM cannot load high DISPLAY.SYS and PRINTER.SYS due to bug.

### Cause:

The QEMM LOADHI.SYS command (in QEMM-386 version 5.13 and earlier, 50/60 5.00 and earlier and QRAM 1.01 and earlier) cannot successfully load the MS-DOS 5.0 version of DISPLAY.SYS or PRINTER.SYS drivers into the upper memory area. Quarterdeck acknowledges this as a bug.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Use DOS 5.0 DEVICEHIGH command or load device drivers into low memory.

1) Edit CONFIG.SYS.

2) Do one of the following, if applicable, as a work around:

a) *NOTE: The computer must have a 386 or higher processor and 1MB of RAM.*

Use the DOS 5.0 DEVICEHIGH command to load these drivers into high memory. Sample CONFIG.SYS:

```
DEVICE=C:\DOS\HIMEM.SYS
```

```
DEVICE=C:\DOS\EMM386.EXE NOEMS
```

```
DOS=HIGH,UMB
```

```
DEVICEHIGH=C:\DOS\DISPLAY.SYS
```

```
DEVICEHIGH=C:\DOS\PRINTER.SYS
```

b) Load the drivers into low memory. Example command lines in CONFIG.SYS:

```
DEVICE=C:\DOS\DISPLAY.SYS
```

```
DEVICE=C:\DOS\PRINTER.SYS
```

3) Save the file.

4) Press CTRL+ALT+DEL to reboot computer for the changes to take effect.





## Added memory not recognized due to mainboard DIP/jumper settings.

### Cause:

Some computers require changing the settings on [DIP Switches](#) or [Jumpers](#) to indicate that additional memory is now installed.

### Solution:

***CAUTION:*** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Consult the hardware manual for the computer and change jumpers and/or set DIP switches on the mainboard.



## Added memory not recognized due to mainboard DIP/jumper settings.

### Cause:

Some computers require changing the settings on [DIP Switches](#) or [Jumpers](#) to indicate that additional memory is now installed.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Consult the hardware manual for the computer and change the jumpers and/or set the DIP switches on the mainboard.





## Memory manager not configured right; Install/configure memory manager correctly.

### Cause:

DOS is unable to use system memory beyond 640KB without the assistance of a memory manager (a special software program designed to manage system memory). If the memory manager is not installed and configured correctly, the computer will not recognize additional system memory. Memory managers are available with DOS, and Windows, and from third-party providers.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Make sure memory manager (e.g., HIMEM.SYS) is installed and configured correctly for available system memory.

- 1) Edit CONFIG.SYS and try to locate a line with a memory manager (e.g., HIMEM.SYS, QEMM, etc.) similar to the following:  
DEVICE=C:\DOS\HIMEM.SYS
- 2) Do one of the following:
  - a) If the command is present, check that the drive, path and filename used in the command are correct. Especially make sure the path is correct, and that the HIMEM.SYS line (or line for other memory manager) is listed first.
  - b) If the command is not present, add the command shown in Step 2a to the CONFIG.SYS file.  
*NOTE: It should be the first command in the file.*
- 3) Save the file and reboot the computer.
- 4) Do one or both of the following:
  - a) Enter MEM at the DOS prompt to view available memory.
  - b) Load application that uses the additional memory (e.g., Windows).



## Setup configuration not updated; Update the memory section of Setup.

### Cause:

When hardware changes (e.g., adding system memory) are made, Setup must be updated to reflect these configuration changes.

### Solution:

Run Setup, update memory section, save setup and reboot computer.

- 1) Run [Setup](#).
- 2) Examine the 'Memory' section to determine if the memory added to the system is reflected here.
- 3) If all installed memory is not reflected here, update it accordingly.
- 4) Save Setup and reboot computer.
- 5) Run MEM /C command and/or run a program that will access additional memory.



## XMS memory not reported under DOS 5.0 until accessed due to DOS bug.

### Cause:

XMS (Extended Memory Specification or extended) memory may not be reported by the DOS MEM command, even if HIMEM.SYS is loaded properly and extended memory is available. The XMS memory will be reported once it has been accessed once.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Microsoft Corporation has confirmed this as a bug in MS-DOS version 5.0 and it has been fixed in releases 6.x.

Do the following to recreate the situation and confirm that this is the problem:

- 1) Enter the following commands at the DOS prompt to rename CONFIG.SYS and AUTOEXEC.BAT:

```
REN CONFIG.SYS CONFIG.ORG
```

```
REN AUTOEXEC.BAT AUTOEXEC.ORG
```

*NOTE: This will permit returning to original setup after this test.*

- 2) Use an editor to create and save the following CONFIG.SYS and AUTOEXEC.BAT files:

- a) CONFIG.SYS

```
DEVICE=C:\DOS\HIMEM.SYS
```

```
FILES=30
```

```
BUFFERS=10
```

```
SHELL=C:\DOS\COMMAND.COM C:\DOS\ /P
```

- b) AUTOEXEC.BAT

```
ECHO OFF
```

```
PROMPT $P$G
```

```
PATH=C:\DOS;C:3) Press CTRL+ALT+DEL to reboot computer.
```

- 4) Enter MEM at the DOS prompt.
- 5) With 2MB of memory, MEM will report the following:  
2097152 bytes total contiguous extended memory  
2097152 bytes available contiguous extended memory

*NOTE: Since no program has accessed XMS memory yet, none is reported.*

- 6) Edit AUTOEXEC.BAT and add one or both of the following commands:

DEVICE=C:\DOS\SMARTDRV.SYS

DOS=HIGH

- 7) Save the file and press CTRL+ALT+DEL to reboot the computer.
- 8) Enter MEM and the DOS prompt.

*NOTE: Since both SMARTDRV and DOS=HIGH are 'XMS users', they accessed it when they loaded (when computer rebooted). Now, the MEM command reports all of the contiguous extended memory as available XMS memory (less the 64K high memory area controlled by HIMEM.SYS).*



## Cache controller can't handle memory boundary; Disable the cache controller.

### Cause:

The memory test performed by HIMEM.SYS version 3.10 (shipped with MS-DOS 6.2x) fails when the system uses a hardware cache controller, causing the computer to freeze. This is due to some hardware cache controllers not handling the 16MB and 32MB memory boundaries well.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Disable the hardware cache controller or contact the system hardware vendor for assistance.



## **Setup limitation on IBM PS/2; Obtain updated reference diskette and make changes.**

### **Cause:**

HIMEM.SYS versions 3.07 and later are capable of accessing RAM in excess of 16MB. This is prevented on IBM PS/2s by a setup limitation contained on the reference diskette used to change Setup.

### **Solution:**

Run the test below to determine if this PS/2 computer is affected. If it is, obtain an updated reference diskette and use it to make the necessary changes.

- 1) Run the following test to determine if a new Setup reference diskette is required:
  - a) Insert reference diskette in floppy drive.
  - b) Press CTRL+ALT+DEL to restart the computer.
  - c) Select 'Set Configuration'.
  - d) Select 'View Configuration'.
  - e) Look under the heading 'Total System Memory'. Compare the values shown under 'Installed Memory' and 'Usable Memory'. If the 'Installed Memory' amount is correct (e.g., 20MB, 24MB, etc.) but the value for 'Usable Memory' is still 16MB, an updated reference diskette is required (barring other hardware problems).
- 2) Run a hardware utility to check the amount of RAM reported, and make sure there is not a hardware problem.
- 3) Obtain the updated reference diskette by downloading it from the NSC Bulletin board service at (919) 517-0001. If necessary, contact IBM at (800) 426-9397 for additional information.
- 4) Repeat Step 1 above to install the update.



## Cache design; Contact hardware manufacturer for further guidance.

### Cause:

A LOSS in system performance may occur when installing additional RAM (e.g., upgrading from 8MB to 16MB) because of optimal cache design. Cache subsystems are designed to enhance system memory performance, given a specific amount of memory. Increasing available memory may actually decrease, rather than increase, system performance.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Contact the hardware vendor for further guidance. Perhaps the system cache should be disabled to increase performance.



## Memory conflicts; Run MemMaker to optimize memory.

### Cause:

There is a memory conflict between one or more applications, the memory manager, TSRs, device drivers, etc.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Run MemMaker to optimize memory, load DOS high, and TSRs, drivers and special programs into UMA. Use the latest versions of memory managers and SmartDrive. Adjust files, buffers and environment space. Do not load items not used (e.g., mouse driver for DOS-only applications).

Do one or all of the following, when possible, to increase system performance:

1) Run MemMaker to optimize memory:

- a) Exit all programs, including Windows and DOS Shell.
- b) Enter the following command at the DOS prompt:  
MEMMAKER
- c) Select 'Express Setup' (Unless very experienced with memory management).
- d) When asked if any programs require expanded memory (EMS), answer Yes or No (usually No).
- e) Answer several questions about Windows (e.g., where it is installed).
- f) Wait for MemMaker to perform, as follows:
  - 1] MemMaker will reboot the PC.
  - 2] MemMaker analyzes the system to determine optimum memory setup.
  - 3] MemMaker rewrites the AUTOEXEC.BAT and CONFIG.SYS files.
  - 4] MemMaker reboots the system again (Press 'Enter' key to proceed).
- g) MemMaker asks if system is working properly:
  - 1] Choose Yes by pressing 'Enter', if no error messages were displayed and computer appears to be working properly.
  - 2] Choose No by pressing 'Spacebar' if computer is not functioning properly. Follow instructions on screen to have MemMaker try some additional setup changes.

*NOTE: To discard member's changes and return system to previous state, enter the following*



command at the DOS prompt:

MEMMAKER /UNDO

- 2) Upgrade to the latest MS-DOS version (at least version 5.0) and load DOS into the high memory area (HMA or the first 64K of extended memory), by using the following command in CONFIG.SYS:  
DOS-HIGH, UMB
- 3) Make sure the most recent versions of HIMEM.SYS, EMM386.EXE, RAMDRIVE.SYS and SMARTDRV.EXE are in the path specified by commands loading them in CONFIG.SYS. (Windows may provide later versions than those that came with MS-DOS)
- 4) Use HIMEM.SYS, and make sure it is loaded first in CONFIG.SYS.
- 5) Load SMARTDRV.EXE in AUTOEXEC.BAT, and allocate the largest amount of memory possible to it.
- 6) Set the files command in CONFIG.SYS to 30, unless one or more often used applications requires more.  
FILES=30
- 7) Do one of the following:
  - a) Set the buffers command in CONFIG.SYS to 10 if using SMARTDRV.EXE. A higher setting will decrease performance.  
BUFFERS=10
  - b) If not using SMARTDRV.EXE, set buffers command in CONFIG.SYS to 20. This reduces disk access time, but uses more conventional memory.
- 8) Install a RAMDrive, and set the Windows TEMP environment variable to it if there is a shortage of hard disk space (or using a diskless workstation) and there is plenty of available memory (> 6MB). This especially improves performance for Print Manager and programs that create many temporary files (.TMP).
- 9) Use EMM386.EXE if running DOS applications requiring expanded memory (or to load TSRs and drivers into the upper memory area or UMA).
- 10) Load only required TSRs, drivers and special programs. Load them into the upper memory area to save conventional memory when possible.
- 11) Specify a smaller environment space with the /E switch of the shell command in CONFIG.SYS.  
*NOTE: 256KB is the default.*  
SHELL=C:\DOS\COMMAND.COM /E:1024 /P
- 12) Remove command lines for mouse drivers from AUTOEXEC.BAT and CONFIG.SYS, if not using the mouse for non-Windows applications.  
*NOTE: Windows 3.x loads its own mouse driver.*



## **Multiple programs open; Close as many open programs as possible.**

### **Cause:**

Running many software programs simultaneously causes DOS to run slowly, and may lead to memory error messages.

### **Solution:**

Close as many open software programs as possible.



## **DOS runs slowly or see error messages about low memory due 2 COMMAND.COMs.**

### **Cause:**

There are 2 copies of COMMAND.COM running at the same time. Running two copies simultaneously slows down the entire computer system. It is easy to forget this was done when running a DOS full-screen session from Windows.

### **Solution:**

Enter EXIT at the DOS prompt to return to original application or Windows.



## **Software problem in FAST! cache; Contact manufacturer for updated information.**

### **Cause:**

FAST! cache may cause file corruption or data loss when used with DoubleSpace in MS-DOS 6 and 6.2 due to software bug in FAST! cache.

### **Solution:**

Contact Future Computer Systems, Incorporated, the vendor, for technical update information.



## **Cannot access extended memory using FAST! cache due to utility problem.**

### **Cause:**

FAST! cache versions before 3.0x cannot access extended memory when used with MS-DOS 5.0.

### **Solution:**

Contact Future Computer Systems, Incorporated, the vendor, for update information.



## System refuses to load more than one program due memory configuration.

### Cause:

Memory configuration is not optimal. Any recent changes to system (e.g., installed new application or device) may have changed the memory configuration.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Run MemMaker to optimize the memory, load DOS high, and TSRs, drivers and special programs into UMA. Use the latest versions of memory managers and SmartDrive. Adjust files, buffers and environment space. Do not load items not used (e.g., mouse driver for DOS-only applications).

Do one or all of the following, when possible, to increase system performance:

1) Run MemMaker to optimize memory:

- a) Exit all programs, including Windows and DOS Shell.
- b) Enter the following command at the DOS prompt:  
MEMMAKER
- c) Select 'Express Setup' (Unless very experienced with memory management).
- d) When asked if any programs require expanded memory (EMS), answer Yes or No (usually No).
- e) Answer several questions about Windows (e.g., where it is installed).
- f) Wait for MemMaker to perform, as follows:
  - 1] MemMaker will reboot the PC.
  - 2] MemMaker analyzes the system to determine optimum memory setup.
  - 3] MemMaker rewrites the AUTOEXEC.BAT and CONFIG.SYS files.
  - 4] MemMaker reboots the system again (Press 'Enter' key to proceed).
- g) MemMaker asks if system is working properly:
  - 1] Choose Yes by pressing 'Enter', if no error messages were displayed and computer appears to be working properly.
  - 2] Choose No by pressing 'Spacebar' if computer is not functioning properly. Follow instructions on screen to have MemMaker try some additional setup changes.

*NOTE: To discard MemMaker's changes and return system to previous state, enter the following command at the DOS prompt:*

MEMMAKER /UNDO

- 2) Upgrade to the latest MS-DOS version (at least version 5.0), and load DOS into the high memory area (HMA or the first 64K of extended memory) by using the following command in CONFIG.SYS:  
DOS-HIGH, UMB
- 3) Make sure the most recent versions of HIMEM.SYS, EMM386.EXE, RAMDRIVE.SYS and SMARTDRV.EXE are in the path specified by commands loading them in CONFIG.SYS. (Windows may provide later versions than those that came with MS-DOS)
- 4) Use HIMEM.SYS, and make sure it is loaded first in CONFIG.SYS.
- 5) Load SMARTDRV.EXE in AUTOEXEC.BAT, and allocate the largest amount of memory possible to it.
- 6) Set the files command in CONFIG.SYS to 30, unless one or more often used applications requires a higher value.  
FILES=30
- 7) Do one of the following:
  - a) Set the buffers command in CONFIG.SYS to 10 if using SMARTDRV.EXE. A higher setting will decrease performance.  
BUFFERS=10
  - b) If not using SMARTDRV.EXE, set buffers command in CONFIG.SYS to 20. This reduces disk access times, but uses more conventional memory.
- 8) Install a RAMDrive, and set the Windows TEMP environment variable to it if there is a shortage of hard disk space (or using a diskless workstation) and there is plenty of available memory (> 6MB). This especially improves performance for Print Manager and programs that create many temporary files (.TMP).
- 9) Use EMM386.EXE if running DOS applications requiring expanded memory (or to load TSRs and drivers into the upper memory area or UMA).
- 10) Load only required TSRs, drivers and special programs. Load them into the upper memory area to save conventional memory when possible.
- 11) Specify a smaller environment space with the /E switch of the SHELL command in CONFIG.SYS.  
*NOTE: 256KB is the default.*  
SHELL=C:\DOS\COMMAND.COM /E:1024 /P
- 12) Remove command lines for mouse drivers from AUTOEXEC.BAT and CONFIG.SYS if not using the mouse for non-Windows applications.

*NOTE: Windows 3.x loads its own mouse driver.*



## System refuses to load more than one program due to virus(es) present.

### Cause:

**WARNING:** Computer VIRUS!

### Solution:

**CAUTION:** *Computer viruses are very dangerous, can be destructive, and spread very easily.*

Save any open files, close all open applications (including Windows) and turn off the computer immediately!

**CAUTION:** *Arrange for a qualified computer technician to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Close Windows.
  - d) Turn off the computer.
  - e) Identify and segregate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and eradicate virus(es).
  - a) Insert a bootable, write-protected diskette in the appropriate drive and turn on the power to the computer.
  - b) After the system boots, insert a write-protected diskette containing a virus detection program in the drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.
  - e) If a virus has infected the boot sector of the hard drive, the following command may be useful. Enter it at the DOS prompt:  
FDISK /MBR  
(The /MBR switch of the FDISK command rebuilds the Master Boot Record on the hard disk.)
  - f) Cold boot the computer (Turn off the computer, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.



- g)** Scan all memory and connected drives for viruses again using the most thorough scan pattern (some detectors miss viruses on the first pass). Use another virus detector program if available (to be absolutely sure all remnants of the virus(es) are gone).
- 3)** Check surrounding environment and notify anyone who has shared these disks or files:
  - a)** Scan all nearby PCs and floppy diskettes for viruses (re-infection of the disinfected computer from other previously infected diskettes commonly occurs).
  - b)** Notify anyone who has used the infected disks. Make sure the owner of the source diskette knows of the infection.
- 4)** Call for expert help from virus software and/or 3rd party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## Chronically low memory while running regularly used applications due virus.

### Cause:

**WARNING:** Computer VIRUS!

### Solution:

**CAUTION:** *Computer viruses are very dangerous, can be destructive, and spread very easily.*

Save any open files, close all open applications (including Windows) and turn off the computer immediately!

**CAUTION:** *Arrange for a qualified computer technician to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Close Windows.
  - d) Turn off the computer.
  - e) Identify and segregate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and eradicate virus(es).
  - a) Insert a bootable, write-protected diskette in the appropriate drive and turn on the power to the computer.
  - b) After the system boots, insert a write-protected diskette containing a virus detection program in the drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.
  - e) If a virus has infected the boot sector of the hard drive, the following command may be useful. Enter it at the DOS prompt:  
FDISK /MBR  
(The /MBR switch of the FDISK command rebuilds the Master Boot Record on the hard disk.)
  - f) Cold boot the computer (Turn off the computer, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.

- g)** Scan all memory and connected drives for viruses again using the most thorough scan pattern (some detectors miss viruses on the first pass). Use another virus detector program if available (to be absolutely sure all remnants of the virus(es) are gone).
- 3)** Check surrounding environment and notify anyone who has shared these disks or files:
  - a)** Scan all nearby PCs and floppy diskettes for viruses (re-infection of the disinfected computer from other previously infected diskettes commonly occurs).
  - b)** Notify anyone who has used the infected disks. Make sure the owner of the source diskette knows of the infection.
- 4)** Call for expert help from virus software and/or 3rd party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## Chronically low memory while run regular applications due configuration.

### Cause:

Memory configuration is not optimal. Any recent changes to system (e.g., installed new application or device) may have changed the memory configuration.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Run MemMaker to optimize memory and load DOS high; and TSRs, drivers and other programs used into UMA. Use the latest versions of memory managers and SmartDrive. Adjust files, buffers and environment space. Do not load items not used (e.g., mouse driver for DOS-only applications).

Do one or all of the following, when possible, to increase system performance:

- 1) Run MemMaker to optimize memory:
  - a) Exit all programs, including Windows and DOS Shell.
  - b) Enter the following command at the DOS prompt:  
MEMMAKER
  - c) Select 'Express Setup' (Unless very experienced with memory management).
  - d) When asked if any programs require expanded memory (EMS), answer Yes or No (usually No).
  - e) Answer several questions about Windows (e.g., where it is installed).
  - f) Wait for MemMaker to perform, as follows:
    - 1] MemMaker will reboot the PC.
    - 2] MemMaker analyzes the system to determine optimum memory setup.
    - 3] MemMaker rewrites the AUTOEXEC.BAT and CONFIG.SYS files.
    - 4] MemMaker reboots the system again (Press 'Enter' key to proceed).
  - g) MemMaker asks if system is working properly:
    - 1] Choose Yes by pressing 'Enter', if no error messages were displayed and computer appears to be working properly.
    - 2] Choose No by pressing 'Spacebar' if computer is not functioning properly. Follow instructions on screen to have MemMaker try some additional setup changes.

*NOTE: To discard MemMaker's changes and return computer to previous state, enter the following command at the DOS prompt:*

## MEMMAKER /UNDO

- 2) Upgrade to the latest MS-DOS version (at least version 5.0) and load DOS into the high memory area (HMA or the first 64K of extended memory) by using the following command in CONFIG.SYS:  
DOS-HIGH, UMB
- 3) Make sure the most recent versions of HIMEM.SYS, EMM386.EXE, RAMDRIVE.SYS and SMARTDRV.EXE are in the path specified by commands loading them in CONFIG.SYS. (Windows may provide later versions than those that came with MS-DOS)
- 4) Use HIMEM.SYS, and make sure it is loaded first in CONFIG.SYS.
- 5) Load SMARTDRV.EXE in AUTOEXEC.BAT and allocate the largest amount of memory possible to it.
- 6) Set the files command in CONFIG.SYS to 30, unless one or more often used applications requires more.  
FILES=30
- 7) Do one of the following:
  - a) Set the buffers command in CONFIG.SYS to 10 if using SMARTDRV.EXE. A higher setting will decrease performance.  
BUFFERS=10
  - b) If not using SMARTDRV.EXE, set buffers command in CONFIG.SYS to 20. This reduces disk access times, but uses more conventional memory.
- 8) Install a RAMDrive and set the Windows TEMP environment variable to it, if there is a shortage of hard disk space (or using a diskless workstation), and there is plenty of available memory (> 6MB). This especially improves performance for Print Manager and programs that create many temporary files (.TMP).
- 9) Use EMM386.EXE if running DOS applications requiring expanded memory (or to load TSRs and drivers into the upper memory area or UMA).
- 10) Load only required TSRs, drivers and special programs. Load them into the upper memory area to save conventional memory when possible.
- 11) Specify a smaller environment space with the /E switch of the shell command in CONFIG.SYS.  
*NOTE: 256KB is the default.*  
SHELL=C:\DOS\COMMAND.COM /E:1024 /P
- 12) Remove command lines for mouse drivers from AUTOEXEC.BAT and CONFIG.SYS if not using the mouse for non-Windows applications.



## Mouse does not work at all due to defective mouse.

### Cause:

Mouse is defective.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Install bus mouse.

Use MSD to select a free COM port and interrupt. Turn the computer off. Set card jumpers. Install bus mouse card. Locate mouse/serial port and plug mouse cable into back of computer. Turn computer on, install mouse driver and update system file(s). Reboot computer, update Windows and OS/2.

- 1) Run a diagnostic utility (e.g., Microsoft Diagnostics (MSD) to identify both a free COM port and free interrupt. Type MSD at the DOS prompt.
- 2) Review and select COM port.
  - a) Choose 'COM Ports...' button.



[Choose MSD COM Ports Screen](#)

- b) Review list of COM ports to Make sure there are no conflicts and identify a free COM port.



[MSD Serial Port Configuration Example](#)

- c) See [Serial Port Configuration Standards](#) for information on selecting a COM port.
- d) Select an available COM port.
- 3) Review and select interrupt (IRQ).
  - a) Choose 'IRQ Status...' button.



[Choose MSD IRQ Status Screen](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard

*interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- b) Review list of interrupts to Make sure there are no conflicts and identify a free interrupt.



[Choose MSD IRQ Status Example](#)

- c) See [IRQ Conflicts](#) for information on avoiding IRQ conflicts.
- d) Select an available interrupt.

(HINT: If not using a 2nd printer port and base unit contains few expansion cards, interrupt (IRQ) 5 should be available.)

*NOTE: If removing an expansion board is not required, skip to Step 6 for bus mouse card installation steps.*

4) [Remove base unit cover.](#)

5) Remove old bus mouse card:

- a) Remove the screw from the top notch of the mounting bracket on the card.
- b) Touch the metal sides of the base unit to ground any static and, grasping the bus mouse card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
- c) Place the card in a static-resistant envelope.
- d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.

6) Install new bus mouse card:

- a) Remove the bus mouse card from its box and from the protective anti-static envelope.
- b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
- c) Considering the COM port and IRQ assignments determined in step 1, read the bus mouse card manual and identify which, if any, settings must be changed on the card for this particular computer.

*(NOTE: If installing Microsoft Bus Mouse (InPort Adapter), leave port selection switch set to 'Primary Inport'.)*

- d) [Move Jumpers](#) and/or [Change DIP Switches](#), if necessary.



[Photo-Moving jumpers](#)



[Photo-DIP switches](#)

- e) Identify a free expansion slot of appropriate size and remove the rear metal slot cover.
- f) Touch the metal sides of the base unit to ground any static and, grasping the bus mouse card by its edges, insert bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
- g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
- h) Orient the serial plug on the end of the mouse cable to the bus mouse card serial socket on the rear of the

computer, and connect it.

- i) Make sure no parts or tools remain in metal sides of the base unit.
- j) Replace necessary cables (power, keyboard, video) and plug in power cable.
- k) Turn on the computer and related peripherals one at a time.

7) Install mouse driver:

*NOTE: If replacing a mouse with an identical mouse, the following section is optional (however an updated mouse driver may be available).*

- a) Locate the mouse installation diskette and instructions and insert the diskette in floppy drive.
- b) Type the following command at the DOS prompt:  
A:INSTALL or A:SETUP  
(Depending on instructions.)
- c) Follow instructions in the installation program (responding with the port assignment determined in step 1).
- d) Respond 'YES' when asked for permission to add information to AUTOEXEC.BAT and/or CONFIG.SYS. (This adds the correct driver statement to the file to enable the mouse to run when the computer is turned on.)
- e) Press CTRL+ALT+DEL to reboot the computer. (This will load the driver added to AUTOEXEC.BAT or CONFIG.SYS into memory and enable mouse to function.)

8) If the mouse model differs from the old mouse, update mouse configuration in Windows and/or OS/2.

[Update Windows/OS2 Mouse Configuration](#)

9) Test application software that uses the mouse (drivers and bus mouse card) to Make sure proper configuration.

10) [Replace base unit cover.](#)

11) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD





## Defective serial mouse; Replace with a working serial mouse.

### Cause:

Mouse is defective.

### Solution:

Replace with serial mouse. Turn computer off. Locate mouse/serial port and plug mouse cable into back of computer. Turn computer on, install mouse driver and update system file(s). Reboot computer and update Windows.

- 1) Save all files and exit all programs, including Windows.
- 2) Power down the computer.  
*NOTE: If removing an old mouse is not required, skip to Step 4 for installation steps.*
- 3) Remove the defective mouse:
  - a) Trace the mouse cable to the back of the computer. Note the location of the mouse cable connection.
  - b) If the mouse connects to a 9-pin or 24-pin serial port, unscrew any hold-down screws on this plug.
  - c) Grasp the mouse plug and gently pull it straight out.
- 4) Install a new serial mouse:
  - a) Match the connector styles of the mouse and the computer port to use (Make note of the port used (e.g., COM1, COM2):
    - 1] If both match the port where the old mouse was removed, use this port.
    - 2] If both are slender 6-pin PS/2-style connectors, use this port (often labeled 'Mouse').
    - 3] If both use 9-pin serial ports, use this port.
    - 4] If the mouse plug differs in size from the port on the back of the computer, obtain an adapter (e.g., 9-pin to 6-pin serial port adapter, or 9-pin to 25-pin serial adapter).
    - 5] If no serial port is available, a bus-mouse is required (See installing a bus-mouse.)
  - b) Examine the shape and markings (e.g., notches or arrow) of the mouse plug and orient it to fit into the socket on the back of the PC.
  - c) Carefully insert the plug into the socket and push it in gently until it fits tightly. (Secure any port screws or finger screws.)  
***WARNING:** Do not use excessive force; it may damage the pins or connector.* Instead, check plug orientation or type.
  - d) Turn on the power to the computer.
- 5) To Install Mouse Software:

*NOTE: If replacing a mouse with an identical mouse, the following section is optional (however an updated*

*mouse driver may be available).*

- a)** Locate the mouse installation CD and the instructions and insert the CD in the CD ROM.
  - b)** Select the 'Start' button and select 'Run'.
  - c)** Enter the following command in the 'Open' drop-down list box:  
D:INSTALL or D:SETUP  
(Depending on the instructions.)
  - d)** Follow instructions in the installation program (responding to the port assignment determined in step 4).
  - e)** Respond 'YES' when asked for permission to add information to AUTOEXEC.BAT and/or CONFIG.SYS. (This adds the correct driver statement to the file to enable the mouse to run when the computer is turned on.)
  - f)** Press CTRL+ALT+DEL twice to reboot the computer. (This will load the driver added to the AUTOEXEC.BAT or CONFIG.SYS files into memory and enable the mouse to function.)
- 6)** If the mouse model differs from the old mouse, update Windows as follows:
  - a)** Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b)** Select 'Settings' then select 'Control Panel'.
  - c)** Double-click the 'Mouse' icon then choose the 'General' tab.
  - d)** Choose the 'Change' button. (The 'Select Device' dialog box appears.)
  - e)** Select the appropriate manufacturer and model for the new mouse.
  - f)** Choose 'OK'.
  - g)** Choose the 'Close' button.
  - h)** Choose the 'Yes' button when asked to restart Windows. (This will reboot the computer and allow the new mouse driver to take effect).



## **Mouse does not work at all due to faulty COM port or other problem.**

### **Cause:**

The COM port the mouse is connected to is faulty or there is another problem inside the base unit.

### **Solution:**

***CAUTION:*** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

This problem requires further diagnosis and repair and should be handled by a qualified computer technician.



## **Incorrect mouse configuration; Configure the computer for this mouse.**

### **Cause:**

The mouse configuration in Windows is incorrect or missing.

### **Solution:**

Configure Windows for this mouse.

- 1) If the mouse model differs from the old mouse, update Windows as follows:
  - a) Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b) Select 'Settings' then select 'Control Panel'.
  - c) Double-click the 'Mouse' icon then choose the 'General' tab.
  - d) Choose the 'Change' button. (The 'Select Device' dialog box appears.)
  - e) Select the appropriate manufacturer and model for the new mouse.
  - f) Choose 'OK'.
  - g) Choose the 'Close' button.
  - h) Choose the 'Yes' button when asked to restart Windows. (This will reboot the computer and allow the new mouse driver to take effect).
- 2) (Optional) Change settings for mouse movement and click rate:
  - a) Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b) Select 'Settings' then select 'Control Panel'.
  - c) Double-click the 'Mouse' icon then choose the 'Buttons' tab.
  - d) Adjust the double-click speed using the slider bar. Practice setting in the trial box provided. Readjust double-click speed if necessary.
  - e) Choose the 'Motion' tab.
  - f) Adjust the horizontal and vertical slider bars to change the rate at which mouse movement moves the cursor on the screen.
  - g) Choose 'OK' when done.





## Mouse does not work at all due to COM port/IRQ conflict.

### Cause:

There is a port conflict between the mouse and another device. In other words, they are attempting to use the same port simultaneously or there is an interrupt conflict.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Run a hardware status utility to identify COM port conflict and/or interrupt (IRQ) conflict and change the port and/or IRQ assignments on one of the devices. If the mouse was working fine, preferably change the other device.

- 1) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- 2) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- 3) Identify port assignments and write them down. Also identify which port is being used by both devices.



[MSD COM Ports example](#)

- 4) Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 5) Select an item or items to change to eliminate the conflict. See [Serial & Parallel Port Configuration Standards](#) for advice on COM port assignments. See [IRQ Conflicts](#) for advice on resolving conflicts.

- 6) Implement the change(s). *(NOTE: The following assumes that the device other than the mouse is being changed.)* Do one of the following:
- a) Some devices (e.g., internal modem) can be changed via software. For example, open the communications package and change the port selection from, say COM1 to COM2.
  - b) Other devices require a hardware change to change their COM port and/or interrupt assignments.
    - 1] Turn computer off and disconnect power cables.
    - 2] Do one of the following:
      - a] If device is external, remove cover and/or locate port and interrupt selection switches.
      - b] If device is internal, Remove base unit cover.
    - 3] Disconnect all data cables to device/card.
    - 4] Remove device/card and change COM port and/or IRQ assignment by Moving Jumpers to desired settings. If an IRQ is changed, also change the address to correspond to the new IRQ. Refer to device/card manual for instructions.
    - 5] Reinstall device/card.
    - 6] Reconnect all data cables to device/card.
    - 7] Reconnect power cables to base unit and turn computer on.
    - 8] Rerun hardware status program to determine if the conflict is eliminated.
    - 9] Repeat test activity.
    - 10] Repeat Steps 1-6 until problem solved.
    - 11] Replace base unit cover.



## Mouse does not work at all due to COM port/IRQ conflict.

### Cause:

There is a port conflict between the mouse and another device. In other words, they are attempting to use the same port simultaneously or there is an interrupt conflict.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Run a hardware status utility to identify COM port conflict and/or interrupt (IRQ) conflict and change the port and/or IRQ assignments on one of the devices. If the mouse was working fine, preferably change the other device.

COM port and/or IRQ conflict require further diagnosis and repair.

- 1) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- 2) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- 3) Identify port assignments and write them down. Also identify which port is being used by both devices.



[MSD COM Ports example](#)

- 4) Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard



*interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- 5) Select an item or items to change to eliminate the conflict. See [Serial & Parallel Port Configuration Standards](#) for advice on COM port assignments. See [IRQ Conflicts](#) for advice on resolving conflicts.
- 6) Implement the change(s). *(NOTE: The following assumes that the device other than the mouse is being changed.)* Do one of the following:
  - a) Some devices (e.g., internal modem) can be changed via software. For example, open the communications package and change the port selection from, say COM1 to COM2.
  - b) Other devices require a hardware change to change their COM port and/or interrupt assignments.
    - 1] Turn computer off and disconnect power cables.
    - 2] Do one of the following:
      - a] If device is external, remove cover and/or locate port and interrupt selection switches.
      - b] If device is internal, [Remove base unit cover](#).
    - 3] Disconnect all data cables to device/card.
    - 4] Remove device/card and change COM port and/or IRQ assignment by [Moving Jumpers](#) to desired settings. If an IRQ is changed, also change the address to correspond to the new IRQ. Refer to device/card manual for instructions.
    - 5] Reinstall device/card.
    - 6] Reconnect all data cables to device/card.
    - 7] Reconnect power cables to base unit and turn computer on.
    - 8] Rerun hardware status program to determine if the conflict is eliminated.
    - 9] Repeat test activity.
    - 10] Repeat Steps 1-6 until problem solved.
    - 11] [Replace base unit cover](#).



## Mouse does not work at all due to incorrect port in command.

### Cause:

The command line in AUTOEXEC.BAT or CONFIG.SYS that loads the mouse driver contained the incorrect port switch.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Change the port switch in the command line.

- 1) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and locate a line with the word 'MOUSE...' similar to one of the following:
  - a) In AUTOEXEC.BAT: C:\DOS\MOUSE\MOUSE.COM /x
  - b) In CONFIG.SYS: DEVICE=C:\DOS\MOUSE\MOUSE.SYS /x
- 2) After the word 'MOUSE' there may be a '/1' or '/2'. If the digit is a 1, change it to 2; if it is a 2, change it to a 1.
- 3) Save the file and reboot the computer.
- 4) Watch for message about loading mouse driver during bootup process.
- 5) Load application that uses the mouse (e.g., Windows).
- 6) Attempt to use the mouse.



## **Infrared beam blocked; Clear desktop area between mouse and computer.**

### **Cause:**

Optical mice require a clear line of site between the mouse and the control/base unit to pass the infrared light. Obstacles such as papers, books and other objects on the desktop obstruct this line of site and prevent the mouse from working.

### **Solution:**

Clear the desktop of papers, books and other objects. Maintain a clear path between the mouse the base unit.



## **Mouse pad position wrong; Place mouse pad long-ways (landscape) in front of you.**

### **Cause:**

Optical mice require a special mouse pad with a visible grid. The mouse will not work without this special pad. Also if the pad is oriented portrait instead of landscape, the mouse will not function properly.

### **Solution:**

Obtain the optical mouse pad and orient it in landscape fashion.



## Mouse does not work at all due to bad command/syntax in loading driver.

### Cause:

The command/syntax for loading the mouse driver from AUTOEXEC.BAT or CONFIG.SYS is incorrect (Drive, path, filename).

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Correct the load command/syntax, save the file and reboot the computer.

- 1) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and try to locate a line with the word 'MOUSE...' similar to one of the following:
  - a) In AUTOEXEC.BAT: C:\DOS\MOUSE\MOUSE.COM /x
  - b) In CONFIG.SYS: DEVICE=C:\DOS\MOUSE\MOUSE.SYS /x
- 2) Do one of the following:
  - a) If the command is present, check the drive, path and filename used in the command for correctness. Especially make sure path is correct.
  - b) If the command is not present, add the correct command shown in Step 1 to whichever file is open.

*NOTE: Leave '/x' off for now.*
- 3) Save the file and reboot the computer.
- 4) Watch for the message about loading mouse driver during bootup process.
- 5) Load the application that uses the mouse (e.g., Windows).
- 6) Attempt to use the mouse.



## **Mouse does not work at all due to incorrect/updated mouse driver.**

### **Cause:**

The mouse driver being loaded is either incorrect for this model mouse or is outdated.

### **Solution:**

Obtain and install an up-to-date version of the correct mouse driver software for this mouse.

- 1) Obtain an updated mouse driver.
- 2) Install the mouse driver software:
  - a) Locate the mouse installation CD and the instructions and insert the CD in the CD ROM.
  - b) Select the 'Start' button and select 'Run'.
  - c) Enter the following command in the 'Open' drop-down list box:  
D:INSTALL or D:SETUP  
(Depending on the instructions.)
  - d) Follow instructions in the installation program (responding with the port assignment determined in step 1).
  - e) Respond 'YES' when asked for permission to add information to AUTOEXEC.BAT and/or CONFIG.SYS. (This adds the correct driver statement to the file to enable the mouse to run when the computer is turned on.)
  - e) Press CTRL+ALT+DEL twice to reboot the computer. (This will load the driver added to AUTOEXEC.BAT or CONFIG.SYS into memory and enable mouse to function.)
- 3) If the mouse model differs from the old mouse, update Windows as follows:
  - a) Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b) Select 'Settings' then select 'Control Panel'.
  - c) Double-click the 'Mouse' icon then choose the 'General' tab.
  - d) Choose the 'Change' button. (The 'Select Device' dialog box appears.)
  - e) Select the appropriate manufacturer and model for the new mouse.
  - f) Choose 'OK'.
  - g) Choose the 'Close' button.
  - h) Choose the 'Yes' button when asked to restart Windows. (This will reboot the computer and allow the new mouse driver to take effect).

- 4)** (Optional) Change settings for mouse movement and click rate:
- a)** Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b)** Select 'Settings' then select 'Control Panel'.
  - c)** Double-click the 'Mouse' icon then choose the 'Buttons' tab.
  - d)** Adjust the double-click speed using the slider bar. Practice setting in the trial box provided. Readjust double-click speed if necessary.
  - e)** Choose the 'Motion' tab.
  - f)** Adjust the horizontal and vertical slider bars to change the rate at which mouse movement moves the cursor on the screen.
  - g)** Choose 'OK' when done.



## **Mouse does not work at all due to missing mouse driver.**

### **Cause:**

Mouse driver (mouse software) missing.

### **Solution:**

Reinstall mouse driver software.

- 1) Obtain an updated mouse driver.
- 2) Install the mouse driver software:
  - a) Locate the mouse installation CD and the instructions and insert the CD in the CD ROM.
  - b) Select the 'Start' button and select 'Run'.
  - c) Enter the following command in the 'Open' drop-down list box:  
D:INSTALL or D:SETUP  
(Depending on the instructions.)
  - d) Follow instructions in the installation program (responding with the port assignment determined in step 1).
  - e) Respond 'YES' when asked for permission to add information to AUTOEXEC.BAT and/or CONFIG.SYS. (This adds the correct driver statement to the file to enable the mouse to run when the computer is turned on.)
  - f) Press CTRL+ALT+DEL twice to reboot the computer. (This will load the driver added to AUTOEXEC.BAT or CONFIG.SYS into memory and enable mouse to function.)
- 3) If the mouse model differs from the old mouse, update Windows as follows:
  - a) Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b) Select 'Settings' then select 'Control Panel'.
  - c) Double-click the 'Mouse' icon then choose the 'General' tab.
  - d) Choose the 'Change' button. (The 'Select Device' dialog box appears.)
  - e) Select the appropriate manufacturer and model for the new mouse.
  - f) Choose 'OK'.
  - g) Choose the 'Close' button.
  - h) Choose the 'Yes' button when asked to restart Windows. (This will reboot the computer and allow the new mouse driver to take effect).
- 4) (Optional) Change settings for mouse movement and click rate:



- a)** Choose the Windows 95 'Start' button to open the 'Start' menu.
- b)** Select 'Settings' then select 'Control Panel'.
- c)** Double-click the 'Mouse' icon then choose the 'Buttons' tab.
- d)** Adjust the double-click speed using the slider bar. Practice setting in the trial box provided.  
Readjust double-click speed if necessary.
- e)** Choose the 'Motion' tab.
- f)** Adjust the horizontal and vertical slider bars to change the rate at which mouse movement moves the cursor on the screen.
- g)** Choose 'OK' when done.



## **Mouse does not work at all due to bad mouse cable connection.**

### **Cause:**

Mouse cable is not securely fastened to the correct port connector on the rear of the base unit.

### **Solution:**

Secure the mouse cable to the correct port connection.

Check the mouse cable connection:

- 1) Turn off the computer.
- 2) Trace the mouse cable to the back of the computer.
- 3) Do one of the following:
  - a) If the socket is a PS/2 style connector, make sure it is inserted into the connector marked 'Mouse' or one with a mouse icon. Make sure it is secure.
  - b) If the socket is a 9-pin size serial connector, make sure it is securely attached to an open COM port (Usually COM1). Make sure screws are snug.
- 4) Pick up the mouse and make sure the tracking ball moves freely inside its compartment.
- 5) Turn on the power to the computer and watch for a message about loading the mouse driver during the bootup process.
- 6) Start the application that uses the mouse (e.g., Windows).
- 7) Attempt to use the mouse.



## Microsoft Mouse acts up with Plus Hard Card due to conflict over IRQ 12.

### Cause:

This problem applies to Microsoft Mouse version 6.x, 7.x, 8.x and 9.0 and the Plus Hard Card when the card is set to use (interrupt) IRQ 12. This is not a factory setting, but when applied, it instigates an IRQ conflict with the Microsoft mouse.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

There is a port conflict and/or interrupt (IRQ) conflict between the mouse and the Plus Hard Card.



## Microsoft Mouse acts up with Plus Hard Card due to conflict over IRQ 12.

### Cause:

This problem applies to Microsoft Mouse version 6.x, 7.x, 8.x and 9.0 and the Plus Hard Card when the card is set to use (interrupt) IRQ 12. This is not a factory setting, but when applied, it causes an IRQ conflict with the Microsoft mouse.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Run a hardware status utility to identify COM port conflict and/or interrupt (IRQ) conflict, and change the port and/or IRQ assignments on one of the devices. If the mouse was working fine before installing the Plus Hard Card, changing the IRQ on the Hard Card, not the mouse IRQ, is recommended.



## Mouse acts funny when using modem due to COM port/IRQ conflict.

### Cause:

There is a port conflict between the modem and the mouse. In other words, the modem and the mouse are attempting to use the same port simultaneously or there is an interrupt conflict between them.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

COM port and/or IRQ conflict require further diagnosis and repair.

- 1) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- 2) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- 3) Identify port assignments and write them down. Also identify which port is being used by both devices.



[MSD COM Ports example](#)

- 4) Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 5) Select an item or items to change to eliminate the conflict. See [Serial & Parallel Port Configuration Standards](#) for advice on COM port assignments. See [IRQ Conflicts](#) for advice on resolving conflicts.
- 6) Implement the change(s). (NOTE: The following assumes that the device other than the mouse is being

*changed.*) Do one of the following:

- a)** Some devices (e.g., internal modem) can be changed via software. For example, open the communications package and change the port selection from, say COM1 to COM2.
- b)** Other devices require a hardware change to change their COM port and/or interrupt assignments.
  - 1]** Turn computer off and disconnect power cables.
  - 2]** Do one of the following:
    - a]** If device is external, remove cover and/or locate port and interrupt selection switches.
    - b]** If device is internal, Remove base unit cover.
  - 3]** Disconnect all data cables to device/card.
  - 4]** Remove device/card and change COM port and/or IRQ assignment by Moving Jumpers to desired settings. If an IRQ is changed, also change the address to correspond to the new IRQ. Refer to device/card manual for instructions.
  - 5]** Reinstall device/card.
  - 6]** Reconnect all data cables to device/card.
  - 7]** Reconnect power cables to base unit and turn computer on.
  - 8]** Rerun hardware status program to determine if the conflict is eliminated.
  - 9]** Repeat test activity.
  - 10]** Repeat Steps 1-6 until problem solved.
  - 11]** Replace base unit cover.



## Mouse acts funny when using modem due to COM port/IRQ conflict.

### Cause:

There is a port conflict between the modem and the mouse. In other words, the modem and the mouse are attempting to use the same port simultaneously or there is an interrupt conflict between them.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

COM port and/or IRQ conflict require further diagnosis and repair.

- 1) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- 2) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- 3) Identify port assignments and write them down. Also identify which port is being used by both devices.



[MSD COM Ports example](#)

- 4) Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 5) Select an item or items to change to eliminate the conflict. See [Serial & Parallel Port Configuration Standards](#) for advice on COM port assignments. See [IRQ Conflicts](#) for advice on resolving conflicts.
- 6) Implement the change(s). (NOTE: The following assumes that the device other than the mouse is being

*changed.*) Do one of the following:

- a)** Some devices (e.g., internal modem) can be changed via software. For example, open the communications package and change the port selection from, say COM1 to COM2.
- b)** Other devices require a hardware change to change their COM port and/or interrupt assignments.
  - 1]** Turn computer off and disconnect power cables.
  - 2]** Do one of the following:
    - a]** If device is external, remove cover and/or locate port and interrupt selection switches.
    - b]** If device is internal, Remove base unit cover.
  - 3]** Disconnect all data cables to device/card.
  - 4]** Remove device/card and change COM port and/or IRQ assignment by Moving Jumpers to desired settings. If an IRQ is changed, also change the address to correspond to the new IRQ. Refer to device/card manual for instructions.
  - 5]** Reinstall device/card.
  - 6]** Reconnect all data cables to device/card.
  - 7]** Reconnect power cables to base unit and turn computer on.
  - 8]** Rerun hardware status program to determine if the conflict is eliminated.
  - 9]** Repeat test activity.
  - 10]** Repeat Steps 1-6 until problem solved.
  - 11]** Replace base unit cover.





## Mouse acts up when using another peripheral due to COM port/IRQ conflict.

### Cause:

There is a port conflict between the other device being used and the mouse. In other words, the device and the mouse are attempting to use the same port simultaneously or there is an interrupt conflict between them.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

COM port and/or IRQ conflict require further diagnosis and repair.

- 1) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- 2) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- 3) Identify port assignments and write them down. Also identify which port is being used by both devices.



[MSD COM Ports example](#)

- 4) Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 5) Select an item or items to change to eliminate the conflict. See [Serial & Parallel Port Configuration Standards](#) for advice on COM port assignments. See [IRQ Conflicts](#) for advice on resolving conflicts.
- 6) Implement the change(s). (NOTE: The following assumes that the device other than the mouse is being

*changed.*) Do one of the following:

- a)** Some devices (e.g., internal modem) can be changed via software. For example, open the communications package and change the port selection from, say COM1 to COM2.
- b)** Other devices require a hardware change to change their COM port and/or interrupt assignments.
  - 1]** Turn computer off and disconnect power cables.
  - 2]** Do one of the following:
    - a]** If device is external, remove cover and/or locate port and interrupt selection switches.
    - b]** If device is internal, Remove base unit cover.
  - 3]** Disconnect all data cables to device/card.
  - 4]** Remove device/card and change COM port and/or IRQ assignment by Moving Jumpers to desired settings. If an IRQ is changed, also change the address to correspond to the new IRQ. Refer to device/card manual for instructions.
  - 5]** Reinstall device/card.
  - 6]** Reconnect all data cables to device/card.
  - 7]** Reconnect power cables to base unit and turn computer on.
  - 8]** Rerun hardware status program to determine if the conflict is eliminated.
  - 9]** Repeat test activity.
  - 10]** Repeat Steps 1-6 until problem solved.
  - 11]** Replace base unit cover.



## Mouse acts up when using another peripheral due to COM port/IRQ conflict.

### Cause:

There is a port conflict between the other device being used and the mouse. In other words, the device and the mouse are attempting to use the same port simultaneously or there is an interrupt conflict between them.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

COM port and/or IRQ conflict require further diagnosis and repair.

- 1) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- 2) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- 3) Identify port assignments and write them down. Also identify which port is being used by both devices.



[MSD COM Ports example](#)

- 4) Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 5) Select an item or items to change to eliminate the conflict. See [Serial & Parallel Port Configuration Standards](#) for advice on COM port assignments. See [IRQ Conflicts](#) for advice on resolving conflicts.
- 6) Implement the change(s). (NOTE: The following assumes that the device other than the mouse is being

*changed.*) Do one of the following:

- a)** Some devices (e.g., internal modem) can be changed via software. For example, open the communications package and change the port selection from, say COM1 to COM2.
- b)** Other devices require a hardware change to change their COM port and/or interrupt assignments.
  - 1]** Turn computer off and disconnect power cables.
  - 2]** Do one of the following:
    - a]** If device is external, remove cover and/or locate port and interrupt selection switches.
    - b]** If device is internal, Remove base unit cover.
  - 3]** Disconnect all data cables to device/card.
  - 4]** Remove device/card and change COM port and/or IRQ assignment by Moving Jumpers to desired settings. If an IRQ is changed, also change the address to correspond to the new IRQ. Refer to device/card manual for instructions.
  - 5]** Reinstall device/card.
  - 6]** Reconnect all data cables to device/card.
  - 7]** Reconnect power cables to base unit and turn computer on.
  - 8]** Rerun hardware status program to determine if the conflict is eliminated.
  - 9]** Repeat test activity.
  - 10]** Repeat Steps 1-6 until problem solved.
  - 11]** Replace base unit cover.



## **Mouse is dirty; Clean and service mouse using a mouse cleaning kit.**

### **Cause:**

The mouse is dirty. The compartment where the mouse ball resides is filled with lint, dirt, and/or sticky substances.

### **Solution:**

Clean and service the mouse.

Clean and service the mouse:

- 1) Remove the mouse ball from its compartment.
- 2) Wash the ball in warm water and dry with a soft, lint-free cloth.
- 3) Inspect and clean the ball compartment and rollers using a mouse cleaning kit.
- 4) Reassemble the mouse.
- 5) Test the mouse's operation.



## **Wrong 3 button mouse switch settings; Move switch on mouse to 2-button setting.**

### **Cause:**

Some mice with 3 or more buttons navigate in only one direction due to difference between software exceptions and button selection switch on bottom of mouse.

### **Solution:**

Pick up the mouse and locate the switch. Move the selector to the 2-button setting.



## **Mouse from another computer does not work on this computer due to driver.**

### **Cause:**

The mouse driver software is different. Each mouse has mouse driver software that enables it to work and many of these drivers vary significantly between models and manufacturers.

### **Solution:**

Obtain and install the mouse driver software for the backup mouse.

- 1) Obtain an updated mouse driver.
- 2) Install the mouse driver software:
  - a) Locate the mouse installation CD and the instructions and insert the CD in the CD ROM.
  - b) Select the 'Start' button and select 'Run'.
  - c) Enter the following command in the 'Open' drop-down list box:  
D:INSTALL or D:SETUP  
(Depending on the instructions.)
  - d) Follow instructions in the installation program (responding with the port assignment determined in step 1).
  - e) Respond 'YES' when asked for permission to add information to AUTOEXEC.BAT and/or CONFIG.SYS. (This adds the correct driver statement to the file to enable the mouse to run when the computer is turned on.)
  - e) Press CTRL+ALT+DEL twice to reboot the computer. (This will load the driver added to AUTOEXEC.BAT or CONFIG.SYS into memory and enable mouse to function.)
- 3) If the mouse model differs from the old mouse, update Windows as follows:
  - a) Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b) Select 'Settings' then select 'Control Panel'.
  - c) Double-click the 'Mouse' icon then choose the 'General' tab.
  - d) Choose the 'Change' button. (The 'Select Device' dialog box appears.)
  - e) Select the appropriate manufacturer and model for the new mouse.
  - f) Choose 'OK'.
  - g) Choose the 'Close' button.
  - h) Choose the 'Yes' button when asked to restart Windows. (This will reboot the computer and allow the new mouse driver to take effect).

- 4)** (Optional) Change settings for mouse movement and click rate:
- a)** Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b)** Select 'Settings' then select 'Control Panel'.
  - c)** Double-click the 'Mouse' icon then choose the 'Buttons' tab.
  - d)** Adjust the double-click speed using the slider bar. Practice setting in the trial box provided. Readjust double-click speed if necessary.
  - e)** Choose the 'Motion' tab.
  - f)** Adjust the horizontal and vertical slider bars to change the rate at which mouse movement moves the cursor on the screen.
  - g)** Choose 'OK' when done.





**Software does not allow use of other buttons; Use primary ('select') button only.**

**Cause:**

Software program does not use multiple mouse buttons within the program; it uses only the primary one.

**Solution:**

Use the primary mouse button (usually the left button) in this software program.



## Mouse moves erratically due to defective mouse.

### Cause:

Mouse is defective due to inoperable button(s).

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Replace with new bus mouse.

- 1) Run a diagnostic utility (e.g., Microsoft Diagnostics (MSD) to identify both a free COM port and free interrupt. To run Microsoft Diagnostics, enter MSD at the DOS prompt.
- 2) Review and select COM port.
  - a) Choose 'COM Ports...' button.



[Choose MSD COM Ports](#)

- b) Review list of COM ports to Make sure there are no conflicts and identify a free COM port.



[Example: MSD Serial Port Configuration](#)

- c) See [Serial Port Configuration Standards](#) for information on selecting a COM port.
- d) Select an available COM port.
- 3) Review and select interrupt (IRQ).
  - a) Choose 'IRQ Status...' button.



[Choose MSD IRQ Status](#)

- b) Review list of interrupts to Make sure there are no conflicts and identify a free interrupt.



[Example: Choose MSD IRQ Status](#)c) See [IRQ Conflicts](#) for

information on avoiding IRQ conflicts.

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ)

*assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- d) Select an available interrupt.

(TIP: If not using a 2nd printer port and base unit contains few expansion cards, interrupt (IRQ) 5 should be available.)

*NOTE: If removing an expansion board is not required, skip to Step 6 for bus mouse card installation steps.*

4) Remove base unit cover.

5) Remove old bus mouse card:

- a) Remove the screw from the top notch of the mounting bracket on the card.
- b) Touch the metal sides of the base unit to ground any static and, grasping the bus mouse card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
- c) Place the card in a static-resistant envelope.
- d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.

6) Install new bus mouse card:

- a) Remove the bus mouse card from its box and from the protective static envelope.
- b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
- c) Considering the COM port and IRQ assignments determined in step 1, read the bus mouse card manual and identify which, if any, settings need to be changed on the card for this particular computer.

*(NOTE: If installing Microsoft Bus Mouse (InPort Adapter), leave port selection switch set to 'Primary Inport'.)*

- d) Move Jumpers and/or Change DIP Switches, if necessary.

The CyberMedia logo is displayed in a stylized, bold, red font with a slight shadow effect.

Photo: Moving jumpers

The CyberMedia logo is displayed in a stylized, bold, red font with a slight shadow effect.

Photo: DIP Switches

- e) Identify a free expansion slot of appropriate size and remove the rear metal slot cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the bus mouse card by its edges, insert the card bottom (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - h) Orient the serial plug on the end of the mouse cable to the bus mouse card serial socket on the rear of the computer and connect it.
  - i) Make sure no parts or tools remain in metal sides of the base unit.
  - j) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - k) Power up computer and related peripherals one at a time.
- 7) Install mouse driver:

*NOTE: If replacing a mouse with an identical mouse, the following section is optional (however an updated mouse driver may be available).*

- a) Locate the mouse installation diskette and instructions and insert the diskette in floppy drive.
  - b) Type the following command at the DOS prompt:  
A:INSTALL or A:SETUP  
(Depending on instructions.)
  - c) Follow instructions in the installation program (responding with the port assignment determined in step 1).
  - d) Respond 'YES' when asked for permission to add information to AUTOEXEC.BAT and/or CONFIG.SYS. (This adds the correct driver statement to the file to enable the mouse to run when the computer is turned on.)
  - e) Press CTRL+ALT+DEL to reboot the computer. (This will load the driver added to AUTOEXEC.BAT or CONFIG.SYS into memory and enable mouse to function.)  
Do one of the following (8 or 9) if applicable):
- 8) If the mouse model differs from the old mouse, update Windows as follows:
- a) Open 'Windows Setup'.
  - b) Select 'Options'.
  - b) Select 'Change System Settings'.
  - c) Select down-arrow next to 'Mouse' to bring down a list of mouse models.
  - d) Select appropriate mouse model.
  - e) Choose 'OK'.
  - f) Choose 'Restart Windows' when asked. (This will reboot computer).
  - g) (Optional) Change settings for mouse movement and click rate:
    - 1] Open 'Main' icon.
    - 2] Open 'Control Panel'.
    - 3] Open 'Mouse'.
    - 4] Adjust the horizontal and vertical slider bars to change the rate at which mouse movement moves the cursor on the screen.
    - 5] Adjust the double-click speed using the slider bar. Practice setting in the trial box provided. Readjust double-click speed if necessary.
    - 6] Choose 'OK' when done.
- 9) If the mouse model differs from the old mouse, update OS/2 as follows:
- a) Open 'OS/2 System'.
  - b) Open 'System Setup'.
  - c) Open 'Selective install'. (This opens the 'System Configuration' panel)
  - d) Use the space bar to check the 'Mouse' box.
  - e) Choose 'OK'.
  - f) Select the mouse type just installed from the list.
  - g) Provide the port assignment (determined in step 2 above). h) Choose 'OK'.
  - i) (Optional) Change settings for mouse movement and click rate:

- 1] Open 'OS/2 System'.
  - 2] Open 'System Setup'.
  - 3] Open 'Mouse'. (This opens the 'Timing' page of 'Mouse-Settings' function.
  - 4] Adjust the 'Double-click' slide bar and test the double-click speed in the box labeled 'Test here'.
  - 5] Adjust the 'Tracking speed' slider bar to change the rate at which mouse movement moves the cursor on the screen.
  - 6] Double-click in the upper-left-hand corner to close the panel.
- 10) Test application software that uses the mouse (drivers and bus mouse card) to Make sure proper configuration.
- 11) Replace base unit cover.
- 12) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:
- DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.
- OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD



## Mouse cursor moves OK, but button(s) do not due to defective mouse.

### Cause:

Mouse is defective due to inoperable button(s).

### Solution:

Replace with a new serial mouse. Turn off the computer. Locate the mouse/serial port and plug the mouse cable into the back of the computer. Turn on the computer, install the mouse driver and update the system file(s). Reboot the computer, update Windows.

1) Save all files and exit all programs, including Windows.

2) Turn off the power to the computer.

*NOTE: If removing an old mouse is not required, skip to Step 4 for installation steps.*

3) Remove the defective mouse:

- a) Trace the mouse cable to the back of the computer. Note the location of the mouse cable connection.
- b) If the mouse connects to a 9-pin or 24-pin serial port, unscrew any hold-down screws on this plug.
- c) Grasp the mouse plug and gently pull it straight out.

4) Install a new serial mouse:

- a) Match the connector styles of the mouse and the computer port to use (Make note of the port used (e.g., COM1, COM2):
  - 1] If both match the port where the old mouse was removed, use this port.
  - 2] If both are slender 6-pin PS/2-style connectors, use this port (often labeled 'Mouse').
  - 3] If both use 9-pin serial ports, use this port.
  - 4] If the mouse plug differs in size from the port on the back of the computer, obtain an adapter (e.g., 9-pin to 6-pin serial port adapter, or 9-pin to 25-pin serial adapter).
  - 5] If no serial port is available, a bus-mouse is required (See installing a bus-mouse.)
- b) Examine the shape and markings (e.g., notches or arrow) of the mouse plug and orient it to fit into the socket on the back of the PC.
- c) Carefully insert the plug into the socket and push it in gently until it fits tightly. (Secure any port screws or finger screws.)

***WARNING: Do not use excessive force; it may damage the pins or connector.*** Instead, check plug orientation or type.
- d) Turn on the power to the computer.

**5) To Install Mouse Software:**

*NOTE: If replacing a mouse with an identical mouse, the following section is optional (however an updated mouse driver may be available).*

- a)** Locate the mouse installation CD and the instructions and insert the CD in the CD ROM.
- b)** Select the 'Start' button and select 'Run'.
- c)** Enter the following command in the 'Open' drop-down list box:  
D:INSTALL or D:SETUP  
(Depending on the instructions.)
- c)** Follow instructions in the installation program (responding to the port assignment determined in step 4).
- d)** Respond 'YES' when asked for permission to add information to AUTOEXEC.BAT and/or CONFIG.SYS. (This adds the correct driver statement to the file to enable the mouse to run when the computer is turned on.)
- e)** Press CTRL+ALT+DEL twice to reboot the computer. (This will load the driver added to the AUTOEXEC.BAT or CONFIG.SYS files into memory and enable the mouse to function.)

**6) If the mouse model differs from the old mouse, update Windows as follows:**

- a)** Choose the Windows 95 'Start' button to open the 'Start' menu.
- b)** Select 'Settings' then select 'Control Panel'.
- c)** Double-click the 'Mouse' icon then choose the 'General' tab.
- d)** Choose the 'Change' button. (The 'Select Device' dialog box appears.)
- e)** Select the appropriate manufacturer and model for the new mouse.
- f)** Choose 'OK'.
- g)** Choose the 'Close' button.
- h)** Choose the 'Yes' button when asked to restart Windows. (This will reboot the computer and allow the new mouse driver to take effect).



## **Mouse is set for use by opposite hand; Change mouse control setting.**

### **Cause:**

The mouse hand setting (left-handed or right-handed) is currently set opposite of what this user expects.

### **Solution:**

Open the mouse settings and change the mouse hand setting to the desired (left-handed or right-handed) setting.

- 1) Change mouse control hand settings in the Windows control panel:
  - a) Choose the Windows 95 'Start' button to access the 'Start' menu.
  - b) Select 'Settings'.
  - c) Select 'Control Panel'.
  - d) Open the 'Mouse' icon.
  - e) Choose the 'Button' tab, then choose the 'Left-handed' radio button.
  - f) Double-click in the 'Test Box' with the primary button (index finger) to test the new configuration.
  - g) Choose 'OK' when done .
- 2) Try using mouse to navigate around the screen and open and close several objects Readjust settings as necessary.





## Mouse moves erratically due to defective mouse.

### Cause:

Mouse fails to operate correctly due to bad axis rotors or other faulty operational components.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Replace with new bus mouse.

- 1) Run a diagnostic utility (e.g., Microsoft Diagnostics (MSD) to identify both a free COM port and free interrupt. To run Microsoft Diagnostics, enter MSD at the DOS prompt.
- 2) Review and select COM port.
  - a) Choose 'COM Ports...' button.



[Choose MSD COM Ports](#)

- b) Review list of COM ports to Make sure there are no conflicts and identify a free COM port.



[Example: MSD Serial Port Configuration](#)

- c) See [Serial Port Configuration Standards](#) for information on selecting a COM port.
  - d) Select an available COM port.
- 3) Review and select interrupt (IRQ).
  - a) Choose 'IRQ Status...' button.



[Choose MSD IRQ Status](#)

Review list of interrupts to Make sure there are no conflicts and identify a free interrupt.



[Example: Choose MSD IRQ Status](#)c) See [IRQ Conflicts](#) for

information on avoiding IRQ conflicts.

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ)

*assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- d) Select an available interrupt.

(TIP: If not using a 2nd printer port and base unit contains few expansion cards, interrupt (IRQ) 5 should be available.)

*NOTE: If removing an expansion board is not required, skip to Step 6 for bus mouse card installation steps.*

4) Remove base unit cover.

5) Remove old bus mouse card:

- a) Remove the screw from the top notch of the mounting bracket on the card.
- b) Touch the metal sides of the base unit to ground any static and, grasping the bus mouse card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
- c) Place the card in a static-resistant envelope.
- d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.

6) Install new bus mouse card:

- a) Remove the bus mouse card from its box and from the protective anti-static envelope.
- b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
- c) Considering the COM port and IRQ assignments determined in step 1, read the bus mouse card manual and identify which, if any, settings need to be changed on the card for this particular computer.

*(NOTE: If installing Microsoft Bus Mouse (InPort Adapter), leave port selection switch set to 'Primary Inport'.)*

- d) Move Jumpers and/or Change DIP Switches, if necessary.

The CyberMedia logo is displayed in a stylized, italicized red font with a registered trademark symbol.

Photo: Moving jumpers

The CyberMedia logo is displayed in a stylized, italicized red font with a registered trademark symbol.

Photo: DIP Switches

- e) Identify a free expansion slot of appropriate size and remove the rear metal slot cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the bus mouse card by its edges, insert the card bottom (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - h) Orient the serial plug on the end of the mouse cable to the bus mouse card serial socket on the rear of the computer and connect it.
  - i) Make sure no parts or tools remain in metal sides of the base unit.
  - j) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - k) Power up computer and related peripherals one at a time.
- 7) Install mouse driver:

*NOTE: If replacing a mouse with an identical mouse, the following section is optional (however an updated mouse driver may be available).*

- a) Locate the mouse installation diskette and instructions and insert the diskette in floppy drive.
  - b) Type the following command at the DOS prompt:  
A:INSTALL or A:SETUP  
(Depending on instructions.)
  - c) Follow instructions in the installation program (responding with the port assignment determined in step 1).
  - d) Respond 'YES' when asked for permission to add information to AUTOEXEC.BAT and/or CONFIG.SYS. (This adds the correct driver statement to the file to enable the mouse to run when the computer is turned on.)
  - e) Press CTRL+ALT+DEL to reboot the computer. (This will load the driver added to AUTOEXEC.BAT or CONFIG.SYS into memory and enable mouse to function.)  
Do one of the following (8 or 9) if applicable):
- 8) If the mouse model differs from the old mouse, update Windows as follows:
- a) Open 'Windows Setup'.
  - b) Select 'Options'.
  - c) Select 'Change System Settings'.
  - d) Select down-arrow next to 'Mouse' to bring down a list of mouse models.
  - e) Select appropriate mouse model.
  - f) Choose 'OK'.
  - g) Choose 'Restart Windows' when asked. (This will reboot computer).
  - h) (Optional) Change settings for mouse movement and click rate:
    - 1] Open 'Main' icon.
    - 2] Open 'Control Panel'.
    - 3] Open 'Mouse'.
    - 4] Adjust the horizontal and vertical slider bars to change the rate at which mouse movement moves the cursor on the screen.
    - 5] Adjust the double-click speed using the slider bar. Practice setting in the trial box provided. Readjust double-click speed if necessary.
    - 6] Choose 'OK' when done.
- 9) If the mouse model differs from the old mouse, update OS/2 as follows:
- a) Open 'OS/2 System'.
  - b) Open 'System Setup'.
  - c) Open 'Selective install'. (This opens the 'System Configuration' panel)
  - d) Use the space bar to check the 'Mouse' box.
  - e) Choose 'OK'.
  - f) Select the mouse type just installed from the list.
  - g) Provide the port assignment (determined in step 2 above).
  - h) Choose 'OK'.

- i) (Optional) Change settings for mouse movement and click rate:
  - 1] Open 'OS/2 System'.
  - 2] Open 'System Setup'.
  - 3] Open 'Mouse'. (This opens the 'Timing' page of 'Mouse-Settings' function.)
  - 4] Adjust the 'Double-click' slide bar and test the double-click speed in the box labeled 'Test here'.
  - 5] Adjust the 'Tracking speed' slider bar to change the rate at which mouse movement moves the cursor on the screen.
  - 6] Double-click in the upper-left-hand corner to close the panel.
- 10) Test application software that uses the mouse (drivers and bus mouse card) to Make sure proper configuration.
- 11) Replace base unit cover.
- 12) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:
  - DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.
  - OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD



## Mouse moves erratically due to defective mouse.

### Cause:

Mouse fails to operate correctly due to bad axis rotors or other faulty operational components.

### Solution:

Replace with a new serial mouse. Turn off the computer. Locate the mouse/serial port and plug the mouse cable into the back of the computer. Turn on the computer, install the mouse driver and update the system file(s). Reboot the computer, update Windows.

- 1) Save all files and exit all programs, including Windows.
- 2) Turn off the power to the computer.

*NOTE: If removing an old mouse is not required, skip to Step 4 for installation steps.*

- 3) Remove the defective mouse:
  - a) Trace the mouse cable to the back of the computer. Note the location of the mouse cable connection.
  - b) If the mouse connects to a 9-pin or 24-pin serial port, unscrew any hold-down screws on this plug.
  - c) Grasp the mouse plug and gently pull it straight out.
- 4) Install a new serial mouse:
  - a) Match the connector styles of the mouse and the computer port to use (Make note of the port used (e.g., COM1, COM2):
    - 1] If both match the port where the old mouse was removed, use this port.
    - 2] If both are slender 6-pin PS/2-style connectors, use this port (often labeled 'Mouse').
    - 3] If both use 9-pin serial ports, use this port.
    - 4] If the mouse plug differs in size from the port on the back of the computer, obtain an adapter (e.g., 9-pin to 6-pin serial port adapter, or 9-pin to 25-pin serial adapter).
    - 5] If no serial port is available, a bus-mouse is required (See installing a bus-mouse.)
  - b) Examine the shape and markings (e.g., notches or arrow) of the mouse plug and orient it to fit into the socket on the back of the PC.
  - c) Carefully insert the plug into the socket and push it in gently until it fits tightly. (Secure any port screws or finger screws.)

***WARNING: Do not use excessive force; it may damage the pins or connector.*** Instead, check plug orientation or type.
  - d) Turn on the power to the computer.
- 5) To Install Mouse Software:

*NOTE: If replacing a mouse with an identical mouse, the following section is optional (however an updated mouse driver may be available).*

- a) Locate the mouse installation CD and the instructions and insert the CD in the CD ROM.
  - b) Select the 'Start' button and select 'Run'.
  - c) Enter the following command in the 'Open' drop-down list box:  
D:INSTALL or D:SETUP  
(Depending on the instructions.)
  - c) Follow instructions in the installation program (responding to the port assignment determined in step 4).
  - d) Respond 'YES' when asked for permission to add information to AUTOEXEC.BAT and/or CONFIG.SYS. (This adds the correct driver statement to the file to enable the mouse to run when the computer is turned on.)
  - e) Press CTRL+ALT+DEL twice to reboot the computer. (This will load the driver added to the AUTOEXEC.BAT or CONFIG.SYS files into memory and enable the mouse to function.)
- 6) If the mouse model differs from the old mouse, update Windows as follows:
- a) Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b) Select 'Settings' then select 'Control Panel'.
  - c) Double-click the 'Mouse' icon then choose the 'General' tab.
  - d) Choose the 'Change' button. (The 'Select Device' dialog box appears.)
  - e) Select the appropriate manufacturer and model for the new mouse.
  - f) Choose 'OK'.
  - g) Choose the 'Close' button.
  - h) Choose the 'Yes' button when asked to restart Windows. (This will reboot the computer and allow the new mouse driver to take effect).



## Mouse moves erratically due to COM port and/or interrupt (IRQ) conflict.

### Cause:

There is a COM port conflict between the mouse and the other device just installed. In other words, they are attempting to use the same port simultaneously or there is an interrupt conflict.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Run a hardware status utility to identify COM port conflict and/or interrupt (IRQ) conflict and change the port and/or IRQ assignments on one of the devices. If the mouse was working fine, preferably change the other device.

- 1) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- 2) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- 3) Identify port assignments and write them down. Also identify which port is being used by both devices.



[MSD COM Ports example](#)

- 4) Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 5) Select an item or items to change to eliminate the conflict. See [Serial & Parallel Port Configuration Standards](#) for advice on COM port assignments. See [IRQ Conflicts](#) for advice on resolving conflicts.

- 6) Implement the change(s). *(NOTE: The following assumes that the device other than the mouse is being changed.)* Do one of the following:
- a) Some devices (e.g., internal modem) can be changed via software. For example, open the communications package and change the port selection from, say COM1 to COM2.
  - b) Other devices require a hardware change to change their COM port and/or interrupt assignments.
    - 1] Turn computer off and disconnect power cables.
    - 2] Do one of the following:
      - a] If device is external, remove cover and/or locate port and interrupt selection switches.
      - b] If device is internal, Remove base unit cover.
    - 3] Disconnect all data cables to device/card.
    - 4] Remove device/card and change COM port and/or IRQ assignment by Moving Jumpers to desired settings. If an IRQ is changed, also change the address to correspond to the new IRQ. Refer to device/card manual for instructions.
    - 5] Reinstall device/card.
    - 6] Reconnect all data cables to device/card.
    - 7] Reconnect power cables to base unit and turn computer on.
    - 8] Rerun hardware status program to determine if the conflict is eliminated.
    - 9] Repeat test activity.
    - 10] Repeat Step e until problem solved.
    - 11] Replace base unit cover.





## **Mouse moves erratically due to dirty mouse.**

### **Cause:**

Mouse is dirty. The compartment where mouse ball resides is filled with lint, dirt, and/or sticky substances.

### **Solution:**

Clean and service the mouse.

Clean and service the mouse:

- 1) Remove the mouse ball from its compartment.
- 2) Wash the ball in warm water and dry with a soft, lint-free cloth.
- 3) Inspect and clean the ball compartment and rollers using a mouse cleaning kit.
- 4) Reassemble the mouse.
- 5) Test the mouse operation.



## IRQ/COM port conflict; Resolve COM port/IRQ conflict and/or clean mouse.

### Cause:

Either there is a COM port/interrupt (IRQ) conflict or a dirty mouse.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Resolve COM port/IRQ conflict and/or clean mouse.

- 1) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
- 2) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- 3) Identify port assignments and write them down. Also identify which port is being used by both devices.



[MSD COM Ports example](#)

- 4) Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 5) Select an item or items to change to eliminate the conflict. See [Serial & Parallel Port Configuration Standards](#) for advice on COM port assignments. See [IRQ Conflicts](#) for advice on resolving conflicts.
- 6) Implement the change(s). (NOTE: The following assumes that the device other than the mouse is being changed.) Do one of the following:

- a)** Some devices (e.g., internal modem) can be changed via software. For example, open the communications package and change the port selection from, say COM1 to COM2.
- b)** Other devices require a hardware change to change their COM port and/or interrupt assignments.
  - 1]** Turn computer off and disconnect power cables.
  - 2]** Do one of the following:
    - a]** If device is external, remove cover and/or locate port and interrupt selection switches.
    - b]** If device is internal, [Remove base unit cover](#).
  - 3]** Disconnect all data cables to device/card.
  - 4]** Remove device/card and change COM port and/or IRQ assignment by [Moving Jumpers](#) to desired settings. If an IRQ is changed, also change the address to correspond to the new IRQ. Refer to device/card manual for instructions.
  - 5]** Reinstall device/card.
  - 6]** Reconnect all data cables to device/card.
  - 7]** Reconnect power cables to base unit and turn computer on.
  - 8]** Rerun hardware status program to determine if the conflict is eliminated.
  - 9]** Repeat test activity.
  - 10]** Repeat Steps 1-6 until problem solved.
  - 11]** [Replace base unit cover](#).



## **Mouse moves erratically due to invalid or outdated mouse driver.**

### **Cause:**

Loaded mouse driver is either outdated or invalid for this type mouse, causing erratic behavior.

### **Solution:**

Obtain and install updated version of the correct mouse driver for this model mouse.

- 1) Obtain an updated mouse driver.
- 2) Install the mouse driver software:
  - a) Locate the mouse installation CD and the instructions and insert the CD in the CD ROM.
  - b) Select the 'Start' button and select 'Run'.
  - c) Enter the following command in the 'Open' drop-down list box:  
D:INSTALL or D:SETUP  
(Depending on the instructions.)
  - d) Follow instructions in the installation program (responding with the port assignment determined in step 1).
  - e) Respond 'YES' when asked for permission to add information to AUTOEXEC.BAT and/or CONFIG.SYS. (This adds the correct driver statement to the file to enable the mouse to run when the computer is turned on.)
  - e) Press CTRL+ALT+DEL twice to reboot the computer. (This will load the driver added to AUTOEXEC.BAT or CONFIG.SYS into memory and enable mouse to function.)
- 3) If the mouse model differs from the old mouse, update Windows as follows:
  - a) Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b) Select 'Settings' then select 'Control Panel'.
  - c) Double-click the 'Mouse' icon then choose the 'General' tab.
  - d) Choose the 'Change' button. (The 'Select Device' dialog box appears.)
  - e) Select the appropriate manufacturer and model for the new mouse.
  - f) Choose 'OK'.
  - g) Choose the 'Close' button.
  - h) Choose the 'Yes' button when asked to restart Windows. (This will reboot the computer and allow the new mouse driver to take effect).

- 4)** (Optional) Change settings for mouse movement and click rate:
- a)** Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b)** Select 'Settings' then select 'Control Panel'.
  - c)** Double-click the 'Mouse' icon then choose the 'Buttons' tab.
  - d)** Adjust the double-click speed using the slider bar. Practice setting in the trial box provided. Readjust double-click speed if necessary.
  - e)** Choose the 'Motion' tab.
  - f)** Adjust the horizontal and vertical slider bars to change the rate at which mouse movement moves the cursor on the screen.
  - g)** Choose 'OK' when done.



## **Mouse moves erratically due to incorrect adjustment of mouse controls.**

### **Cause:**

Mouse control settings for acceleration and/or double-click speed are not adjusted properly for this user.

### **Solution:**

Adjust the mouse control settings for this particular user in Windows and/.

- 1) Change settings for mouse movement and click rate:
  - a) Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b) Select 'Settings' then select 'Control Panel'.
  - c) Double-click the 'Mouse' icon then choose the 'Buttons' tab.
  - d) Adjust the double-click speed using the slider bar. Practice setting in the trial box provided. Readjust double-click speed if necessary.
  - e) Choose the 'Motion' tab.
  - f) Adjust the horizontal and vertical slider bars to change the rate at which mouse movement moves the cursor on the screen.
  - g) Choose 'OK' when done.
- 2) Try using the mouse to navigate around the screen and open and close several objects. Readjust settings as necessary.



## **Mouse pointer appears but frozen on screen due to incorrect driver.**

### **Cause:**

The correct mouse/driver is not installed in Windows. Windows must also know about the mouse for it to work.

### **Solution:**

Install/correct the mouse/driver in Windows.

Update Mouse Configuration in Windows and/:

Configure Windows for this mouse.

- 1) If the mouse model differs from the old mouse, update Windows as follows:
  - a) Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b) Select 'Settings' then select 'Control Panel'.
  - c) Double-click the 'Mouse' icon then choose the 'General' tab.
  - d) Choose the 'Change' button. (The 'Select Device' dialog box appears.)
  - e) Select the appropriate manufacturer and model for the new mouse.
  - f) Choose 'OK'.
  - g) Choose the 'Close' button.
  - h) Choose the 'Yes' button when asked to restart Windows. (This will reboot the computer and allow the new mouse driver to take effect).
- 2) (Optional) Change settings for mouse movement and click rate:
  - a) Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b) Select 'Settings' then select 'Control Panel'.
  - c) Double-click the 'Mouse' icon then choose the 'Buttons' tab.
  - d) Adjust the double-click speed using the slider bar. Practice setting in the trial box provided. Readjust double-click speed if necessary.
  - e) Choose the 'Motion' tab.
  - f) Adjust the horizontal and vertical slider bars to change the rate at which mouse movement moves the cursor on the screen.
  - g) Choose 'OK' when done.







## Mouse pointer appears frozen on screen due to incorrect DOS driver/path.

### Cause:

There is a problem with the mouse driver being loaded from AUTOEXEC.BAT or CONFIG.SYS. The drive, path, driver or syntax is incorrect.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit AUTOEXEC.BAT or CONFIG.SYS and correct drive, path, driver and/or syntax.

- 1) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and locate a line with the word 'MOUSE...' similar to one of the following:
  - a) In AUTOEXEC.BAT: C:\DOS\MOUSE\MOUSE.COM /x
  - b) In CONFIG.SYS: DEVICE=C:\DOS\MOUSE\MOUSE.SYS /x
- 2) Make sure the drive, path, driver and syntax used are correct.
- 3) After the word 'MOUSE' there may be a '/1' or '/2'. Make sure the digit, if mentioned, points to the correct serial port to which the mouse is connected. To change it, if the digit is a 1, change it to 2; if it is a 2, change it to a 1.
- 4) Save the file, if changes were made and reboot the computer.
- 5) Watch for a message about loading the mouse driver during bootup process.
- 6) Start the application that uses the mouse (e.g., Windows).
- 7) Attempt to use the mouse.



## **Loose mouse cable; Secure mouse cable to port on the back of computer.**

### **Cause:**

Mouse cable connection is loose.

### **Solution:**

Secure the mouse cable to the base unit port.

Check the mouse cable connection:

- 1) Turn off the computer.
- 2) Trace the mouse cable to the back of the computer.
- 3) Do one of the following:
  - a) If the socket is a PS/2 style connector, make sure it is inserted into the connector marked 'Mouse' or one with a mouse icon. Make sure it is secure.
  - b) If the socket is a 9-pin size serial connector, make sure it is securely attached to an open COM port (Usually COM1). Make sure screws are snug.
- 4) Pick up the mouse and make sure the tracking ball moves freely inside its compartment.
- 5) Turn on the power to the computer and watch for a message about loading the mouse driver during the bootup process.
- 6) Start the application that uses the mouse (e.g., Windows).
- 7) Attempt to use the mouse.



## Mouse does not work with all DOS programs because load their own drivers.

### Cause:

Some DOS programs load their own mouse driver into memory. If there is already a mouse driver loaded (i.e., from AUTOEXEC.BAT) the two mouse drivers in memory conflict with each other.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Make sure only one mouse driver is loaded at a time.

- 1) Check the application program documentation and the program directory to determine if it is loading its own mouse driver.
- 2) If it does, Edit AUTOEXEC.BAT or Edit CONFIG.SYS and locate a line with the word 'MOUSE...' similar to one of the following:
  - a) In AUTOEXEC.BAT: C:\DOS\MOUSE\MOUSE.COM
  - b) In CONFIG.SYS: DEVICE=C:\DOS\MOUSE\MOUSE.SYS
- 2) Enter REM for remark in front of that line to prevent the mouse driver from being loaded.
- 3) Save the file and reboot the computer.
- 5) Load the DOS application that uses the mouse.
- 6) Attempt to use the mouse.
- 7) If it works, then create separate batch files to load each of the other programs or configurations to load the appropriate mouse driver only when required.



## **Mouse Snap-To feature snaps to wrong location due to software bug.**

### **Cause:**

Microsoft Mouse version 9.0 has a feature to pointer to automatically jump to the default button in any dialog box. It looks for default buttons created as button objects. It cannot find owner-created buttons (bitmaps). Also it jumps to the default button's original location. When an application draws the dialog box and then resizes it, the pointer snaps to the original location.

### **Solution:**

There is no solution in this knowledge base. Microsoft Corporation has confirmed this as a known bug in Microsoft Mouse Driver for Windows, version 9.0.



## **MS Mouse not working on Zenith laptop serial ports due to port disablement.**

### **Cause:**

The mouse does not work because one or both the serial ports (COM1 and COM2) are disabled from within Setup.

### **Solution:**

Run Setup and enable the desired COM port.

- 1) Connect the mouse cable to the desired COM port.
- 2) Press CTRL+ALT+INS at the DOS prompt to enter the 'Monitor'.
- 3) Enter SETUP to open the Setup program.
- 4) Page up or down between screens to locate the Serial ports section.
- 5) Enable the desired serial port (COM1 or COM2).
- 6) Save the setup changes.
- 7) Reboot the computer.
- 8) Run a program that uses the mouse (e.g., Windows).
- 9) Test the mouse.
- 10) If it doesn't work, make sure the mouse cable is securely connected to the correct COM port (i.e., the one just enabled).
- 11) Also make sure this mouse is enabled in Windows as follows:
- 12) If the mouse model differs from the old mouse, update Windows as follows:
  - a) Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b) Select 'Settings' then select 'Control Panel'.
  - c) Double-click the 'Mouse' icon then choose the 'General' tab.
  - d) Choose the 'Change' button. (The 'Select Device' dialog box appears.)
  - e) Select the appropriate manufacturer and model for the new mouse.
  - f) Choose 'OK'.
  - g) Choose the 'Close' button.
  - h) Choose the 'Yes' button when asked to restart Windows. (This will reboot the computer and allow the new mouse driver to take effect).
- 13) (Optional) Change settings for mouse movement and click rate:

- a)** Choose the Windows 95 'Start' button to open the 'Start' menu.
- b)** Select 'Settings' then select 'Control Panel'.
- c)** Double-click the 'Mouse' icon then choose the 'Buttons' tab.
- d)** Adjust the double-click speed using the slider bar. Practice setting in the trial box provided. Readjust double-click speed if necessary.
- e)** Choose the 'Motion' tab.
- f)** Adjust the horizontal and vertical slider bars to change the rate at which mouse movement moves the cursor on the screen.
- g)** Choose 'OK' when done.



## Installed modem etc. and now mouse acts up disappears due to port conflict.

### Cause:

There is a port conflict between the mouse and the other device just installed. In other words, they are attempting to use the same port simultaneously or there is an interrupt conflict.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Resolve COM port and/or IRQ conflict.

COM port and/or IRQ conflict require further diagnosis and repair.

- 1) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- 2) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- 3) Identify port assignments and write them down. Also identify which port is being used by both devices.



[MSD COM Ports example](#)

- 4) Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 5) Select an item or items to change to eliminate the conflict. See [Serial & Parallel Port Configuration](#)

Standards for advice on COM port assignments. See IRQ Conflicts for advice on resolving conflicts.

- 6) Implement the change(s). *(NOTE: The following assumes that the device other than the mouse is being changed.)* Do one of the following:
  - a) Some devices (e.g., internal modem) can be changed via software. For example, open the communications package and change the port selection from, say COM1 to COM2.
  - b) Other devices require a hardware change to change their COM port and/or interrupt assignments.
    - 1] Turn computer off and disconnect power cables.
    - 2] Do one of the following:
      - a] If device is external, remove cover and/or locate port and interrupt selection switches.
      - b] If device is internal, Remove base unit cover.
    - 3] Disconnect all data cables to device/card.
    - 4] Remove device/card and change COM port and/or IRQ assignment by Moving Jumpers to desired settings. If an IRQ is changed, also change the address to correspond to the new IRQ. Refer to device/card manual for instructions.
    - 5] Reinstall device/card.
    - 6] Reconnect all data cables to device/card.
    - 7] Reconnect power cables to base unit and turn computer on.
    - 8] Rerun hardware status program to determine if the conflict is eliminated.
    - 9] Repeat test activity.
    - 10] Repeat Steps 1-6 until problem solved.
    - 11] Replace base unit cover.





## Conflict with mouse & other device; Identify COM port and/or IRQ conflict.

### Cause:

There is a port conflict between the mouse and the other device just installed. In other words, they are attempting to use the same port simultaneously or there is an interrupt conflict.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

- 1) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- 2) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- 3) Identify port assignments and write them down. Also identify which port is being used by both devices.



[MSD COM Ports example](#)

- 4) Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 5) Select an item or items to change to eliminate the conflict. See [Serial & Parallel Port Configuration Standards](#) for advice on COM port assignments. See [IRQ Conflicts](#) for advice on resolving conflicts.
- 6) Implement the change(s). (NOTE: The following assumes that the device other than the mouse is being changed.) Do one of the following:

- a)** Some devices (e.g., internal modem) can be changed via software. For example, open the communications package and change the port selection from, say COM1 to COM2.
- b)** Other devices require a hardware change to change their COM port and/or interrupt assignments.
  - 1]** Turn computer off and disconnect power cables.
  - 2]** Do one of the following:
    - a]** If device is external, remove cover and/or locate port and interrupt selection switches.
    - b]** If device is internal, [Remove base unit cover.](#)
  - 3]** Disconnect all data cables to device/card.
  - 4]** Remove device/card and change COM port and/or IRQ assignment by [Moving Jumpers](#) to desired settings. If an IRQ is changed, also change the address to correspond to the new IRQ. Refer to device/card manual for instructions.
  - 5]** Reinstall device/card. **6]** Reconnect all data cables to device/card.
  - 6]** Reconnect power cables to base unit and turn computer on.
  - 7]** Rerun hardware status program to determine if conflict is eliminated.
  - 8]** Repeat test activity.
  - 9]** Repeat Step e until problem solved.
  - 10]** [Replace base unit cover.](#)



## **Mouse batteries dead or low; Replace mouse batteries.**

### **Cause:**

Batteries in cordless mouse are low or bad.

### **Solution:**

Replace the batteries.

- 1) Refer to the label on the mouse bottom or instruction manual to determine the number and size of batteries.
- 2) Turn off the mouse.
- 3) Carefully remove the battery compartment cover.
- 4) Remove the old batteries, noting their position and orientation.
- 5) Install fresh batteries, carefully orienting them the same way.
- 6) Replace the battery compartment cover.
- 7) Turn on the mouse.
- 8) Test mouse operation.



## **Cordless mouse sometimes acts weird due to cluttered desktop.**

### **Cause:**

Cordless mouse (infrared variety) requires a clear line of sight between the mouse and the base unit. This line of sight was obstructed with other objects.

### **Solution:**

Clear applicable portion of the desktop or work surface of other objects.



## Computer says it cannot find mouse due to unknown port problem.

### **Cause:**

Unknown port or internal base unit problem.

### **Solution:**

***CAUTION:*** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Obtain further diagnosis and troubleshooting by a qualified computer technician.



## Computer says it cannot find the mouse due to bad mouse.

### Cause:

Mouse is bad.

### Solution:

Replace the mouse. Turn off the computer. Locate the mouse/serial port and plug the mouse cable into the back of the computer. Turn on the computer, install the mouse driver and update system file(s). Reboot the computer, update Windows.

1) Save all files and exit all programs, including Windows.

2) Turn off the power to the computer.

*NOTE: If removing an old mouse is not required, skip to Step 4 for installation steps.*

3) Remove the defective mouse:

- a) Trace the mouse cable to the back of the computer. Note the location of the mouse cable connection.
- b) If the mouse connects to a 9-pin or 24-pin serial port, unscrew any hold-down screws on this plug.
- c) Grasp the mouse plug and gently pull it straight out.

4) Install a new serial mouse:

- a) Match the connector styles of the mouse and the computer port to use (Make note of the port used (e.g., COM1, COM2):
  - 1] If both match the port where the old mouse was removed, use this port.
  - 2] If both are slender 6-pin PS/2-style connectors, use this port (often labeled 'Mouse').
  - 3] If both use 9-pin serial ports, use this port.
  - 4] If the mouse plug differs in size from the port on the back of the computer, obtain an adapter (e.g., 9-pin to 6-pin serial port adapter, or 9-pin to 25-pin serial adapter).
  - 5] If no serial port is available, a bus-mouse is required (See installing a bus-mouse.)
- b) Examine the shape and markings (e.g., notches or arrow) of the mouse plug and orient it to fit into the socket on the back of the PC.
- c) Carefully insert the plug into the socket and push it in gently until it fits tightly. (Secure any port screws or finger screws.)

***WARNING: Do not use excessive force; it may damage the pins or connector.*** Instead, check plug orientation or type.
- d) Turn on the power to the computer.

**5) To Install Mouse Software:**

*NOTE: If replacing a mouse with an identical mouse, the following section is optional (however an updated mouse driver may be available).*

- a)** Locate the mouse installation CD and the instructions and insert the CD in the CD ROM.
- b)** Select the 'Start' button and select 'Run'.
- c)** Enter the following command in the 'Open' drop-down list box:  
D:INSTALL or D:SETUP  
(Depending on the instructions.)
- c)** Follow instructions in the installation program (responding to the port assignment determined in step 4).
- d)** Respond 'YES' when asked for permission to add information to AUTOEXEC.BAT and/or CONFIG.SYS. (This adds the correct driver statement to the file to enable the mouse to run when the computer is turned on.)
- e)** Press CTRL+ALT+DEL twice to reboot the computer. (This will load the driver added to the AUTOEXEC.BAT or CONFIG.SYS files into memory and enable the mouse to function.)

**6) If the mouse model differs from the old mouse, update Windows as follows:**

- a)** Choose the Windows 95 'Start' button to open the 'Start' menu.
- b)** Select 'Settings' then select 'Control Panel'.
- c)** Double-click the 'Mouse' icon then choose the 'General' tab.
- d)** Choose the 'Change' button. (The 'Select Device' dialog box appears.)
- e)** Select the appropriate manufacturer and model for the new mouse.
- f)** Choose 'OK'.
- g)** Choose the 'Close' button.
- h)** Choose the 'Yes' button when asked to restart Windows. (This will reboot the computer and allow the new mouse driver to take effect).



## Defective mouse or port problem; Use new mouse, change mouse port destination.

### Cause:

Mouse port designated in AUTOEXEC.BAT or CONFIG.SYS is incorrect.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Change the mouse port designation.

- 1) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and locate a line with the word 'MOUSE...' similar to one of the following:
  - a) In AUTOEXEC.BAT: C:\DOS\MOUSE\MOUSE.COM /x
  - b) In CONFIG.SYS: DEVICE=C:\DOS\MOUSE\MOUSE.SYS /x
- 2) After the word 'MOUSE' there may be a '/1' or '/2'. If the digit is a 1, change it to 2; if it is a 2, change it to a 1.
- 3) Save the file and reboot the computer.
- 4) Watch for a message about loading the mouse driver during bootup process.
- 5) Start the application that uses the mouse (e.g., Windows).
- 6) Attempt to use the mouse.





## Computer says it cannot find the mouse due to loose mouse cable.

### Cause:

Mouse cable not securely connected to base unit.

### Solution:

Secure the mouse cable connection to the mouse or COM port on the base unit.

Check the mouse cable connection:

- 1) Turn off the computer.
- 2) Trace the mouse cable to the back of the computer.
- 3) Do one of the following:
  - a) If the socket is a PS/2 style connector, make sure it is inserted into the connector marked 'Mouse' or one with a mouse icon. Make sure it is secure.
  - b) If the socket is a 9-pin size serial connector, make sure it is securely attached to an open COM port (Usually COM1). Make sure screws are snug.
- 4) Pick up the mouse and make sure the tracking ball moves freely inside its compartment.
- 5) Turn on the power to the computer and watch for a message about loading the mouse driver during the bootup process.
- 6) Start the application that uses the mouse (e.g., Windows).
- 7) Attempt to use the mouse.



## Install/replace keyboard.

### Solution:

Save all work, exit all programs, including Windows, then turn off the computer. Unplug the keyboard connector, insert the new keyboard connector into the socket and turn on the computer.

- 1) Save all work and exit all program(s), including Windows.
- 2) Turn off the computer.
- 3) Trace the keyboard cable to the back of the computer and carefully pull the keyboard plug straight out.
- 4) Examine the new keyboard plug for an arrow or notch on the outer surface. This notch should line up at the top of the socket on the back of the computer.

*NOTE: If there is no notch on the plug, simply match the pin pattern on the plug with the pinhole pattern in the socket.*

- 5) Orient the plug to match the socket and carefully insert it into the socket on the back of the computer.

*NOTE: Different types of sockets often look alike. Before inserting the plug, double-check to see that you have the keyboard socket.*

***WARNING: Do not force the plug into the socket. This could damage the pins on the plug or the socket.***

- 6) Turn the keyboard over and look for an XT/AT switch. If present, set switch to AT position. (Otherwise skip this step.)
- 7) If the keyboard contains DIP Switches, set them to enable the desired options following the instructions in the owner manual. (Change DIP Switches).
- 8) Turn on the power to the computer.
- 9) Watch POST. (If the keyboard is not properly switched or connected, the POST will generate a keyboard error.)
- 10) If a keyboard error appears, turn off the computer and reseat the keyboard plug and keyboard toggle switch or DIP switches (if applicable). Turn on the computer and try again.



## **Keyboard layout incorrect; Change keyboard setting to Dvorak/Qwerty in Control Panel.**

### **Solution:**

Obtain and run Dvorak/Qwerty keyboard layout program.

- 1) Obtain and run the Dvorak/Qwerty keyboard layout program.
- 2) Do the following to install the Dvorak/Qwerty keyboard in Windows:
  - a) Choose the Windows 95 'Start' button to access the 'Start' menu.
  - b) Select 'Settings', then select 'Control Panel'.
  - c) Open the 'Keyboard' icon.
  - d) Choose the 'Language' tab.
  - e) Choose the 'Properties' button.
  - f) Select the down-arrow next to 'Keyboard Layout'.
  - g) Scroll and select 'US-Dvorak' or 'US-Qwerty' (depending on your preference).
  - h) Choose 'OK'.
  - i) Choose 'OK' again to close the 'Keyboard Properties' dialog box.
  - j) Close the 'Control Panel' window.



## **Wrong keyboard connector; Try keyboard with other type connector or use adapter.**

### **Cause:**

There are 2 sizes of keyboard connectors dominating the market today: the older, larger 15-pin connector and the newer smaller PS/2 style connector.



[Photo: PS/2 Style Keyboard and Mouse connectors](#)

### **Solution:**

If the newer keyboard has both connectors, try the other one. If not, obtain an adapter plug to connect the two. (Be sure to specify which direction.)



## Keyboard connector failure; Repair keyboard connector on mainboard in computer.

### Cause:

Keyboard connector on mainboard is faulty.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Repair keyboard connector on mainboard.



## Keyboard dead or will not type due to bad keyboard.

### Cause:

Keyboard is bad.

### Solution:

Replace keyboard. Save work, exit program, turn off computer. Unplug keyboard connector, insert new keyboard connector into socket and turn computer on.

- 1) Save all work and exit all program(s), including Windows.
- 2) Turn off the computer.
- 3) Trace the keyboard cable to the back of the computer and carefully pull the keyboard plug straight out.
- 4) Examine the new keyboard plug for an arrow or notch on the outer surface. This notch should line up at the top of the socket on the back of the computer.

*NOTE: If there is no notch on the plug, simply match the pin pattern on the plug with the pinhole pattern in the socket.*

- 5) Orient the plug to match the socket and carefully insert it into the socket on the back of the computer.

*NOTE: Different types of sockets often look alike. Before inserting the plug, double-check to see that you have the keyboard socket.*

***WARNING: Do not force the plug into the socket. This could damage the pins on the plug or the socket.***

- 6) Turn the keyboard over and look for an XT/AT switch. If present, set switch to AT position. (Otherwise skip this step.)
- 7) If the keyboard contains DIP Switches, set them to enable the desired options following the instructions in the owner manual. (Change DIP Switches).
- 8) Turn on the power to the computer.
- 9) Watch POST. (If the keyboard is not properly switched or connected, the POST will generate a keyboard error.)
- 10) If a keyboard error appears, turn off the computer and reseat the keyboard plug and keyboard toggle switch or DIP switches (if applicable). Turn on the computer and try again.



## Keyboard dead or will not type due to invalid switch setting on keyboard.

### Cause:

Keyboard switch or DIP switches are not set properly to enable this keyboard to work on this computer.

### Solution:

Set keyboard switch or DIP switches.

- 1) Turn over the keyboard and look for an XT/AT switch. If present, set the switch to the AT position. (Otherwise skip this step.)
- 2) If the keyboard contains [DIP Switches](#), set them to enable desired options following the instructions in the owner manual. ([Change DIP Switches](#)).



## **Keyboard dead or will not type due to keyboard cable in mouse connector.**

### **Cause:**

Keyboard cable is plugged into mouse connector on computer base unit. These two are often confused on PS/2 style setups because they are similar and right next to each other.

### **Solution:**

Plug the keyboard cable into the keyboard connector (or reverse the two if a mouse is present).

Trace the keyboard cable to the back of the computer and make sure it is inserted into the connector marked 'Keyboard' or one with a keyboard icon. Make sure it is secure.



[Photo: PS/2 Style Keyboard and Mouse connectors](#)





## **Keyboard dead or will not type due to loose keyboard connection.**

### **Cause:**

Keyboard cable connection loose.

### **Solution:**

Trace the keyboard cable to the back of the computer and carefully press it in fully. Make sure it is secure.



## **Keyboard dead or will not type due to entering prohibited information.**

### **Cause:**

Attempting to enter restricted characters in this field or area.

Some fields or areas of some applications have built-in constraints that permit only certain types of entries (e.g., numbers in numeric fields) in them. This means that the keyboard will appear not to work when attempting to enter prohibited characters or numbers.

### **Solution:**

Consult on-line help or the user manual for this application to better understand what type of information may be entered in certain restricted fields/areas.



## **Keyboard dead, will not type due to inactive or non-visible window.**

### **Cause:**

The keyboard is working fine. The problem is that either an active window is not selected (which means that the characters being typed are going nowhere) or the active window is not visible (which means that the characters are being actively entered in the application; but that portion of the window is hidden).

### **Solution:**

Click on the desired application window to make it active or move the window towards the center of the screen so that it is entirely visible.



## **Keyboard does not have F11 and F12 keys due to older 84-key keyboard.**

### **Cause:**

Keyboard is an older 83-key or 84-key keyboard. This is not a major problem since most PC programs do not assign important functions to these keys. Also, in most cases, the mouse can be used to perform functions assigned to these keys.

### **Solution:**

Use the mouse or pull-down menus (navigated with arrow keys) to perform tasks assigned to the F11 and F12 keys or replace the keyboard with a new one.



## Keyboard missing key caps; Reattach key caps to the keyboard.

### Cause:

Keyboard was dropped. If all key caps are collected and reinstalled, it is very likely that the keyboard will work.

### Solution:

Turn off the power to the computer, pickup the keyboard, replace the keys, plug in the keyboard, turn on the computer and try the keyboard.

- 1) Turn off the power to the computer.
- 2) Pick up the keyboard and key caps.
- 3) Clean the key area of dirt and grime while the key cap is off using a cotton swab wet with warm water.
- 4) Replace each key cap by positioning it where it belongs and pressing down firmly until it snaps into place.
- 5) Plug in keyboard (if removed), ensuring plug goes into keyboard (not mouse) connector securely.
- 6) Turn on the computer.
- 7) Open a word processing application.
- 8) Type each key several times to make sure each key works properly. Make a list of each key that does not work.
- 9) Turn off the computer and attempt to reseat the keys that did not work.
- 10) If important keys do not work, or if the entire keyboard does not work, replace the keyboard.



## Missing letters from words due to bad keyboard.

### Cause:

Keyboard is bad. It is cheaper to replace keyboard than fool with repairing several keys.

### Solution:

Replace keyboard (cost effective).

- 1) Save all work and exit all program(s), including Windows.
- 2) Turn off the computer.
- 3) Trace the keyboard cable to the back of the computer and carefully pull the keyboard plug straight out.
- 4) Examine the new keyboard plug for an arrow or notch on the outer surface. This notch should line up at the top of the socket on the back of the computer.

*NOTE: If there is no notch on the plug, simply match the pin pattern on the plug with the pinhole pattern in the socket.*

- 5) Orient the plug to match the socket and carefully insert it into the socket on the back of the computer.

*NOTE: If the socket is a PS/2 style connector, make sure that the keyboard socket is used (not the mouse socket).*

***WARNING: Do not force the plug into the socket. This could damage the pins on the plug or the socket.***

- 6) Turn the keyboard over and look for an XT/AT switch. If present, set switch to AT position. (Otherwise skip this step.)
- 7) If the keyboard contains DIP Switches, set them to enable the desired options following the instructions in the owner manual. (Change DIP Switches).
- 8) Turn on the power to the computer.
- 9) Watch POST. (If the keyboard is not properly switched or connected, the POST will generate a keyboard error.)
- 10) If a keyboard error appears, turn off the computer and reseal the keyboard plug and keyboard toggle switch or DIP switches (if applicable). Turn on the computer and try again.



## Missing letters from words due to gunk under key or bent spring.

### Cause:

Characters are consistently missing from words because the keys are sticking or not working. Accumulated material under key (especially sticky material) makes keys stick. Or key may have a bent spring.

### Solution:

Remove key and clean key area and/or straighten key spring.

- 1) Identify which key(s) stick.
- 2) Turn off the power to the computer.
- 3) Carefully remove the nonfunctional key with a paper clip or letter opener.
- 4) Do one of the following:
  - a) Wet a cotton swab with warm water and wash/wipe debris away from the key area.
  - b) If the key area is clean, the problem could be a bent spring. Older keyboards use visible springs. If a bent one is visible, carefully bend or straighten it.
- 5) Replace the key. Press down firmly.
- 6) Turn on the computer.
- 7) Open a word processing application.
- 8) Press formerly sticking key(s) several times to test them.



## Keys stick due to bad keyboard.

### Cause:

Keyboard is bad. It is cheaper to replace keyboard than repair several keys.

### Solution:

Replace the keyboard (cost effective).

- 1) Save all work and exit all program(s), including Windows.
- 2) Turn off the computer.
- 3) Trace the keyboard cable to the back of the computer and carefully pull the keyboard plug straight out.
- 4) Examine the new keyboard plug for an arrow or notch on the outer surface. This notch should line up at the top of the socket on the back of the computer.

*NOTE: If there is no notch on the plug, simply match the pin pattern on the plug with the pinhole pattern in the socket.*

- 5) Orient the plug to match the socket and carefully insert it into the socket on the back of the computer.

*NOTE: If the socket is a PS/2 style connector, make sure that the keyboard socket is used (not the mouse socket).*

***WARNING: Do not force the plug into the socket. This could damage the pins on the plug or the socket.***

- 6) Turn the keyboard over and look for an XT/AT switch. If present, set switch to AT position. (Otherwise skip this step.)
- 7) If the keyboard contains DIP Switches, set them to enable the desired options following the instructions in the owner manual. (Change DIP Switches).
- 8) Turn on the power to the computer.
- 9) Watch POST. (If the keyboard is not properly switched or connected, the POST will generate a keyboard error.)
- 10) If a keyboard error appears, turn off the computer and reseat the keyboard plug and keyboard toggle switch or DIP switches (if applicable). Turn on the computer and try again.





## **Keys stick due to gunk under key or bent spring.**

### **Cause:**

Accumulated material under key (especially sticky material) makes keys stick. Or key may have a bent spring.

### **Solution:**

Remove key and clean key area and/or straighten key spring.

- 1) Identify which key(s) stick.
- 2) Turn off the power to the computer.
- 3) Carefully remove the nonfunctional key with a paper clip or letter opener.
- 4) Do one of the following:
  - a) Wet a cotton swab with warm water and wash/wipe debris away from the key area.
  - b) If the key area is clean, the problem could be a bent spring. Older keyboards use visible springs. If a bent one is visible, carefully bend or straighten it.
- 5) Replace the key. Press down firmly.
- 6) Turn on the computer.
- 7) Open a word processing application.
- 8) Press formerly sticking key(s) several times to test them.



## **New keyboard or one from another one does not work due to incompatible.**

### **Cause:**

This keyboard is incompatible with this computer.

### **Solution:**

Return keyboard and obtain a new one compatible with this computer.



## **New keyboard or one from another computer does not work due to switch.**

### **Cause:**

Keyboard switch or DIP switches are not set properly to enable this keyboard to work on this computer.

### **Solution:**

Set keyboard switch or DIP switches.

- 1) Turn over the keyboard and look for an XT/AT switch. If present, set the switch to the AT position. (Otherwise skip this step.)
- 2) If the keyboard contains [DIP Switches](#), set them to enable the desired options following the instructions in the owner manual. ([Change DIP Switches](#)).



## **New keyboard or one from another keyboard will not work due to connection.**

### **Cause:**

Keyboard cable is plugged into mouse connector on computer base unit. These two are often confused on PS/2 style setups because they are similar and right next to each other.

### **Solution:**

Plug keyboard cable into keyboard connector (or reverse the two if a mouse present).

Trace the keyboard cable to the back of the computer and make sure it is inserted into the connector marked 'Keyboard' or one with a keyboard icon. Make sure it is secure.



[Photo: PS/2 Style Keyboard and Mouse connectors](#)



## **New keyboard or one from another computer does not work due to loose cable.**

### **Cause:**

Keyboard cable is loose.

### **Solution:**

Trace the keyboard cable to the back of the computer and carefully press it in fully. Make sure it is secure.



## **CAPLOCK key/light does not reflect true position of key due to confusion.**

### **Cause:**

Sometimes the computer gets confused about the CAPLOCK key status due to improper memory management or another unknown cause.

### **Solution:**

Reboot the computer.

Press CTRL+ALT+DEL twice to reboot the computer.



## Some keys stick/fail to work after spilling soda pop on keyboard due bad.

### Cause:

Any sticky liquid (especially soda pop) spilled on a keyboard usually renders the keyboard useless sooner or later. Sticky material attracts dirt and dust that inhibits electrical contacts.

### Solution:

Replace the keyboard.

- 1) Save all work and exit all program(s), including Windows.
- 2) Turn off the computer.
- 3) Trace the keyboard cable to the back of the computer and carefully pull the keyboard plug straight out.
- 4) Examine the new keyboard plug for an arrow or notch on the outer surface. This notch should line up at the top of the socket on the back of the computer.

*NOTE: If there is no notch on the plug, simply match the pin pattern on the plug with the pinhole pattern in the socket.*

- 5) Orient the plug to match the socket and carefully insert it into the socket on the back of the computer.

*NOTE: If the socket is a PS/2 style connector, make sure that the keyboard socket is used (not the mouse socket.)*

***WARNING: Do not force the plug into the socket. This could damage the pins on the plug or the socket.***

- 6) Turn the keyboard over and look for an XT/AT switch. If present, set switch to AT position. (Otherwise skip this step.)
- 7) If the keyboard contains [DIP Switches](#), set them to enable the desired options following the instructions in the owner manual. ([Change DIP Switches](#)).
- 8) Turn on the power to the computer.
- 9) Watch [POST](#). (If the keyboard is not properly switched or connected, the POST will generate a keyboard error.)
- 10) If a keyboard error appears, turn off the computer and reseat the keyboard plug and keyboard toggle switch or DIP switches (if applicable). Turn on the computer and try again.



## **Liquid spilled onto keyboard; Clean and air dry the keyboard.**

### **Cause:**

If keyboard had something spilled on it, it may or may not be salvageable. If the liquid was water or plain coffee, chances are good that it will work, if amount spilled was small. If liquid was sweet and sticky (e.g., soda pop) the chances of it working are slim to none; or if it does, it will fail soon.

### **Solution:**

Save all work, turn off the computer, unplug the keyboard and dry out the keyboard for at least 24 hours.

- 1) Save the work, if possible.
- 2) Turn off the computer.
- 3) Unplug the keyboard.
- 4) Use a sponge or towel to carefully wipe up all the liquid possible.
- 5) Place the keyboard in a warm, dry location with good air circulation for 24 hours.
- 6) After the keyboard is dry, plug it back into computer and try all keys.
- 7) If the keys do not work, the keyboard will need to be replaced.
- 8) If the keyboard works, it will probably fail in the near future, especially if the liquid was sweet and sticky.





## **NUMLOCK key/light does not reflect true position of key due to confusion.**

### **Cause:**

Sometimes the computer gets confused about the NUMLOCK key status due to improper memory management or another unknown cause.

### **Solution:**

Reboot the computer.

Press CTRL+ALT+DEL twice to reboot the computer.



## **Keyboard will not type, beeps every time due to frozen state/full buffer.**

### **Cause:**

The computer beeps because the keyboard buffer (20 characters) is full. The keyboard buffer is full because user continued to type characters when the computer is frozen.

### **Solution:**

Attempt to close the application or reboot the computer.

Try one of the following increasingly powerful steps, in sequence, until computer is unfrozen:

- 1) Close the application by using the 'Close Program' dialog box.
  - a) Press CTRL+ALT+DEL.
  - b) Select the application to be closed.
  - c) Choose the 'End Task' button.
  - d) Choose the 'End Task' button again.
- 2) Press CTRL+ALT+DEL twice to reboot computer.
- 3) Press 'Reset' button on base unit (if present).
- 4) Turn off the power to the base unit. Wait 15 seconds. Power up base unit.

*NOTE: The best way to protect yourself against computer failure is to regularly save your work in progress.*



## **Keyboard will not type, beeps every time key is pressed due to loose cable.**

### **Cause:**

Keyboard cable connection is loose.

### **Solution:**

Trace the keyboard cable to the back of the computer and carefully press it in fully. Make sure it is secure.

*NOTE: If the socket is a PS/2 style connector, make sure the keyboard socket is used (not the mouse socket.)*



## **Keyboard will not type, beeps every time key is pressed due to rapid entry.**

### **Cause:**

The computer beeps because the keyboard buffer (20 characters) is full. The keyboard buffer is full because user is typing at a very fast rate while the computer is busy performing other tasks (e.g., saving a file, running another program, etc.).

### **Solution:**

Decrease the speed at which text is entered.



## **Keyboard will not type, beeps every time a key is pressed due illegal keys.**

### **Cause:**

Keys pressed are not allowed by application program in this area or field (e.g., entering characters in a numeric-only field).

### **Solution:**

Refer to the application's on-line help or user manual for assistance on legal entries for each area/field.



## **Keyboard beeps menacingly when typing rapidly due to full keyboard buffer.**

### **Cause:**

The computer beeps because the keyboard buffer (20 characters) is full. The keyboard buffer is full because user is typing at a very fast rate while the computer is busy performing other tasks (e.g., saving a file, running another program, etc.).

### **Solution:**

Decrease the speed with which text is entered.



## Computer beeps every time a key is pressed due to frozen state/full buffer.

### Cause:

The computer beeps because the keyboard buffer (20 characters) is full. The keyboard buffer is full because user continued to type characters when the computer is frozen.

### Solution:

Attempt to close application or reboot the computer.

Try one of the following increasingly powerful steps, in sequence, until computer is unfrozen:

- 1) Close the application by using the 'Close Program' dialog box.
  - a) Press CTRL+ALT+DEL.
  - b) Select the application to be closed.
  - c) Choose the 'End Task' button.
  - d) Choose the 'End Task' button again.
- 2) Press CTRL+ALT+DEL twice to reboot computer.
- 3) Press 'Reset' button on base unit (if present).
- 4) Turn off the power to the base unit. Wait 15 seconds. Power up base unit.

*NOTE: The best way to protect yourself against computer failure is to regularly save your work in progress.*



## Keyboard speed set incorrectly; Adjust keyboard speed to suit you.

### Cause:

Keyboard repeat and delay rates are controlled by settings. The repeat rate controls how fast characters are generated when a key is held down (i.e., how many per second). The delay rate is the amount of pause time (in 1/4 seconds) before the character begins repeating.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Set the keyboard repeat and delay rates in DOS, Windows and/.

Do one or more of the following procedures to set the keyboard repeat and delay rates:

- 1) DOS: Enter the following command at the DOS prompt or add it to AUTOEXEC.BAT:

MODE CON: RATE=xx DELAY=yy

(Where xx is the repeat rate per second (e.g., 20) and yy is the delay rate in 1/4 seconds (e.g., 2)).

*NOTE: If fingers linger on keyboard, try a delay rate of 4. To make the keyboard more responsive, try a repeat rate of 30.*

- 2) Windows:

- a) Choose the Windows 95 'Start' button to access the 'Start' menu.
- b) Select 'Settings', then select 'Control Panel'.
- c) Open the 'Keyboard' icon.
- d) Use the mouse to drag the slider bars for the 'Repeat delay' and 'Repeat Rate' to adjust them.
- e) Click in the 'Test Box' and test new settings by pressing and holding any character key inside the 'Test Box'. Adjust settings and repeat test.
- f) Choose 'OK' to save.





## Want higher resolution on screen due to poor resolution.

### Cause:

There are several factors that must come together to provide high resolution screen images: the display unit, video card, video driver software and application programs. All must be present to achieve this goal.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Make sure the highest resolution video driver that will work is installed. Consider upgrading the video display and video card together, and acquire newer applications that take advantage of these higher resolution capabilities.

Do one or more of the following to check and/or upgrade the video driver in use:

- 1) [Edit AUTOEXEC.BAT](#) and [Edit CONFIG.SYS](#) to check for a video driver. Verify that it is the correct one for this video card and display unit.
- 2) Check/change Windows video driver:
  - a) Choose the Windows 95 'Start' button to access the 'Start' menu.
  - b) Select 'Settings', then select 'Control Panel'.
  - c) Open the 'System' icon.
  - d) Choose the 'Device Manager' tab.
  - e) Choose the + sign next to 'Display Adapters'
  - f) Select the desired adapter and choose the 'Properties' button.
  - g) Choose the 'Driver' tab.
  - h) Check to see if the desired driver is selected.
  - i) If the desired driver is not selected, do the following:
    - 1] Choose the 'Change Device' button.
    - 2] Select a lower resolution driver if one is available.
  - j) Choose 'OK' twice.
  - k) Choose 'Yes' to reboot the system to allow the changes to take effect.
- 3) Lower the resolution of the current driver:

- a)** Open the 'Display' icon.
- b)** Choose the 'Settings' tab.
- c)** Using the mouse, press and drag the 'Desktop area' slider to a lower resolution.
- d)** Choose 'OK'.



## **Acquired new display unit/video card & it appears same due to old programs.**

### **Cause:**

There are several factors that contribute to spectacular video graphics including the display unit, video card, video driver software and application programs. In this case, older application programs, written to support earlier, less spectacular graphics standards unfortunately appear the same even though the video system is upgraded. (In other words, the software lags behind the hardware.)

### **Solution:**

Wait for new upgrades to key application programs that are written to support newer high resolution graphics standards.



## Acquired new display unit but programs look same due to old video card.

### Cause:

There are several factors that contribute to spectacular video graphics including the display unit, video card, video driver software and application programs. In this case, a new display unit is in use on a computer system with an older, video card

with less resolution (i.e., the video card is not capable of projecting the higher resolutions that the display unit is capable of showing).

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Upgrade the video card with one to match the video resolution of the display unit.

- 1) Remove the old video card.
- 2) Locate the jumpers or DIP switches on the new card and Move the Jumpers and/or Change the DIP Switches, to the new settings required by the display unit.



Photo: Moving jumpers



Photo: DIP Switches

- 3) Insert the new video card.
- 4) Connect the video cable to new video card.
- 5) Reconnect the power cables and turn on the computer system.
- 6) Check to see if the display works and whining has stopped.



## Display shows characters or graphics larger(smaller) due to reset video.

### Cause:

Installation programs in new applications often change configuration settings (e.g., video drivers) to meet their requirements. Unfortunately, these changes often leave other installed applications in a less than optimal running state.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Check AUTOEXEC.BAT, CONFIG.SYS and driver settings for recent changes and undo them. Seek a compromise configuration or use multiple configuration menus.

Do one or more of the following to check and/or upgrade the video driver in use:

- 1) Edit AUTOEXEC.BAT and Edit CONFIG.SYS to check for a video driver. Verify that it is the correct one for this video card and display unit.
- 2) Check/change Windows video driver:
  - a) Choose the Windows 95 'Start' button to access the 'Start' menu.
  - b) Select 'Settings', then select 'Control Panel'.
  - c) Open the 'System' icon.
  - d) Choose the 'Device Manager' tab.
  - e) Choose the + sign next to 'Display Adapters'
  - f) Select the desired adapter and choose the 'Properties' button.
  - g) Choose the 'Driver' tab.
  - h) Check to see if the desired driver is selected.
  - i) If the desired driver is not selected, do the following:
    - 1] Choose the 'Change Device' button.
    - 2] Select a lower resolution driver if one is available.
  - j) Choose 'OK' twice.
  - k) Choose 'Yes' to restart the system to allow the changes to take effect.
- 3) Lower the resolution of the current driver:
  - a) Open the 'Display' icon.

- b)** Choose the 'Settings' tab.
- c)** Using the mouse, press and drag the 'Desktop area' slider to a lower resolution.
- d)** Choose 'OK'.



## Display shows characters/graphics due to outdated/incorrect video driver.

### Cause:

Installed video driver is outdated or incorrect for this application.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Install updated/correct video driver.

Do one or more of the following to check and/or upgrade the video driver in use:

- 1) Edit AUTOEXEC.BAT and Edit CONFIG.SYS to check for a video driver. Verify that it is the correct one for this video card and display unit.
- 2) Check/change Windows video driver:
  - a) Choose the Windows 95 'Start' button to access the 'Start' menu.
  - b) Select 'Settings', then select 'Control Panel'.
  - c) Open the 'System' icon.
  - d) Choose the 'Device Manager' tab.
  - e) Choose the + sign next to 'Display Adapters'.
  - f) Select the desired adapter and choose the 'Properties' button.
  - g) Choose the 'Driver' tab.
  - h) Check to see if the desired driver is selected.
  - i) If the desired driver is not selected, do the following:
    - 1] Choose the 'Change Device' button.
    - 2] Select a lower resolution driver if one is available.
  - j) Choose 'OK' twice.
  - k) Choose 'Yes' to reboot the system to allow the changes to take effect.
- 3) Lower the resolution of the current driver:
  - a) Open the 'Display' icon.
  - b) Choose the 'Settings' tab.
  - c) Using the mouse, press and drag the 'Desktop area' slider to a lower resolution.

**d)** Choose 'OK'.





## New application does not look right due to outdated/incorrect video driver.

### Cause:

Installed video driver is outdated or incorrect for this application.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Install updated/correct video driver.

Do one or more of the following to check and/or upgrade the video driver in use:

- 1) Edit AUTOEXEC.BAT and Edit CONFIG.SYS to check for a video driver. Verify that it is the correct one for this video card and display unit.
- 2) Check/change Windows video driver:
  - a) Choose the Windows 95 'Start' button to access the 'Start' menu.
  - b) Select 'Settings', then select 'Control Panel'.
  - c) Open the 'System' icon.
  - d) Choose the 'Device Manager' tab.
  - e) Choose the + sign next to 'Display Adapters'
  - f) Select the desired adapter and choose the 'Properties' button.
  - g) Choose the 'Driver' tab.
  - h) Check to see if the desired driver is selected.
  - i) If the desired driver is not selected, do the following:
    - 1] Choose the 'Change Device' button.
    - 2] Select a lower resolution driver if one is available.
  - j) Choose 'OK' twice.
  - k) Choose 'Yes' to reboot the system to allow the changes to take effect.
- 3) Lower the resolution of the current driver:
  - a) Open the 'Display' icon.
  - b) Choose the 'Settings' tab.
  - c) Using the mouse, press and drag the 'Desktop area' slider to a lower resolution.

**d)** Choose 'OK'.



## **New application does not look right on screen due to unknown problem.**

**Cause:**

Unknown.

**Solution:**

There is no known solution in this knowledge base. Contact the application vendor for technical assistance.



## **New application does not look right on screen due improper configuration.**

### **Cause:**

Program is not properly configured for this computer setup. An old or default configuration may not work.

### **Solution:**

Configure program for computer setup.

- 1) Review application installation and user manual.
- 2) Verify that the program is properly configured for this computer setup.



## **New application does not look right on screen due to different interface.**

### **Cause:**

Perhaps new version of application has a new interface with different and/or new features.

### **Solution:**

Review the application's user manual (especially the update section) and familiarize yourself with the new application version.



## **Right number of characters received but look funny due to bad settings.**

### **Cause:**

Right number of characters are transmitted/received but they look funny, wrap screen or run clear off screen.  
This is caused by bad communications parameters (transmission speed, parity, data bit setting).

### **Solution:**

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Verify required communications parameter settings at distant end and correct local settings in CONFIG.SYS or communications package.



## Bouncing balls that skip and ricochet around screen due to virus.

### Cause:

**WARNING:** Computer VIRUS! This is the Bouncing Ball or Ping-Pong virus. It may drive user crazy, but will not cause any permanent damage.

### Solution:

Save any open files, close all open applications and turn computer off immediately!

Arrange for local qualified computer technicians to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

**CAUTION:** *Computer viruses are extremely dangerous. Your data may be in danger of being corrupted or lost.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Close Windows.
  - d) Turn off the computer.
  - e) Identify and segregate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and eradicate virus(es).
  - a) Insert a bootable, write-protected diskette in the appropriate drive and turn on the power to the computer.
  - b) After the system boots, insert a write-protected diskette containing a virus detection program in the drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.
  - e) If a virus has infected the boot sector of the hard drive, the following command may be useful. Enter it at the DOS prompt:  
FDISK /MBR  
(The /MBR switch of the FDISK command rebuilds the Master Boot Record on the hard disk.)
  - f) Cold boot the computer (Turn off the computer, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.
  - g) Scan all memory and connected drives for viruses again using the most thorough scan pattern (some

detectors miss viruses on the first pass). Use another virus detector program if available (to be absolutely sure all remnants of the virus(es) are gone).

- 3) Check surrounding environment and notify anyone who has shared these disks or files:
  - a) Scan all nearby PCs and floppy diskettes for viruses (re-infection of the disinfected computer from other previously infected diskettes commonly occurs).
  - b) Notify anyone who has used the infected disks. Make sure the owner of the source diskette knows of the infection.
- 4) Call for expert help from virus software and/or 3rd party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*





## Black or red box appears in screen corner, performance slows due to virus.

### Actions:

**WARNING:** Computer VIRUS!

- 1) STOP Immediately!
- 2) Shutdown computer.

### Cause:

**WARNING:** Computer VIRUS! This is likely the Bouncing Ball or Ping Pong virus. They are triggered randomly and are annoying, but cause no permanent damage.

### Solution:

Save any open files, close all open applications (including Windows) and turn off the computer immediately!

Arrange for a qualified computer technician to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

**CAUTION:** *Computer viruses are extremely dangerous. Your data may be in danger of being corrupted or lost.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Close Windows.
  - d) Turn off the computer.
  - e) Identify and segregate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and eradicate virus(es).
  - a) Insert a bootable, write-protected diskette in the appropriate drive and turn on the power to the computer.
  - b) After the system boots, insert a write-protected diskette containing a virus detection program in the drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.
  - e) If a virus has infected the boot sector of the hard drive, the following command may be useful. Enter

it at the DOS prompt:

FDISK /MBR

(The /MBR switch of the FDISK command rebuilds the Master Boot Record on the hard disk.)

- f)** Cold boot the computer (Turn off the computer, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.
  - g)** Scan all memory and connected drives for viruses again using the most thorough scan pattern (some detectors miss viruses on the first pass). Use another virus detector program if available (to be absolutely sure all remnants of the virus(es) are gone).
- 3)** Check surrounding environment and notify anyone who has shared these disks or files:
  - a)** Scan all nearby PCs and floppy diskettes for viruses (re-infection of the disinfected computer from other previously infected diskettes commonly occurs).
  - b)** Notify anyone who has used the infected disks. Make sure the owner of the source diskette knows of the infection.
- 4)** Call for expert help from virus software and/or 3rd party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## Ambulance, Christmas Tree or other graphic suddenly appears due to virus.

### Actions:

**WARNING:** Computer VIRUS!

- 1) STOP Immediately!
- 2) Shutdown computer.

### Cause:

**WARNING:** Computer VIRUS! This may be a prank, but is likely the Ambulance, Christmas Tree or some other graphic virus.

### Solution:

Save any open files, close all open applications (including Windows) and turn off the computer immediately!

Arrange for a qualified computer technician to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

**CAUTION:** *Computer viruses are extremely dangerous. Your data may be in danger of being corrupted or lost.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Close Windows.
  - d) Turn off the computer.
  - e) Identify and segregate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and eradicate virus(es).
  - a) Insert a bootable, write-protected diskette in the appropriate drive and turn on the power to the computer.
  - b) After the system boots, insert a write-protected diskette containing a virus detection program in the drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.

- e) If a virus has infected the boot sector of the hard drive, the following command may be useful. Enter it at the DOS prompt:

FDISK /MBR

(The /MBR switch of the FDISK command rebuilds the Master Boot Record on the hard disk.)

- f) Cold boot the computer (Turn off the computer, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.
  - g) Scan all memory and connected drives for viruses again using the most thorough scan pattern (some detectors miss viruses on the first pass). Use another virus detector program if available (to be absolutely sure all remnants of the virus(es) are gone).
- 3) Check surrounding environment and notify anyone who has shared these disks or files:
- a) Scan all nearby PCs and floppy diskettes for viruses (re-infection of the disinfected computer from other previously infected diskettes commonly occurs).
  - b) Notify anyone who has used the infected disks. Make sure the owner of the source diskette knows of the infection.
- 4) Call for expert help from virus software and/or 3rd party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## Zeros replaced with blanks while working in spreadsheet due to virus.

### Actions:

**WARNING:** Computer VIRUS!

- 1) STOP Immediately!
- 2) Shutdown computer.

### Cause:

**WARNING:** Computer VIRUS! This is likely the Zero Bug virus. A smiley face may also appear on the screen and 'eat' the zeros.

### Solution:

Save any open files, close all open applications (including Windows) and turn off the computer immediately!

Arrange for a qualified computer technician to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

**CAUTION:** *Computer viruses are extremely dangerous. Your data may be in danger of being corrupted or lost.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Close Windows.
  - d) Turn off the computer.
  - e) Identify and segregate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and eradicate virus(es).
  - a) Insert a bootable, write-protected diskette in the appropriate drive and turn on the power to the computer.
  - b) After the system boots, insert a write-protected diskette containing a virus detection program in the drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.

- e) If a virus has infected the boot sector of the hard drive, the following command may be useful. Enter it at the DOS prompt:

FDISK /MBR

(The /MBR switch of the FDISK command rebuilds the Master Boot Record on the hard disk.)

- f) Cold boot the computer (Turn off the computer, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.
  - g) Scan all memory and connected drives for viruses again using the most thorough scan pattern (some detectors miss viruses on the first pass). Use another virus detector program if available (to be absolutely sure all remnants of the virus(es) are gone).
- 3) Check surrounding environment and notify anyone who has shared these disks or files:
- a) Scan all nearby PCs and floppy diskettes for viruses (re-infection of the disinfected computer from other previously infected diskettes commonly occurs).
  - b) Notify anyone who has used the infected disks. Make sure the owner of the source diskette knows of the infection.
- 4) Call for expert help from virus software and/or 3rd party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## Flipped letters or numbers appear transformed when typed due to virus.

### Actions:

**WARNING:** Computer VIRUS!

- 1) STOP Immediately!
- 2) Shutdown computer.

### Cause:

**WARNING:** Computer VIRUS! This is likely the rare Dyslexia virus.

### Solution:

Save any open files, close all open applications and turn computer off immediately!

Arrange for local qualified computer technicians to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

Save any open files, close all open applications (including Windows) and turn off the computer immediately!

Arrange for a qualified computer technician to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

**CAUTION:** *Computer viruses are extremely dangerous. Your data may be in danger of being corrupted or lost.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Close Windows.
  - d) Turn off the computer.
  - e) Identify and segregate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and eradicate virus(es).
  - a) Insert a bootable, write-protected diskette in the appropriate drive and turn on the power to the computer.

- b)** After the system boots, insert a write-protected diskette containing a virus detection program in the drive.
  - c)** Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette in the vicinity).
  - d)** Delete all infected files through detection/disk clean virus program.
  - e)** If a virus has infected the boot sector of the hard drive, the following command may be useful. Enter it at the DOS prompt:  
FDISK /MBR  
(The /MBR switch of the FDISK command rebuilds the Master Boot Record on the hard disk.)
  - f)** Cold boot the computer (Turn off the computer, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.
  - g)** Scan all memory and connected drives for viruses again using the most thorough scan pattern (some detectors miss viruses on the first pass). Use another virus detector program if available (to be absolutely sure all remnants of the virus(es) are gone).
- 3)** Check surrounding environment and notify anyone who has shared these disks or files:
  - a)** Scan all nearby PCs and floppy diskettes for viruses (re-infection of the disinfected computer from other previously infected diskettes commonly occurs).
  - b)** Notify anyone who has used the infected disks. Make sure the owner of the source diskette knows of the infection.
- 4)** Call for expert help from virus software and/or 3rd party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*





## Falling letters suddenly come unglued and slip to a pile due to virus.

### Actions:

**WARNING:** Computer VIRUS!

- 1) STOP Immediately!
- 2) Shutdown computer.

### Cause:

**WARNING:** Computer VIRUS! This is likely the Cascade virus or one of its variants (e.g., 1701, Falling Tears, Autumn). Cascade is relatively benign, but it spreads quickly and can be quite a pain to eradicate.

### Solution:

Save any open files, close all open applications (including Windows) and turn off the computer immediately!

Arrange for a qualified computer technician to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

**CAUTION:** *Computer viruses are extremely dangerous. Your data may be in danger of being corrupted or lost.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Close Windows.
  - d) Turn off the computer.
  - e) Identify and segregate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and eradicate virus(es).
  - a) Insert a bootable, write-protected diskette in the appropriate drive and turn on the power to the computer.
  - b) After the system boots, insert a write-protected diskette containing a virus detection program in the drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.

- e) If a virus has infected the boot sector of the hard drive, the following command may be useful. Enter it at the DOS prompt:

FDISK /MBR

(The /MBR switch of the FDISK command rebuilds the Master Boot Record on the hard disk.)

- f) Cold boot the computer (Turn off the computer, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.
  - g) Scan all memory and connected drives for viruses again using the most thorough scan pattern (some detectors miss viruses on the first pass). Use another virus detector program if available (to be absolutely sure all remnants of the virus(es) are gone).
- 3) Check surrounding environment and notify anyone who has shared these disks or files:
- a) Scan all nearby PCs and floppy diskettes for viruses (re-infection of the disinfected computer from other previously infected diskettes commonly occurs).
  - b) Notify anyone who has used the infected disks. Make sure the owner of the source diskette knows of the infection.
- 4) Call for expert help from virus software and/or 3rd party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## Display filled with nonsense characters due to incorrect video driver.

### Cause:

An incorrect video driver often causes screens filled with nonsense characters.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Check and change the video driver after verifying the resolution capability of the display unit.

Do one or more of the following to check and/or upgrade the video driver in use:

- 1) Edit AUTOEXEC.BAT and Edit CONFIG.SYS to check for a video driver. Verify that it is the correct one for this video card and display unit.
- 2) Check/change Windows video driver:
  - a) Choose the Windows 95 'Start' button to access the 'Start' menu.
  - b) Select 'Settings', then select 'Control Panel'.
  - c) Open the 'System' icon.
  - d) Choose the 'Device Manager' tab.
  - e) Choose the + sign next to 'Display Adapters'
  - f) Select the desired adapter and choose the 'Properties' button.
  - g) Choose the 'Driver' tab.
  - h) Check to see if the desired driver is selected.
  - i) If the desired driver is not selected, do the following:
    - 1] Choose the 'Change Device' button.
    - 2] Select a lower resolution driver if one is available.
  - j) Choose 'OK' twice.
  - k) Choose 'Yes' to reboot the system to allow the changes to take effect.
- 3) Lower the resolution of the current driver:
  - a) Open the 'Display' icon.
  - b) Choose the 'Settings' tab.

- c)** Using the mouse, press and drag the 'Desktop area' slider to a lower resolution.
- d)** Choose 'OK'.



## Video cable loose causes nonsense characters; Secure video cable connections.

### Cause:

Video cable is loose.

### Solution:

Secure loose video cable.

- 1) Turn off the power to the computer base unit and disconnect the power cable.
- 2) Locate the video card connector on the rear of the base unit



[Photo: Video cable connection.](#)

- 3) Insert or secure video cable plug into the video card connector. It fits only one way.  
***WARNING: Do not force connection. Pins and/or the connector may become damaged.***
- 4) Secure the connector with attached screws.
- 5) If the video cable has a connector plug on the display unit end, make sure it is securely connected.
- 6) Reconnect power cables and turn on the power to the computer and display unit.



## **Video driver outdated; Contact software manufacturer for updated video driver.**

### **Cause:**

Video driver for this application is outdated.

### **Solution:**

Contact application vendor for updated video driver.



## Display looks OK, but contains garbage characters due to bad video card.

### Cause:

Video card is bad.

### Solution:

Replace video card.

- 1) Update or create a System Rescue Diskette that includes currently installed drivers, AUTOEXEC.BAT, CONFIG.SYS, WIN.INI and SYSTEM.INI files. (This process may install a video driver that is incompatible with certain applications or other hardware in system.)
- 2) Remove base unit cover.  
*NOTE: If removing an old video card is not required, skip to Step 4 for installation steps.*
- 3) Remove the old video card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Place the card in a static-resistant envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 4) Install new video card:
  - a) Remove the video card from its box and from the protective static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
  - c) Read the video card manual and identify which, if any, settings need to be changed on the card to use the COM port and interrupt chosen in Step 1.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo: Moving jumpers



Photo: DIP Switches

- e) Identify an appropriate size expansion slot for the type of video card to be installed. Identify the required slot type by examining the row of connector pins along the bottom of the card. An older adapter may fit an 8-bit slot. Most ISA-based video cards require a 16-bit slot while a VESA Local Bus card requires an even longer slot. Choose an appropriate slot by matching the length and gaps in this row of connector pins with slots on the mainboard. Remove the rear metal expansion plate cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, insert the card bottom (part with the gold-striped bars) into the free slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - h) (Optional) If installing 2 video cards for a 2-display setup, attach the VGA pass-through cable to the pin connector or edge-style connector along the top of the video card.
- 5) Connect the video cable from the display unit to the socket on the back of the video card. Secure connector with attached screws.
  - 6) Check the display unit for a Analog/TTL switch. Make sure it is set to 'Analog' (unless it is an old digital display). **CAUTION: Setting this switch in the wrong position could damage the display unit.**
  - 7) (Optional) Some high-end video cards and displays ship with BNC connectors (twist on/off) labeled RGB (Red, Green, Blue). If supplied, they should be used because they provide better color separation and screen appearance. 2 types are available:
    - a) If RGB, connect the red cable to the color input socket marked 'Red' and so on for the others.
    - b) If composite (Ext. sync) connect the white or gray cable to 'Horizontal' and the black cable to 'Vertical'.
  - 8) Install the video driver and test new configuration:
    - a) Make sure no parts or tools remain in metal sides of the base unit.
    - b) Replace necessary cables (power, keyboard, mouse, etc.) and plug power cable into surge protector or wall outlet.
    - c) Power up computer and related peripherals one at a time. (System should boot normally, assuming there are no memory or address conflicts.)
    - d) Insert the video driver diskette that came with the videocard into floppy drive and enter the following:  
A:INSTALL (or SETUP (Refer to program instructions))  
Press ENTER
    - e) Follow installation/setup instructions.
    - f) If a specific memory address was set on card in Step 4, exclude this area from Windows management by entering the following line in the [386enh] section of SYSTEM.INI and reboot computer:  
EMMExclude=xxxx-xxxx  
(Where xxxx-xxxx is the video card address (e.g., C800-CFFF).  
(This prevents Windows from using the video portion of memory preventing lockups and crashes.)
    - g) Test video card, driver installation and display configuration by running installed programs.
  - 9) If display does not work right or a message about address or interrupt (IRQ) conflicts during use or another device (e.g., mouse) fails:
    - a) Turn computer system off and check seating of video card and all cable connections.



- b) Reread settings instructions and recheck DIP Switch and Jumper settings.
- c) Make sure proper video driver is selected.
- d) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- e) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[Example: MSD IRQ Status](#)

- f) See [IRQ Conflicts](#) for advice on eliminating interrupt conflicts.
- g) Contact video card manufacturer for technical support.

**10) [Replace base unit cover.](#)**

- 11)** Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Display looks OK, but contains garbage characters due to bad video card.

### Cause:

Video card is bad.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace video card. Update System Rescue Diskette, remove base unit cover, remove old card, set address/IRQ, install video card, connect video cable, turn on computer and install new video driver. Run programs to test configuration and replace cover.

- 1) Update or create a System Rescue Diskette that includes currently installed drivers, AUTOEXEC.BAT, CONFIG.SYS, and Windows .INI and .GRP files. (This process may install a video driver that is incompatible with certain applications or other hardware in system.)
- 2) Remove base unit cover.  
*NOTE: If removing an old video card is not required, skip to Step 4 for installation steps.*
- 3) Remove the old video card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Place the card in a static-resistant envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 4) Install new video card:
  - a) Remove the video card from its box and from the protective static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
  - c) Read the video card manual and identify which, if any, settings need to be changed on the card to use the COM port and interrupt chosen in Step 1.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo: Moving jumpers



Photo: DIP Switches

- e) Identify an appropriate size expansion slot for the type of video card to be installed. Identify the required slot type by examining the row of connector pins along the bottom of the card. An older adapter may fit an 8-bit slot. Most ISA-based video cards require a 16-bit slot while a VESA Local Bus card requires an even longer slot. Choose an appropriate slot by matching the length and gaps in this row of connector pins with slots on the mainboard. Remove the rear metal expansion plate cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, insert the card bottom (part with the gold-striped bars) into the free slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - h) (Optional) If installing 2 video cards for a 2-display setup, attach the VGA pass-through cable to the pin connector or edge-style connector along the top of the video card.
- 5) Connect the video cable from the display unit to the socket on the back of the video card. Secure connector with attached screws.
  - 6) Check the display unit for a Analog/TTL switch. Make sure it is set to 'Analog' (unless it is an old digital display). **CAUTION:** *Setting this switch in the wrong position could damage the display unit.*
  - 7) (Optional) Some high-end video cards and displays ship with BNC connectors (twist on/off) labeled RGB (Red, Green, Blue). If supplied, they should be used because they provide better color separation and screen appearance. Two types are available:
    - a) If RGB, connect the red cable to the color input socket marked 'Red' and so on for the others.
    - b) If composite (Ext. sync) connect the white or gray cable to 'Horizontal' and the black cable to 'Vertical'.
  - 8) Install the video driver and test new configuration:
    - a) Make sure no parts or tools remain in metal sides of the base unit.
    - b) Replace necessary cables (power, keyboard, mouse, etc.) and plug power cable into surge protector or wall outlet.
    - c) Power up computer and related peripherals one at a time. (System should boot normally, assuming there are no memory or address conflicts.)
    - d) Insert the video driver diskette that came with the video card into floppy drive and enter the following:  
A:INSTALL (or SETUP (Refer to program instructions))  
Press ENTER
    - e) Follow installation/setup instructions.
    - f) If a specific memory address was set on card in Step 4, exclude this area from Windows management by entering the following line in the [386enh] section of SYSTEM.INI and reboot computer:  
EMMExclude=xxxx-xxxx  
(Where xxxx-xxxx is the video card address (e.g., C800-CFFF).  
(This prevents Windows from using the video portion of memory preventing lockups and crashes.)
    - g) Test video card, driver installation and display configuration by running installed programs.
  - 9) If display does not work right or a message about address or interrupt (IRQ) conflicts during use or another device (e.g., mouse) fails:

- a) Turn computer system off and check seating of video card and all cable connections.
- b) Reread settings instructions and recheck DIP Switch and Jumper settings.
- c) Make sure proper video driver is selected.
- d) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
- e) Identify interrupt (IRQ) assignments using the IRQ Status screen.



Example: MSD IRQ Status

- CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*
- f) See IRQ Conflicts for advice on resolving conflicts.
  - g) Contact video card manufacturer for technical support.
  - h) If all else fails, reinstall the original video card, reboot from System Recovery Diskette (updated in Step 1) and restore the original configuration.10) Replace base unit cover.
  - 11) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.  
OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Display looks OK, but contains garbage characters due to virus.

### Actions:

**WARNING:** Computer VIRUS!

STOP Immediately!

### Cause:

Virus detected. Viruses are serious business and can cause things as harmless as extra garbage characters appearing on screen to massive destruction.

### Solution:

Save any open files, close all open applications (including Windows) and turn off the computer immediately!

Arrange for a qualified computer technician to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

**CAUTION:** *Computer viruses are extremely dangerous. Your data may be in danger of being corrupted or lost.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Close Windows.
  - d) Turn off the computer.
  - e) Identify and segregate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and eradicate virus(es).
  - a) Insert a bootable, write-protected diskette in the appropriate drive and turn on the power to the computer.
  - b) After the system boots, insert a write-protected diskette containing a virus detection program in the drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.
  - e) If a virus has infected the boot sector of the hard drive, the following command may be useful. Enter

it at the DOS prompt:

FDISK /MBR

(The /MBR switch of the FDISK command rebuilds the Master Boot Record on the hard disk.)

- f)** Cold boot the computer (Turn off the computer, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.
  - g)** Scan all memory and connected drives for viruses again using the most thorough scan pattern (some detectors miss viruses on the first pass). Use another virus detector program if available (to be absolutely sure all remnants of the virus(es) are gone).
- 3)** Check surrounding environment and notify anyone who has shared these disks or files:
  - a)** Scan all nearby PCs and floppy diskettes for viruses (re-infection of the disinfected computer from other previously infected diskettes commonly occurs).
  - b)** Notify anyone who has used the infected disks. Make sure the owner of the source diskette knows of the infection.
- 4)** Call for expert help from virus software and/or 3rd party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## **Display looks OK, contains garbage characters due to program configuration.**

### **Cause:**

Application is probably not configured for this keyboard.

### **Solution:**

Check the application's on-line help or user's manual for instructions on configuring the application for this keyboard.



## **Communications contains garbage or mistyped characters due to line noise.**

### **Cause:**

Line noise is static, hum, crackling, echoes, cross-talk or other unwanted signals that causes problems ranging from generating a few garbage characters to confusing equipment and changing characters received to completely disrupting communications.

### **Solution:**

Check all wires and connections beginning at the modem for damage and loose connections.

Try one of the following, in sequence:

- 1) Remove any nearby appliances or transmitters or consider moving the computer.
- 2) Confirm the problem by tapping the line with a telephone receiver and listen to see if there is any line noise (when not using modem).
- 3) Trace all data communications lines (i.e., telephone lines) (as far as reasonable) looking for routing problems, obvious damage or loose terminal connections.

*NOTE: If the problem persists and you are unable to pinpoint the source of trouble, ask your local telephone company to test the wiring for problems on their end.*





## Characters, images and shapes appear warped due bad display & video card.

### Cause:

Display unit and video adapter card is bad.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace video adapter card. Update System Rescue Diskette, remove base unit cover, remove old card, set address/IRQ, install video card, connect video cable, turn on computer and install new video driver. Run programs to test configuration and replace cover. Replace display unit.

- 1) Update or create a System Rescue Diskette that includes currently installed drivers, AUTOEXEC.BAT, CONFIG.SYS, WIN.INI and SYSTEM.INI files. (This process may install a video driver that is incompatible with certain applications or other hardware in system.)
- 2) Remove base unit cover.  
*NOTE: If removing an old video card is not required, skip to Step 4 for installation steps.*
- 3) Remove the old video card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Place the card in a static-resistant envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 4) Install new video card:
  - a) Remove the video card from its box and from the protective static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
  - c) Read the video card manual and identify which, if any, settings need to be changed on the card to use the COM port and interrupt chosen in Step 1.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo: Moving jumpers



Photo: DIP Switches

- e) Identify an appropriate size expansion slot for the type of video card to be installed. Identify the required slot type by examining the row of connector pins along the bottom of the card. An older adapter may fit an 8-bit slot. Most ISA-based video cards require a 16-bit slot while a VESA Local Bus card requires an even longer slot. Choose an appropriate slot by matching the length and gaps in this row of connector pins with slots on the mainboard. Remove the rear metal expansion plate cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, insert the card bottom (part with the gold-striped bars) into the free slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - h) (Optional) If installing 2 video cards for a 2-display setup, attach the VGA pass-through cable to the pin connector or edge-style connector along the top of the video card.
- 5) Connect the video cable from the display unit to the socket on the back of the video card. Secure connector with attached screws.
  - 6) Check the display unit for a Analog/TTL switch. Make sure it is set to 'Analog' (unless it is an old digital display). **CAUTION: Setting this switch in the wrong position could damage the display unit.**
  - 7) (Optional) Some high-end video cards and displays ship with BNC connectors (twist on/off) labeled RGB (Red, Green, Blue). If supplied, they should be used because they provide better color separation and screen appearance. 2 types are available:
    - a) If RGB, connect the red cable to the color input socket marked 'Red' and so on for the others.
    - b) If composite (Ext. sync) connect the white or gray cable to 'Horizontal' and the black cable to 'Vertical'.
  - 8) Install the video driver and test new configuration:
    - a) Make sure no parts or tools remain in metal sides of the base unit.
    - b) Replace necessary cables (power, keyboard, mouse, etc.) and plug power cable into surge protector or wall outlet.
    - c) Power up computer and related peripherals one at a time. (System should boot normally, assuming there are no memory or address conflicts.)
    - d) Insert the video driver diskette that came with the video card into floppy drive and enter the following:  
A:INSTALL (or SETUP (Refer to program instructions))  
Press ENTER
    - e) Follow installation/setup instructions.
    - f) If a specific memory address was set on card in Step 4, exclude this area from Windows management by entering the following line in the [386enh] section of SYSTEM.INI and reboot computer:  
EMMExclude=xxxx-xxxx  
(Where xxxx-xxxx is the video card address (e.g., C800-CFFF).  
(This prevents Windows from using the video portion of memory preventing lockups and crashes.)
    - g) Test video card, driver installation and display configuration by running installed programs.
  - 9) If display does not work right or a message about address or interrupt (IRQ) conflicts during use or another device (e.g., mouse) fails:

- a) Turn computer system off and check seating of video card and all cable connections.
- b) Reread settings instructions and recheck DIP Switch and Jumper settings.
- c) Make sure proper video driver is selected.
- d) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
- e) Identify interrupt (IRQ) assignments using the IRQ Status screen.



#### Example: MSD IRQ Status

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- f) See IRQ Conflicts for advice on resolving conflicts.
  - g) Contact video card manufacturer for technical support.
  - h) If all else fails, reinstall the original video card, reboot from System Recovery Diskette (updated in Step 1) and restore the original configuration.
- 10) Replace base unit cover.
- 11) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.  
OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD
- Replace display unit:
- NOTE: The display unit and video adapter card (installed inside the base unit) MUST match in type (e.g., EGA, VGA, SVGA) and resolution (e.g., 640 by 480). If upgrading display unit, video card should be upgraded also.*
- 12) Make sure new display unit matches video adapter card capabilities. (If necessary, run hardware utility (e.g., Microsoft Diagnostics (MSD) to determine type of current video adapter card.

To run Microsoft Diagnostics:

- a) Type MSD at DOS prompt (brings up MSD main screen).



#### Choose MSD Video Status Screen

- b) Press 'V' or choose 'Video...' (3d button on left side) to display Video information on video adapter card and display unit.



#### Video Status Screen

- c) Check manual of new display to determine if it will work properly with existing video adapter card.

- 13) Save work files, exit all applications and turn the computer off.
- 14) (Optional) If also installing video adapter card, install it first.
- 15) Unplug display unit's power cable from surge protector or wall socket.
- 16) Use a small flat-tip screwdriver to loosen screws holding video data cable onto connector on back of base unit. (TIP: Trace video data cable from back of display unit to back of base unit.)
- 17) Grasp video cable plug and pull it straight out of socket (**CAUTION: Forcing it could damage connector pins or socket; Make sure screws are completely loosened.**) *Note orientation of plug to socket.*
- 18) Move old display unit from desk.
- 19) Carefully unpack new display unit and remove all packing materials.
- 20) If display unit base is detached, position display unit upside down on desk or sturdy surface and install the display base (following accompanying assembly instructions).
- 21) Set new display unit right-side up near base unit (Make sure cables will reach).
- 22) Connect data cable to video card socket on back of base unit.
  - a) Locate same 15-pin socket the old video cable was removed from.
  - b) Orient the plug so that it matches the socket (similar to the way old one was removed in Step 6 above.)
  - c) Insert the plug into the video card socket until it is firmly seated. *NOTE: Do NOT force it. If plug does not fit, check plug orientation (it fits only one way) and make sure the correct socket is being used.)*
  - c) Tighten the securing screws using the small flat-tip screwdriver.
  - d) If video cable is not permanently attached to display unit, attach it, repeating Steps 11a to 11d.
- 23) Plug the display unit power cable into both the display unit and the surge protector or wall.
- 24) Position the display unit where desired (leave plenty of slack in cables for minor adjustments).
- 25) Turn on display unit (Make sure operation light on display unit comes on. (If light does not come on, check power cable connections.
- 26) Turn on computer.
- 27) Watch display unit for familiar information during bootup.
- 28) If display unit is on and nothing appears on display, perhaps video cable is not connected securely; check it.
- 29) Adjust video controls (contrast, brightness, positioning) to desired levels (consult owner manual for location and instructions).



## Video adapter card bad; Replace video adapter card with new one.

### Cause:

Video card is bad.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace video card. Update System Rescue Diskette, remove base unit cover, remove old card, set address/IRQ, install video card, connect video cable, turn on computer and install new video driver. Run programs to test configuration and replace cover.

- 1) Update or create a System Rescue Diskette that includes currently installed drivers, AUTOEXEC.BAT, CONFIG.SYS, and Windows .INI and .GRP files. (This process may install a video driver that is incompatible with certain applications or other hardware in system.)
- 2) Remove base unit cover.  
*NOTE: If removing an old video card is not required, skip to Step 4 for installation steps.*
- 3) Remove the old video card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Place the card in a static-resistant envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 4) Install new video card:
  - a) Remove the video card from its box and from the protective static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
  - c) Read the video card manual and identify which, if any, settings need to be changed on the card to use the COM port and interrupt chosen in Step 1.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo: Moving jumpers



Photo: DIP Switches

- e) Identify an appropriate size expansion slot for the type of video card to be installed. Identify the required slot type by examining the row of connector pins along the bottom of the card. An older adapter may fit an 8-bit slot. Most ISA-based video cards require a 16-bit slot while a VESA Local Bus card requires an even longer slot. Choose an appropriate slot by matching the length and gaps in this row of connector pins with slots on the mainboard. Remove the rear metal expansion plate cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, insert the card bottom (part with the gold-stripped bars) into the free slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - h) (Optional) If installing 2 video cards for a 2-display setup, attach the VGA pass-through cable to the pin connector or edge-style connector along the top of the video card.
- 5) Connect the video cable from the display unit to the socket on the back of the video card. Secure connector with attached screws.
  - 6) Check the display unit for a Analog/TTL switch. Make sure it is set to 'Analog' (unless it is an old digital display). **CAUTION:** *Setting this switch in the wrong position could damage the display unit.*
  - 7) (Optional) Some high-end video cards and displays ship with BNC connectors (twist on/off) labeled RGB (Red, Green, Blue). If supplied, they should be used because they provide better color separation and screen appearance. 2 types are available:
    - a) If RGB, connect the red cable to the color input socket marked 'Red' and so on for the others.
    - b) If composite (Ext. sync) connect the white or gray cable to 'Horizontal' and the black cable to 'Vertical'.
  - 8) Install the video driver and test new configuration:
    - a) Make sure no parts or tools remain in metal sides of the base unit.
    - b) Replace necessary cables (power, keyboard, mouse, etc.) and plug power cable into surge protector or wall outlet.
    - c) Power up computer and related peripherals one at a time. (System should boot normally, assuming there are no memory or address conflicts.)
    - d) Insert the video driver diskette that came with the video card into floppy drive and enter the following:  
A:INSTALL (or SETUP (Refer to program instructions))  
Press ENTER
    - e) Follow installation/setup instructions.
    - f) If a specific memory address was set on card in Step 4, exclude this area from Windows management by entering the following line in the [386enh] section of SYSTEM.INI and reboot computer:  
EMMExclude=xxxx-xxxx  
(Where xxxx-xxxx is the video card address (e.g., C800-CFFF).  
(This prevents Windows from using the video portion of memory preventing lockups and crashes.)
    - g) Test video card, driver installation and display configuration by running installed programs.
  - 9) If display does not work right or a message about address or interrupt (IRQ) conflicts during use or another device (e.g., mouse) fails:

- a) Turn computer system off and check seating of video card and all cable connections.
- b) Reread settings instructions and recheck DIP Switch and Jumper settings.
- c) Make sure proper video driver is selected.
- d) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
- e) Identify interrupt (IRQ) assignments using the IRQ Status screen.



Example: MSD IRQ Status

- CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*
- f) See IRQ Conflicts for advice on resolving conflicts.
  - g) Contact video card manufacturer for technical support.
  - h) If all else fails, reinstall the original video card, reboot from System Recovery Diskette (updated in Step 1) and restore the original configuration.
- 10) Replace base unit cover.
- 11) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.  
OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Characters, images and shapes appear warped due to bad display unit.

### Cause:

Display unit is bad.

### Solution:

Make sure the display unit and video adapter card match. Disconnect the data and power cables. Switch display units and reconnect the cables. Turn on the display unit and computer and check for proper operation.

*NOTE: The display unit and video adapter card inside the computer must match both in type (e.g., EGA, VGA, SVGA) and resolution (e.g., 640 by 480). If you upgrade your display unit, you must also upgrade the video card.*

- 1) Make sure the new display unit matches the video adapter card capabilities. (If necessary, run a hardware utility (e.g., Microsoft Diagnostics (MSD)) to determine the type of current video adapter card.

To run Microsoft Diagnostics:

- a) Enter MSD at the DOS prompt (this brings up the MSD main screen).



Choose MSD Video Status Screen

- b) Press 'V' or choose 'Video...' (3d button on left side) to display Video information on the video adapter card and display unit.



Video Status Screen

- c) Check the manual of the new display to determine if it will work properly with the existing video adapter card.
- 2) Save all work files, exit all applications and turn off the computer.
- 3) (Optional) If also installing a video adapter card, install it first.
- 4) Unplug the display unit's power cable from the surge protector or wall socket.
- 5) Use a small flat-tip screwdriver to loosen the screws holding the video data cable onto the connector on the back of the base unit. (TIP: Trace the video data cable from the back of the display unit to the back of the base unit.)
- 6) Carefully grasp the video cable plug and pull it straight out of the socket (**WARNING: Forcing it could damage the connector pins or socket. Make sure screws are completely loosened.**) Note the orientation of the plug to the socket.



- 7) Remove the old display unit from the desk.
- 8) Carefully unpack the new display unit and remove all packing materials.
- 9) If the display unit base is detached, position the display unit upside down on a desk or sturdy surface and install the display base (following accompanying assembly instructions).
- 10) Set the new display unit right-side up near the base unit (make sure the cables will reach).
- 11) Connect the data cable to the video card socket on the back of the base unit.
  - a) Locate the same 15-pin socket that the old video cable was removed from.
  - b) Orient the plug so that it matches the socket (similar to the way the old one was removed in Step 6 above.)
  - c) Carefully insert the plug into the video card socket until it is firmly seated.

**WARNING: Do NOT force it.** If plug does not fit, check plug orientation (it fits only one way) and make sure the correct socket is being used.)
  - d) Tighten the securing screws using the *small flat-tip screwdriver*.
  - e) If video cable is not permanently attached to display unit, attach it, repeating Steps 11a to 11d.
- 12) Plug the display unit power cable into both the display unit and the surge protector or wall.
- 13) Position the display unit at its desired location (leave plenty of slack in the cables for minor adjustments).
- 14) Turn on the display unit (make sure the operation light on the display unit comes on. (If the light does not come on, check the power cable connections.)
- 15) Turn on the computer.
- 16) Watch the display unit for familiar information during bootup.
- 17) If the display unit is on and nothing appears on the display, perhaps the video cable is not connected securely; check it.
- 18) Adjust video controls (contrast, brightness, positioning) to desired levels (consult the display's owner's manual for location and instructions).



## **Electrical power interference; Move/adjust monitor or move computer to new area.**

### **Cause:**

Text and image distortion may be caused by electrical power interference from fluorescent lights, laser printer, power lines in walls, or other large electrical devices.

### **Solution:**

Adjust the display unit, move it slightly or move the computer to another location.

Try one of the following, in sequence:

- 1) Adjust or shift the display unit slightly.
- 2) Move the display unit to other side of the desk and a different angle.
- 3) Move the computer and display unit to another location away from fluorescent lights, laser printer, power lines in wall or another device.



## **Characters, images and shapes appear warped due to misalignment.**

### **Cause:**

Vertical and horizontal controls are misaligned.

### **Solution:**

Adjust the horizontal and vertical adjustment controls to center the image on display.

- 1) Locate the horizontal and vertical adjustment controls on the display unit. Try one of the following locations:
  - a) Look for control labels.
  - b) Just underneath the lower front edge of the display unit.
  - c) A small control panel door to open.
  - d) Along the left or right side of the display unit.
  - e) Somewhere on the rear panel of the display unit.
- 2) Identify the horizontal adjustment control. It often has a box with a horizontal double arrow label.
- 3) Identify the vertical adjustment control. It often has a box with a vertical double arrow label.
- 4) Adjust one (or both, if necessary). They expand or contract the breadth of the screen image. Adjust it so that both image edges just barely reach the edge of the display screen.



## **Brightness and contrast set incorrectly; Adjust contrast and brightness.**

### **Cause:**

Contrast and brightness controls are out of adjustment.

### **Solution:**

Adjust contrast and brightness.

- 1) Open a word processing application and open a text document (place some text on the screen).
- 2) Locate the brightness and contrast controls on the display unit. Try one of the following locations:
  - a) Look for control labels.
  - b) Just underneath the lower front edge of display unit.
  - c) A small control panel door to open.
  - d) Along the left or right side of display unit.
  - e) Somewhere on the rear panel of the display unit.
- 3) Identify the brightness control. It often has a light bulb or sun label.
- 4) Identify the contrast control. It often has a half-shaded circle.
- 5) Make sure both the brightness and contrast controls are centered or turned up from the minimum setting.
- 6) Turn the contrast control back and forth until the letters on the screen appear sharp.
- 7) Turn the brightness control all the way up. Then turn it down until the light-colored glow around the screen's borders merges into the background.



## Video cable loose causes screen distortion; Secure video cable connections.

### Cause:

Video cable connection(s) is loose.

### Solution:

Secure the video cable connections.

- 1) Turn off the computer base unit and disconnect the power cable.
- 2) Locate the video card connector on the rear of the base unit.



[Photo: Video cable connection.](#)

- 3) Insert or secure the video cable plug into the video card connector. It fits only one way.  
***WARNING: Do not force the connection. Pins and/or the connector may become damaged.***
- 4) Secure the connector with the attached screws.
- 5) If the video cable has a connector plug on the display unit end, make sure it is securely connected.
- 6) Reconnect the power cables and turn on the power to the computer and display unit.



## Computer boots and flashes sassy message due to computer virus.

### Actions:

**WARNING:** Computer VIRUS!

- 1) STOP Immediately!
- 2) Power down computer immediately.

### Cause:

Computer virus! Messages include: 'Today is Sunday...', 'Gledelig Jul', 'Type Happy Birthday Joshi', Internal Error Code 02CH', 'Your Computer is Now Stoned' or something similar.

### Solution:

Save any open files, close all open applications (including Windows) and turn off the computer immediately!

Arrange for a qualified computer technician to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

**CAUTION:** *Computer viruses are extremely dangerous. Your data may be in danger of being corrupted or lost.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Close Windows.
  - d) Turn off the computer.
  - e) Identify and segregate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and eradicate virus(es).
  - a) Insert a bootable, write-protected diskette in the appropriate drive and turn on the power to the computer.
  - b) After the system boots, insert a write-protected diskette containing a virus detection program in the drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.

- e) If a virus has infected the boot sector of the hard drive, the following command may be useful. Enter it at the DOS prompt:

FDISK /MBR

(The /MBR switch of the FDISK command rebuilds the Master Boot Record on the hard disk.)

- f) Cold boot the computer (Turn off the computer, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.
  - g) Scan all memory and connected drives for viruses again using the most thorough scan pattern (some detectors miss viruses on the first pass). Use another virus detector program if available (to be absolutely sure all remnants of the virus(es) are gone).
- 3) Check surrounding environment and notify anyone who has shared these disks or files:
- a) Scan all nearby PCs and floppy diskettes for viruses (re-infection of the disinfected computer from other previously infected diskettes commonly occurs).
  - b) Notify anyone who has used the infected disks. Make sure the owner of the source diskette knows of the infection.
- 4) Call for expert help from virus software and/or 3rd party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## Number of rows not recognized; Use MODE command to change display lines.

### Cause:

MS-DOS 4.x ANSI.SYS does not recognize a change in number of rows unless the change is made using the MODE CO80,xx command or the Int 21h/function 44h API.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Use the MODE command to change display lines.

Use the following command from the DOS prompt or in CONFIG.SYS to change the number of lines (e.g., to 43 lines):

MODE CO80,43

*NOTE: Microsoft Corporation has confirmed this to be a problem with MS-DOS 4.x; the problem has been corrected in MS-DOS 5.x and later editions.*





## Type one key, and different character appears on screen due bad keyboard.

### Cause:

Keyboard is bad.

### Solution:

Replace the keyboard.

- 1) Save all work and exit all program(s), including Windows.
- 2) Turn off the computer.
- 3) Trace the keyboard cable to the back of the computer and carefully pull the keyboard plug straight out.
- 4) Examine the new keyboard plug for an arrow or notch on the outer surface. This notch should line up at the top of the socket on the back of the computer. *(NOTE: If there is no notch on the plug, simply match the pin pattern on the plug with the pinhole pattern in the socket.)*
- 5) Orient the plug to match the socket and carefully insert it into the socket on the back of the computer.  
*NOTE: If the socket is a PS/2 style connector, make sure that the keyboard socket is used (not the mouse socket.)*  
***WARNING: Do not force the plug into the socket. This could damage the pins on the plug or the socket.***
- 6) Turn the keyboard over and look for an XT/AT switch. If present, set switch to AT position. (Otherwise skip this step.)
- 7) If the keyboard contains DIP Switches, set them to enable the desired options following the instructions in the owner manual. (Change DIP Switches).
- 8) Turn on the power to the computer.
- 9) Watch POST. (If the keyboard is not properly switched or connected, the POST will generate a keyboard error.)
- 10) If a keyboard error appears, turn off the computer and reseat the keyboard plug and keyboard toggle switch or DIP switches (if applicable). Turn on the computer and try again.



## **Keyboard configured incorrectly; Reset keyboard to default configuration.**

### **Cause:**

Keyboard is reprogrammed using special keyboard utility.

### **Solution:**

Read the instruction manual to determine how to reset the keyboard to the default configuration.



## Country command incorrect; Change/remove COUNTRY command in CONFIG.SYS.

### Cause:

Either CONFIG.SYS contains the COUNTRY command with an incorrect country setting, or someone temporarily changed the keyboard setting with the KEYB command.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit the CONFIG.SYS and change or remove the COUNTRY command, or run the KEYB command at the DOS prompt.

Do one or both of the following:

- 1) Edit CONFIG.SYS.
  - a) Check for a command line matching the following:  
COUNTRY=xxx  
(Where xxx represents a country or foreign language.)
  - b) If this exists, do one of the following:
    - 1] If the desired language is English, delete this line.
    - 2] If the desired language differs from what is there, change the country to the desired country/language (see DOS manual for list of countries).
- 2) Enter the following command at the DOS prompt to return to a United States English keyboard configuration:  
KEYB/US



## **Old keyboard design; Reconfigure other keys to perform F11 & F12 functions**

### **Cause:**

Some programs remap (reassign or redefine) certain keyboard keys to suit their own purposes and other keys can be programmed to perform the same functions as missing keys (e.g., missing F11 and F12 keys).

### **Solution:**

Read software program's user manual to learn new keyboard mapping. If F11 and F12 keys are needed and are not keys found on the keyboard, program other keys to perform the same functions.



**Type one key, and a different character appears on screen due to hands.**

**Cause:**

Hands are out of position on keyboard.

**Solution:**

Make sure index fingers are positioned on the home keys ('F' and 'J').



## Typing lower case, but upper case letters appear on screen due to CAPLOCK.

### **Cause:**

The CAPLOCK key was pressed or turned on at some point. If not pressed, some program may have turned it on.

### **Solution:**

Press the CAPLOCK key. The keyboard should revert to small-case letters (CAPLOCK light should go out).

*(NOTE: Sometimes the computer gets confused and the CAPLOCK light will be on when in small-case and vice versa. Exiting all programs and rebooting the computer should solve this problem.)*



## **Press arrow keys to move cursor, but numbers appear instead due to NUMLOCK.**

### **Cause:**

The NUMLOCK key is on. This converts the numeric keypad to use the numbers and disables the arrow keys.

### **Solution:**

Press the NUMLOCK key to turn off the numeric keypad, or use the other arrow keys between the main keyboard section and the numeric keypad (if available).



## **Type a number, but the cursor moves instead due to NUMLOCK key off.**

### **Cause:**

To operate the numeric keypad on the right-hand side of the keyboard as a numeric keypad, the NUMLOCK must be pressed first.

### **Solution:**

Press the NUMLOCK key (the NUMLOCK status light on the keyboard should light).





## MENUDEFAULT command has error; Edit CONFIG.SYS & correct MENUDEFAULT command.

### Cause:

The MENUDEFAULT command in CONFIG.SYS contains an error, making the display time-out value default to zero (i.e., the menu does not remain on the screen). Common errors include using the full menu descriptor (menu\_text) rather than the menu block name, and using non-numeric characters.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit the CONFIG.SYS file and correct the MENUDEFAULT command.

- 1) [Edit CONFIG.SYS.](#)
- 2) Locate the MENUDEFAULT command.
- 3) Correct the syntax so that it appears as follows, within a menu block:  
MENUDEFAULT=<blockname>,<time>  
(Where <blockname> is the name of the menu block and <time> is the amount of time in seconds DOS will wait before continuing.) EXAMPLE:  
[MENU]
- 4) Do not use more than one word for the block name. To use text to describe an option, use a one-word blockname followed by a comma and the description. EXAMPLE:  
MENUITEM=WFWG, Windows for Workgroups
- 5) When making this the default, do NOT include the descriptor. EXAMPLE:  
DEFAULT=WFWG,20  
MENUITEM=WINDOVS  
MENUDEFAULT=WINDOVS,15



## Keyboard will not type, no characters appear due to bad connector.

### Cause:

Keyboard connector on mainboard is bad.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the keyboard connector on the mainboard.



## Keyboard is defective or incompatible with this computer; Replace keyboard.

### Cause:

Keyboard is bad.

### Solution:

Replace the keyboard.

- 1) Save all work and exit all program(s), including Windows.
- 2) Turn off the computer.
- 3) Trace the keyboard cable to the back of the computer and carefully pull the keyboard plug straight out.
- 4) Examine the new keyboard plug for an arrow or notch on the outer surface. This notch should line up at the top of the socket on the back of the computer. *(NOTE: If there is no notch on the plug, simply match the pin pattern on the plug with the pinhole pattern in the socket.)*
- 5) Orient the plug to match the socket and carefully insert it into the socket on the back of the computer.  
*NOTE: If the socket is a PS/2 style connector, make sure that the keyboard socket is used (not the mouse socket.)*  
***WARNING: Do not force the plug into the socket. This could damage the pins on the plug or the socket.***
- 6) Turn the keyboard over and look for an XT/AT switch. If present, set switch to AT position. (Otherwise skip this step.)
- 7) If the keyboard contains DIP Switches, set them to enable the desired options following the instructions in the owner manual. (Change DIP Switches).
- 8) Turn on the power to the computer.
- 9) Watch POST. (If the keyboard is not properly switched or connected, the POST will generate a keyboard error.)
- 10) If a keyboard error appears, turn off the computer and reseat the keyboard plug and keyboard toggle switch or DIP switches (if applicable). Turn on the computer and try again.



## **Keyboard will not type, no characters appear on screen due to loose cable.**

### **Cause:**

Keyboard cable is loose or not securely connected to keyboard connector.

### **Solution:**

Turn off the computer, reinsert the keyboard cable and reboot the computer.

- 1) Turn off the power to the computer.
- 2) Trace the keyboard cable to the rear of the base unit.
- 3) Carefully grasp the keyboard plug and remove it from the keyboard connector.
- 4) Orient the plug, and reinsert it into the keyboard connector. Make sure it is securely connected.
- 5) Turn on the computer and wait for it to boot.
- 6) Try typing on the keyboard again.



## **Display provides shock when touched or adjusted due to electricity leak.**

### **Cause:**

Faulty display unit is leaking electricity.

***WARNING:*** *This display unit is dangerous to touch and is a fire hazard.*

### **Solution:**

Replace the display unit as soon as possible. Return to vendor if still under warranty.



## **Mouse pointer settings wrong; Change size, style, color or trail of pointer.**

### **Cause:**

The mouse pointer may be too small or the wrong color to see (e.g., cannot see blue pointer in window with blue background).

### **Solution:**

Change the size, style, color or trail of the pointer.

Use the control software that comes with the mouse (or obtain a 3d party utility) to apply one or more of the following changes:

- 1) Change the size or style of the mouse pointer.
- 2) Change the color of the mouse pointer.
- 3) Change the behavior of the mouse pointer so that it leaves a trail.



## **User cannot find mouse pointer on screen due to being lost or off screen.**

### **Cause:**

Sometimes the mouse pointer gets hidden or lost off the edge of the screen.

### **Solution:**

Recenter the mouse on the mouse pad and move it in several circles until pointer appears.

The pointer is likely hidden or off the edge of the screen.

- 1) Pick up the mouse and place it in the center of the mouse pad or desktop area.
- 2) Grasp the mouse and quickly move it in a large circular motion narrowing to smaller concentric circles, while slowing down (i.e., 2-3 spiral circles, moving towards the center).
- 3) Observe the display and the pointer should appear.

*NOTE: If using a trackball instead of a mouse, skip Step 1 and move the trackball in large to smaller circles, as described.*



## **Cursor/image appears askew when switching applications due to video modes.**

### **Cause:**

Switching video modes when changing applications. This problem is most noticeable when switching between Windows and DOS applications run under Windows that require a different video mode.

### **Solution:**

Adjust the horizontal and vertical adjustment controls to center the image on display.

- 1) Locate the horizontal and vertical adjustment controls on the display unit. Try one of the following locations:
  - a) Look for control labels.
  - b) Just underneath the lower front edge of the display unit.
  - c) A small control panel door to open.
  - d) Along the left or right side of the display unit.
  - e) Somewhere on the rear panel of the display unit.
- 2) Identify the horizontal adjustment control. It often has a box with a horizontal double arrow label.
- 3) Identify the vertical adjustment control. It often has a box with a vertical double arrow label.
- 4) Adjust one (or both, if necessary). They expand or contract the breadth of the screen image. Adjust it so that both image edges just barely reach the edge of the display screen.





## **Cursor disappeared when exiting program due to program fault.**

### **Cause:**

Some programs are faulty and do not return the cursor when they are exited.

### **Solution:**

Run another program and exit it.

Try one of the following, in sequence, to return the cursor:

- 1) Load or run another program and exit it immediately.
- 2) Exit and reload Windows.
- 3) Press CTRL+ALT+DEL twice to reboot the computer.
- 4) Turn off the power to the computer. Wait 15 seconds. Turn on the power to the computer.



## **ANSI.SYS driver caused color problem; Remove the ANSI.SYS device driver.**

### **Cause:**

When ANSI.SYS is loaded from a multiple configuration menu block, it fails to detect the previous state of the CON device in which certain menu colors were set.

### **Solution:**

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Remove the ANSI.SYS device driver from the multi-config submenu command block.



## **Color problem from video card limitations, not DoubleSpace; Upgrade video card.**

### **Cause:**

DoubleSpace Setup runs in monochrome on the original IBM 8514 video card, the ATI Ultra video card in 8514 mode, and the Paradise 8514/A video card. This is due to video card limitations, and is not attributable to DoubleSpace.

### **Solution:**

There is no solution to this problem.



## **Screen exposed to uneven temperatures; Move laptop to an even room temperature.**

### **Cause:**

There is a temperature difference affecting portions of the screen differently (e.g., recharging laptop battery may heat up portion of screen). The problem disappears when the entire screen returns to an even room temperature.

### **Solution:**

Let the display return to an even room temperature.



## Missing or incorrect colors due to detachable video cable that is too long.

### Cause:

Video cables longer than 6 feet or 2 meters can distort the image and cause characters and colors to drop out of an image that seems otherwise fine.

### Solution:

Replace the detachable video cable.

- 1) Unplug the display unit's power cable from the surge protector or wall socket.
- 2) Disconnect/reconnect the video cable to the base unit:
  - a) Use a small flat-tip screwdriver to loosen the screws holding the video data cable onto the connector on the back of the base unit. (TIP: Trace the video data cable from the back of the display unit to the back of the base unit.)
  - b) Carefully grasp the video cable plug and pull it straight out of the socket (***WARNING: Forcing it could damage the connector pins or socket; make sure the screws are completely loosened.***) Note the orientation of the plug to the socket.
  - c) Connect the data cable to the video card socket on the back of the base unit.
    - 1] Locate the same 15-pin socket that the old video cable was removed from.
    - 2] Orient the plug so that it matches the socket (similar to the way the old one was removed in Step 6 above.)
    - 3] Insert the plug into the video card socket until it is firmly seated.  
***WARNING: Do NOT force it.*** If the plug does not fit, check the plug orientation (it fits only one way) and make sure the correct socket is being used.)
    - 4] Tighten the securing screws.
- 3) Disconnect/reconnect the video cable to the display unit:
  - a) Use a small flat-tip screwdriver to loosen the screws holding the video data cable onto the connector on the display unit. (TIP: Trace the video data cable to the back of the display unit.)
  - b) Carefully, grasp the video cable plug and pull it straight out of the socket (***WARNING: Forcing it could damage the connector pins or socket; make sure the screws are completely loosened.***) Note the orientation of the plug to the socket.
  - c) Connect the data cable to the connector on the back of the display unit.
    - 1] Locate the same 15-pin socket that the old video cable was removed from.
    - 2] Orient the plug so that it matches the socket (similar to the way the old one was removed.)

- 3] Insert the plug into the socket until it is firmly seated.  
***WARNING: Do NOT force it.*** If the plug does not fit, check the plug orientation (it fits only one way).
- 4] Tighten the securing screws.
- 4) Plug the display unit power cable into both the display unit and the surge protector or wall receptacle.
- 5) Position the display unit so the screen is visible (leave plenty of slack in the cables for minor adjustments).
- 6) Turn on the display unit (make sure the operation light on the display unit comes on. (If the light does not come on, check the power cable connections.
- 7) Turn on the computer.
- 8) Watch the display unit for familiar information and images during bootup.
- 9) If the display looks normal here, the display unit is likely OK and the problem is probably elsewhere. If the display images are not normal, the display unit is likely faulty. (There may also be additional problems.)



## **Video cable too long; Replace with video cable shorter than 6 feet (2 meters).**

### **Cause:**

Video cables longer than 6 feet or 2 meters can distort the image and cause characters and colors to drop out of an image that seems otherwise fine.

### **Solution:**

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace permanently attached lengthy video cable.



## Missing or incorrect colors due to bad display unit.

### Cause:

Display unit is bad.

### Solution:

Make sure the display unit and video adapter card match. Disconnect the data and power cables. Switch display units and reconnect the cables. Turn on the display unit and computer and check for proper operation.

*NOTE: The display unit and video adapter card inside the computer must match both in type (e.g., EGA, VGA, SVGA) and resolution (e.g., 640 by 480). If you upgrade your display unit, you must also upgrade the video card.*

- 1) Make sure the new display unit matches the video adapter card capabilities. (If necessary, run a hardware utility (e.g., Microsoft Diagnostics (MSD))) to determine the type of current video adapter card.

To run Microsoft Diagnostics:

- a) Enter MSD at the DOS prompt (this brings up the MSD main screen).



[Choose MSD Video Status Screen](#)

- b) Press 'V' or choose 'Video...' (3d button on left side) to display Video information on the video adapter card and display unit.



[Video Status Screen](#)

- c) Check the manual of the new display to determine if it will work properly with the existing video adapter card.
  - 2) Save all work files, exit all applications and turn off the computer.
  - 3) (Optional) If also installing a video adapter card, install it first.
  - 4) Unplug the display unit's power cable from the surge protector or wall socket.
  - 5) Use a small flat-tip screwdriver to loosen the screws holding the video data cable onto the connector on the back of the base unit. (TIP: Trace the video data cable from the back of the display unit to the back of the base unit.)
  - 6) Carefully grasp the video cable plug and pull it straight out of the socket (**WARNING: Forcing it could damage the connector pins or socket. Make sure screws are completely loosened.**) Note the orientation of the plug to the socket.
  - 7) Remove the old display unit from the desk.



- 8) Carefully unpack the new display unit and remove all packing materials.
- 9) If the display unit base is detached, position the display unit upside down on a desk or sturdy surface and install the display base (following accompanying assembly instructions).
- 10) Set the new display unit right-side up near the base unit (make sure the cables will reach).
- 11) Connect the data cable to the video card socket on the back of the base unit.
  - a) Locate the same 15-pin socket that the old video cable was removed from.
  - b) Orient the plug so that it matches the socket (similar to the way the old one was removed in Step 6 above.)
  - c) Carefully insert the plug into the video card socket until it is firmly seated.

***WARNING: Do NOT force it.*** If plug does not fit, check plug orientation (it fits only one way) and make sure the correct socket is being used.)
  - d) Tighten the securing screws using the small flat-tip screwdriver.
  - e) If video cable is not permanently attached to display unit, attach it, repeating Steps 11a to 11d.
- 12) Plug the display unit power cable into both the display unit and the surge protector or wall.
- 13) Position the display unit at its desired location (leave plenty of slack in the cables for minor adjustments).
- 14) Turn on the display unit (make sure the operation light on the display unit comes on. (If the light does not come on, check the power cable connections.)
- 15) Turn on the computer.
- 16) Watch the display unit for familiar information during bootup.
- 17) If the display unit is on and nothing appears on the display, perhaps the video cable is not connected securely; check it.
- 18) Adjust video controls (contrast, brightness, positioning) to desired levels (consult the display's owner's manual for location and instructions).



## Video cable or connector damaged; Replace video cable or connector.

### Cause:

Video cable/connector is damaged.

### Solution:

Replace the detachable video cable.

- 1) Unplug the display unit's power cable from the surge protector or wall socket.
- 2) Disconnect/reconnect the video cable to the base unit:
  - a) Use a small flat-tip screwdriver to loosen the screws holding the video data cable onto the connector on the back of the base unit. (TIP: Trace the video data cable from the back of the display unit to the back of the base unit.)
  - b) Carefully grasp the video cable plug and pull it straight out of the socket (**WARNING: Forcing it could damage the connector pins or socket; make sure the screws are completely loosened.**) Note the orientation of the plug to the socket.
  - c) Connect the data cable to the video card socket on the back of the base unit.
    - 1] Locate the same 15-pin socket that the old video cable was removed from.
    - 2] Orient the plug so that it matches the socket (similar to the way the old one was removed in Step 6 above.)
    - 3] Insert the plug into the video card socket until it is firmly seated.  
**WARNING: Do NOT force it.** If the plug does not fit, check the plug orientation (it fits only one way) and make sure the correct socket is being used.)
    - 4] Tighten the securing screws.
- 3) Disconnect/reconnect the video cable to the display unit:
  - a) Use a small flat-tip screwdriver to loosen the screws holding the video data cable onto the connector on the display unit. (TIP: Trace the video data cable to the back of the display unit.)
  - b) Carefully, grasp the video cable plug and pull it straight out of the socket (**WARNING: Forcing it could damage the connector pins or socket; make sure the screws are completely loosened.**) Note the orientation of the plug to the socket.
  - c) Connect the data cable to the connector on the back of the display unit.
    - 1] Locate the same 15-pin socket that the old video cable was removed from.
    - 2] Orient the plug so that it matches the socket (similar to the way the old one was removed.)
    - 3] Insert the plug into the socket until it is firmly seated.

***WARNING: Do NOT force it.*** If the plug does not fit, check the plug orientation (it fits only one way).

- 4] Tighten the securing screws.
- 4) Plug the display unit power cable into both the display unit and the surge protector or wall receptacle.
- 5) Position the display unit so the screen is visible (leave plenty of slack in the cables for minor adjustments).
- 6) Turn on the display unit (make sure the operation light on the display unit comes on. (If the light does not come on, check the power cable connections.
- 7) Turn on the computer.
- 8) Watch the display unit for familiar information and images during bootup.
- 9) If the display looks normal here, the display unit is likely OK and the problem is probably elsewhere. If the display images are not normal, the display unit is likely faulty. (There may also be additional problems.)



## **Missing or incorrect colors due to attached damaged video cable/connector.**

### **Cause:**

Video cable and/or connector is damaged.

### **Solution:**

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace permanently attached video cable.



## Dim, faded or muddy colors due to aging display.

### Cause:

A display with dim, faded or muddy colors, indicates an aging display unit. Brightness, contrast and focus deteriorate over time.

### Solution:

Adjust contrast and brightness and color guns and consider replacing display unit.

Do one of the following, in sequence:

- 1) Adjust contrast and brightness.
  - a) Open a word processing application and open a text document (place some text on the screen).
  - b) Locate the brightness and contrast controls on the display unit. Try one of the following locations:
    - 1] Look for control labels.
    - 2] Just underneath the lower front edge of display unit.
    - 3] A small control panel door to open.
    - 4] Along the left or right side of display unit.
    - 5] Somewhere on the rear panel of the display unit.
  - c) Identify the brightness control. It often has a light bulb or sun label.
  - d) Identify the contrast control. It often has a half-shaded circle.
  - e) Make sure both the brightness and contrast controls are centered or turned up from the minimum setting.
  - f) Turn the contrast control back and forth until the letters on the screen appear sharp.
  - g) Turn the brightness control all the way up. Then turn it down until the light-colored glow around the screen's borders merges into the background.
- 2) Realign color guns via external convergence controls:
  - a) Attempt to locate convergence controls on the display unit. Look:
    - 1] Center rear of the display unit.
    - 2] Lower rear of the display unit.
    - 3] Inside the hidden panel on the front or rear of the display unit.
  - b) Adjust each knob until the right balance of color appears on the display image.
- 3) Consider replacing an aging display unit with a new one (and a new video card also).





## Not enough colors generated; Change video driver or video adapter card.

### Cause:

The color resolution set by the video driver in conjunction with the video card determines the number of colors to be displayed. Older video cards display 16 or 256 colors. Viewing high quality photos or graphic images requires a video card generating 65,000 colors (16-bit) or 16.7 million colors (24-bit). This video driver/video card does not generate enough colors.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Increase video resolution (increase the number of colors) by switching video drivers (within the limits of the video card and display unit) or upgrade to a more powerful video card and display unit.

Do one or more of the following to check and/or upgrade the video driver in use:

- 1) Edit AUTOEXEC.BAT and Edit CONFIG.SYS to check for a video driver. Verify that it is the correct one for this video card and display unit.
- 2) Check/change Windows video driver:
  - a) Choose the Windows 95 'Start' button to access the 'Start' menu.
  - b) Select 'Settings', then select 'Control Panel'.
  - c) Open the 'System' icon.
  - d) Choose the 'Device Manager' tab.
  - e) Choose the + sign next to 'Display Adapters'
  - f) Select the desired adapter and choose the 'Properties' button.
  - g) Choose the 'Driver' tab.
  - h) Check to see if the desired driver is selected.
  - i) If the desired driver is not selected, do the following:
    - 1] Choose the 'Change Device' button.
    - 2] Select a lower resolution driver if one is available.
  - j) Choose 'OK' twice.
  - k) Choose 'Yes' to reboot the system to allow the changes to take effect.
- 3) Lower the resolution of the current driver:

- a)** Open the 'Display' icon.
- b)** Choose the 'Settings' tab.
- c)** Using the mouse, press and drag the 'Desktop area' slider to a lower resolution.
- d)** Choose 'OK'.





## **White background grows gray or dingy due to excessive magnetic charge.**

### **Cause:**

When a display unit is running for a long period of time (many hours or days), it builds up a large magnetic charge that can cause a gray or dingy cast.

### **Solution:**

Degauss display unit or turn it off.

Do one of the following:

- 1) Choose the 'Degausser' button (if available).
  - a) Locate the degausser button. Try one of the following locations:
    - 1] Look for control labels.
    - 2] Just underneath the lower front edge of display unit.
    - 3] A small control panel door to open.
    - 4] Along the left or right side of display unit.
    - 5] Somewhere on the rear panel of the display unit.
  - b) Identify the degausser button and choose it.
- 2) Turn off the display unit. Wait a while (for magnetic charge to dissipate). Turn it back on.



## **White background grows gray or dingy due to electrical interference.**

### **Cause:**

Gray or dingy cast may be caused by electrical power interference from fluorescent lights, laser printer, power lines in walls, or other large electrical devices.

### **Solution:**

Adjust the display unit, move it slightly or move the computer to another location.

Try one of the following, in sequence:

- 1) Adjust or shift the display unit slightly.
- 2) Move the display unit to other side of the desk and a different angle.
- 3) Move the computer and display unit to another location away from fluorescent lights, laser printer, power lines in wall or another device.



## **Edges of display have pink or yellow cast due to electrical interference.**

### **Cause:**

A display with a pink or yellow cast along the edges may be caused by electrical power interference from fluorescent lights, laser printer, power lines in walls, or other large electrical devices.

### **Solution:**

Adjust the display unit, move it slightly or move the computer to another location.

Try one of the following, in sequence:

- 1) Adjust or shift the display unit slightly.
- 2) Move the display unit to other side of the desk and a different angle.
- 3) Move the computer and display unit to another location away from fluorescent lights, laser printer, power lines in wall or another device.



## **Edges of display have pink or yellow cast due to excessive magnetic charge.**

### **Cause:**

When a display unit is running for a long period of time (many hours or days), it builds up a large magnetic charge that can cause the edges of the display to have a pink or yellow cast.

### **Solution:**

Degauss display unit or turn it off.

Do one of the following:

- 1) Choose the 'Degausser' button (if available).
  - a) Locate the degausser button. Try one of the following locations:
    - 1] Look for control labels.
    - 2] Just underneath the lower front edge of display unit.
    - 3] A small control panel door to open.
    - 4] Along the left or right side of display unit.
    - 5] Somewhere on the rear panel of the display unit.
  - b) Identify the degausser button and choose it.
- 2) Turn off the display unit. Wait a while (for magnetic charge to dissipate). Turn it back on.



## **Edges of display have pink or yellow cast due to electrical interference.**

### **Cause:**

A display with a pink or yellow cast along the edges may be caused by electrical power interference from fluorescent lights, laser printer, power lines in walls, or other large electrical devices.

### **Solution:**

Adjust the display unit, move it slightly or move the computer to another location.

Try one of the following, in sequence:

- 1) Adjust or shift the display unit slightly.
- 2) Move the display unit to other side of the desk and a different angle.
- 3) Move the computer and display unit to another location away from fluorescent lights, laser printer, power lines in wall or another device.



## **Magnetic charge buildup; Press degauss button on monitor or turn off for a while.**

### **Cause:**

When a display unit is running for a long period of time (many hours or days), it builds up a large magnetic charge that can cause the edges of the display to have a pink or yellow cast.

### **Solution:**

Degauss display unit or turn it off.

Do one of the following:

- 1) Choose the 'Degausser' button (if available).
  - a) Locate the degausser button. Try one of the following locations:
    - 1] Look for control labels.
    - 2] Just underneath the lower front edge of display unit.
    - 3] A small control panel door to open.
    - 4] Along the left or right side of display unit.
    - 5] Somewhere on the rear panel of the display unit.
  - b) Identify the degausser button and choose it.
- 2) Turn off the display unit. Wait a while (for magnetic charge to dissipate). Turn it back on.



## **Software program colors set wrong; Change colors in the software program.**

### **Cause:**

User does not like the colors selected for a particular application.

### **Solution:**

Change the colors within the application. Look under 'Controls', 'Options', 'Settings' or consult the user manual.



## Colors look awful in one program on monochrome display due to bad setting.

### Cause:

Attempting to run a color program on a monochrome display while program set to color.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Change the color mode in the program or add the monochrome MODE command to the CONFIG.SYS file.

Do one of the following:

- 1) Check the application documentation for how to change the application colors to monochrome only.
- 2) DOS: Add the following command to the CONFIG.SYS file:

MODE BW80

*NOTE: This will apply to all programs.*





## Colors look awful in one program due to bad contrast and brightness.

### Cause:

Contrast and brightness are out of adjustment.

### Solution:

Adjust the contrast and/or brightness.

- 1) Open a word processing application and open a text document (place some text on the screen).
- 2) Locate the brightness and contrast controls on the display unit. Try one of the following locations:
  - a) Look for control labels.
  - b) Just underneath the lower front edge of display unit.
  - c) A small control panel door to open.
  - d) Along the left or right side of display unit.
  - e) Somewhere on the rear panel of the display unit.
- 3) Identify the brightness control. It often has a light bulb or sun label.
- 4) Identify the contrast control. It often has a half-shaded circle.
- 5) Make sure both the brightness and contrast controls are centered or turned up from the minimum setting.
- 6) Turn the contrast control back and forth until the letters on the screen appear sharp.
- 7) Turn the brightness control all the way up. Then turn it down until the light-colored glow around the screen's borders merges into the background.



## **Missing lines or text due to possible defective display unit.**

### **Cause:**

Display unit may be defective (e.g., a multi-sync display unit may not be switching to the right mode (resolution) when instructed).

### **Solution:**

Have a computer technician examine the display unit.



## **Video card resolutions settings wrong; Adjust video card resolution settings.**

### **Cause:**

Display resolution settings that exceed the capability of the display unit are set using a video card software utility.

### **Solution:**

Use the utility to adjust the video card resolution settings down within the resolution capability of the display unit.

- 1) Insert the video card utility diskette into the floppy drive.
- 2) Enter the appropriate command.
- 3) Follow the instructions on the screen or in the user manual to select a lower resolution setting for this display unit.



## **MODE command incorrect; Remove or change MODE command in CONFIG.SYS.**

### **Cause:**

The MODE console command in CONFIG.SYS is set to change the number of columns or lines or both. This causes them to run off the screen.

### **Solution:**

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Remove the MODE console command or change the values.

Edit CONFIG.SYS and do one of the following:

- 1) Eliminate the MODE console command.
- 2) Change the value of the 'columns' and/or the 'lines' command to match the display.



## **Dim screen on portable computer due to faulty display.**

**Cause:**

Display is faulty.

**Solution:**

A portable computer should be examined by a qualified computer technician for a faulty display.



## **Dim screen on portable computer due to temperature difference.**

### **Cause:**

Drastic temperature differences between the computer and the air often do not permit the display to react properly to electrical impulses. (EXAMPLE: Bringing a cold computer indoors from winter weather.)

### **Solution:**

Turn off the power to the computer and allow it to adjust to the current temperature first. Then turn it on and use it normally.



## **Low or weak laptop battery; Charge or replace laptop battery.**

### **Cause:**

Battery is low or weak.

### **Solution:**

Do one of the following:

- 1) Switch to an alternate battery pack.
- 2) Switch to electric power using the power adapter and wall receptacle.
- 3) Stop using the computer and recharge the battery.



## **Image dim on portable computer due to nonadjustment of contrast/brightness.**

### **Cause:**

Contrast and/or brightness controls on portable computer are turned down too far.

### **Solution:**

Adjust the contrast and brightness controls until image is clear and bright.

- 1) Open a word processing application and open a text document (place some text on the screen).
- 2) Locate the brightness and contrast controls on the display unit. Try one of the following locations:
  - a) Look for control labels.
  - b) Just underneath the lower front edge of display unit.
  - c) A small control panel door to open.
  - d) Along the left or right side of display unit.
  - e) Somewhere on the rear panel of the display unit.
- 3) Identify the brightness control. It often has a light bulb or sun label.
- 4) Identify the contrast control. It often has a half-shaded circle.
- 5) Make sure both the brightness and contrast controls are centered or turned up from the minimum setting.
- 6) Turn the contrast control back and forth until the letters on the screen appear sharp.
- 7) Turn the brightness control all the way up. Then turn it down until the light-colored glow around the screen's borders merges into the background.





## **Color guns misaligned in monitor; Adjust color guns or replace monitor.**

### **Cause:**

A monitor that is dim and fuzzy, even with the contrast and brightness controls turned up, indicates an aging monitor. Brightness, contrast and focus deteriorate over time.

### **Solution:**

Adjust color guns and consider replacing monitor.

Do one of the following, in sequence:

- 1) Realign the color guns via the external convergence controls:
  - a) Attempt to locate the convergence controls on the monitor. Look:
    - 1] Center rear of the monitor.
    - 2] Lower rear of the monitor.
    - 3] Inside the hidden panel on the front or rear of the monitor.
  - b) Adjust each knob until the right balance of color appears on the monitor image.
- 2) Consider replacing the aging monitor with a new one (and a new video card also).



## Bright line or spot due to damaged video card from power surge.

### Cause:

Video card is damaged due to power surge.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the video card.



## **Bright line or spot on display due to bad video card caused by power surge.**

### **Cause:**

Video card is bad due to power surge that ruined it.

### **Solution:**

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Remove base unit cover, remove old card, set address/IRQ, install video card, connect video cable, turn on computer and install new video driver. Run programs to test configuration and replace cover.



## **Bright line or spot due to power surge damage to display and video card.**

### **Cause:**

Both the display unit and video card are bad due to power surge that ruined them.

### **Solution:**

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace both the display unit and video card.



## Bright line or spot on display due to bad video card caused by power surge.

### Cause:

Video card and display unit are bad due to power surge that ruined them.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace video card and display unit.

Replace video card:

- 1) Update or create a System Rescue Diskette that includes currently installed drivers, AUTOEXEC.BAT, CONFIG.SYS, and Windows .INI and .GRP files. (This process may install a video driver that is incompatible with certain applications or other hardware in system.)
- 2) Remove base unit cover.  
*NOTE: If removing an old video card is not required, skip to Step 4 for installation steps.*
- 3) Remove the old video card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Place the card in a static-resistant envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 4) Install new video card:
  - a) Remove the video card from its box and from the protective static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
  - c) Read the video card manual and identify which, if any, settings need to be changed on the card to use the COM port and interrupt chosen in Step 1.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo: Moving jumpers



Photo: DIP Switches

- e) Identify an appropriate size expansion slot for the type of video card to be installed. Identify the required slot type by examining the row of connector pins along the bottom of the card. An older adapter may fit an 8-bit slot. Most ISA-based video cards require a 16-bit slot while a VESA Local Bus card requires an even longer slot. Choose an appropriate slot by matching the length and gaps in this row of connector pins with slots on the mainboard. Remove the rear metal expansion plate cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, insert the card bottom (part with the gold-striped bars) into the free slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - h) (Optional) If installing 2 video cards for a 2-display setup, attach the VGA pass-through cable to the pin connector or edge-style connector along the top of the video card.
- 5) Connect the video cable from the display unit to the socket on the back of the video card. Secure connector with attached screws.
  - 6) Check the display unit for a Analog/TTL switch. Make sure it is set to 'Analog' (unless it is an old digital display). **CAUTION:** *Setting this switch in the wrong position could damage the display unit.*
  - 7) (Optional) Some high-end video cards and displays ship with BNC connectors (twist on/off) labeled RGB (Red, Green, Blue). If supplied, they should be used because they provide better color separation and screen appearance. 2 types are available:
    - a) If RGB, connect the red cable to the color input socket marked 'Red' and so on for the others.
    - b) If composite (Ext. sync) connect the white or gray cable to 'Horizontal' and the black cable to 'Vertical'.
  - 8) Install the video driver and test new configuration:
    - a) Make sure no parts or tools remain in metal sides of the base unit.
    - b) Replace necessary cables (power, keyboard, mouse, etc.) and plug power cable into surge protector or wall outlet.
    - c) Power up computer and related peripherals one at a time. (System should boot normally, assuming there are no memory or address conflicts.)
    - d) Insert the video driver diskette that came with the video card into floppy drive and enter the following:  
A:INSTALL (or SETUP (Refer to program instructions))  
Press ENTER
    - e) Follow installation/setup instructions.
    - f) If a specific memory address was set on card in Step 4, exclude this area from Windows management by entering the following line in the [386enh] section of SYSTEM.INI and reboot computer:  
EMMExclude=xxxx-xxxx  
(Where xxxx-xxxx is the video card address (e.g., C800-CFFF).  
(This prevents Windows from using the video portion of memory preventing lockups and crashes.)
    - g) Test video card, driver installation and display configuration by running installed programs.
  - 9) If display does not work right or a message about address or interrupt (IRQ) conflicts during use or another device (e.g., mouse) fails:

- a) Turn computer system off and check seating of video card and all cable connections.
- b) Reread settings instructions and recheck DIP Switch and Jumper settings.
- c) Make sure proper video driver is selected.
- d) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
- e) Identify interrupt (IRQ) assignments using the IRQ Status screen.



Example: MSD IRQ Status

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- f) See IRQ Conflicts for advice on resolving conflicts.
  - g) Contact video card manufacturer for technical support.
  - h) If all else fails, reinstall the original video card, reboot from System Recovery Diskette (updated in Step 1) and restore the original configuration.
- 10) Replace base unit cover.
- 11) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:
- DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.
- OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD



## Bright line or spot due to bad display unit caused by power surge.

### Cause:

Display unit is bad due to power surge that ruined display unit.

### Solution:

Make sure display unit and video adapter card match. Disconnect data and power cables. Switch display units and reconnect cables. Turn on display unit and computer and check for proper operation.

*NOTE: The display unit and video adapter card inside the computer must match both in type (e.g., EGA, VGA, SVGA) and resolution (e.g., 640 by 480). If you upgrade your display unit, you must also upgrade the video card.*

- 1) Make sure the new display unit matches the video adapter card capabilities. (If necessary, run a hardware utility (e.g., Microsoft Diagnostics (MSD)) to determine the type of current video adapter card.

To run Microsoft Diagnostics:

- a) Enter MSD at the DOS prompt (this brings up the MSD main screen).



[Choose MSD Video Status Screen](#)

- b) Press 'V' or choose 'Video...' (3d button on left side) to display Video information on the video adapter card and display unit.



[Video Status Screen](#)

- c) Check the manual of the new display to determine if it will work properly with the existing video adapter card.
- 2) Save all work files, exit all applications and turn off the computer.
- 3) (Optional) If also installing a video adapter card, install it first.
- 4) Unplug the display unit's power cable from the surge protector or wall socket.
- 5) Use a small flat-tip screwdriver to loosen the screws holding the video data cable onto the connector on the back of the base unit. (TIP: Trace the video data cable from the back of the display unit to the back of the base unit.)
- 6) Carefully grasp the video cable plug and pull it straight out of the socket (**WARNING: Forcing it could damage the connector pins or socket. Make sure screws are completely loosened.**) Note the orientation of the plug to the socket.



- 7) Remove the old display unit from the desk.
- 8) Carefully unpack the new display unit and remove all packing materials.
- 9) If the display unit base is detached, position the display unit upside down on a desk or sturdy surface and install the display base (following accompanying assembly instructions).
- 10) Set the new display unit right-side up near the base unit (make sure the cables will reach).
- 11) Connect the data cable to the video card socket on the back of the base unit.
  - a) Locate the same 15-pin socket that the old video cable was removed from.
  - b) Orient the plug so that it matches the socket (similar to the way the old one was removed in Step 6 above.)
  - c) Carefully insert the plug into the video card socket until it is firmly seated.

*NOTE: Do NOT force it. If plug does not fit, check plug orientation (it fits only one way) and make sure the correct socket is being used.)*
  - d) Tighten the securing screws using the small flat-tip screwdriver.
  - e) If video cable is not permanently attached to display unit, attach it, repeating Steps 11a to 11d.
- 12) Plug the display unit power cable into both the display unit and the surge protector or wall.
- 13) Position the display unit at its desired location (leave plenty of slack in the cables for minor adjustments).
- 14) Turn on the display unit (make sure the operation light on the display unit comes on. (If the light does not come on, check the power cable connections.)
- 15) Turn on the computer.
- 16) Watch the display unit for familiar information during bootup.
- 17) If the display unit is on and nothing appears on the display, perhaps the video cable is not connected securely; check it.
- 18) Adjust video controls ( contrast , brightness , positioning ) to desired levels ( consult the display's owner's manual for location and instructions ).

Thank you for using Knowledge - Paks from ServiceWare Inc.

Questions? Call 412-826-1158 or email to [support@serviceware.com](mailto:support@serviceware.com).



[Node:771]



## **Missing lines or text due to installed driver exceeding display capability..**

### **Cause:**

The installed video driver in use exceeds the resolution display capability of the display unit.

### **Solution:**

Select/install a video driver that matches or is less-than the resolution limit of the display unit.

- 1) Check owner manual for display unit to determine maximum allowable display resolution.
- 2) Check/change Windows video driver:
  - a) Choose the Windows 95 'Start' button to access the 'Start' menu.
  - b) Select 'Settings', then select 'Control Panel'.
  - c) Open the 'System' icon.
  - d) Choose the 'Device Manager' tab.
  - e) Choose the + sign next to 'Display Adapters'
  - f) Select the desired adapter and choose the 'Properties' button.
  - g) Choose the 'Driver' tab.
  - h) Check to see if the desired driver is selected.
  - i) If the desired driver is not selected, do the following:
    - 1] Choose the 'Change Device' button.
    - 2] Select a lower resolution driver if one is available.
  - j) Choose 'OK' twice.
  - k) Choose 'Yes' to reboot the system to allow the changes to take effect.
- 3) Lower the resolution of the current driver:
  - a) Open the 'Display' icon.
  - b) Choose the 'Settings' tab.
  - c) Using the mouse, press and drag the 'Desktop area' slider to a lower resolution.
  - d) Choose 'OK'.





## **Misaligned horizontal/vertical controls; Adjust controls.**

### **Cause:**

Horizontal and/or vertical adjustment controls on display unit are not adjusted properly to center image on screen.

### **Solution:**

Adjust the horizontal and vertical adjustment controls to center the image on display.

- 1) Locate the horizontal and vertical adjustment controls on the display unit. Try one of the following locations:
  - a) Look for control labels.
  - b) Just underneath the lower front edge of the display unit.
  - c) A small control panel door to open.
  - d) Along the left or right side of the display unit.
  - e) Somewhere on the rear panel of the display unit.
- 2) Identify the horizontal adjustment control. It often has a box with a horizontal double arrow label.
- 3) Identify the vertical adjustment control. It often has a box with a vertical double arrow label.
- 4) Adjust one (or both, if necessary). They expand or contract the breadth of the screen image. Adjust it so that both image edges just barely reach the edge of the display screen.





## **Screen looks washed out due to poor adjustment of contrast and brightness.**

### **Cause:**

Contrast and brightness controls are out of adjustment.

### **Solution:**

Adjust the contrast and brightness controls until the image is clear and bright.

- 1) Open a word processing application and open a text document (place some text on the screen).
- 2) Locate the brightness and contrast controls on the display unit. Try one of the following locations:
  - a) Look for control labels.
  - b) Just underneath the lower front edge of display unit.
  - c) A small control panel door to open.
  - d) Along the left or right side of display unit.
  - e) Somewhere on the rear panel of the display unit.
- 3) Identify the brightness control. It often has a light bulb or sun label.
- 4) Identify the contrast control. It often has a half-shaded circle.
- 5) Make sure both the brightness and contrast controls are centered or turned up from the minimum setting.
- 6) Turn the contrast control back and forth until the letters on the screen appear sharp.
- 7) Turn the brightness control all the way up. Then turn it down until the light-colored glow around the screen's borders merges into the background.



## **Color guns misaligned, causing red & blue halos; Realign color guns on monitor.**

### **Cause:**

3 color guns at rear of monitor shoot red, green and blue light at screen. When these guns drift out of precise alignment they create a colored halo around images. Misalignment is often caused by knocking monitor around during movement/shipping or may be due to old age.

### **Solution:**

Realign color guns.

Do one of the following, in sequence:

- 1) Realign color guns via the external convergence controls:
  - a) Attempt to locate the convergence controls on the monitor. Look:
    - 1] In the center rear of the monitor.
    - 2] In the lower rear of the monitor.
    - 3] Inside the hidden panel on the front or rear of the monitor.
  - b) Adjust each knob until the right balance of color appears on the monitor image.
- 2) Send the monitor to a repair shop to have the color guns aligned using the internal controls and a special tool.



## **Image shimmies, flickers or wavers due to unshielded video cable.**

### **Cause:**

Flicker may be caused by one or more of the following:

- 1) A poorly shielded video data cable.
- 2) An older interlaced display unit (new technology uses non-interlaced).
- 3) Low video refresh rates used by display unit.

All of these situations can contribute to excessive eye strain and headaches after prolonged use.

### **Solution:**

***CAUTION:*** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

Replace the video cable (wired into display unit) or upgrade the display unit and video card.



## **Electrical Interference; Move or adjust display or move computer to new location.**

### **Cause:**

Flicker may be caused by electrical power interference from fluorescent lights, laser printer, power lines in walls, or other large electrical devices.

### **Solution:**

Adjust the display unit, move it slightly or move the computer to another location.

Try one of the following, in sequence:

- 1) Adjust or shift the display unit slightly.
- 2) Move the display unit to other side of the desk and a different angle.
- 3) Move the computer and display unit to another location away from fluorescent lights, laser printer, power lines in wall or another device.



## **Image suddenly shrinks, then enlarges again to full size due to power.**

### **Cause:**

Classic symptom of excessive electrical power draw on circuit from another device/appliance that is causing a power shortage for this device (i.e., computer).

### **Solution:**

Install an uninterruptable power supply (UPS) unit for the computer.



## **Image suddenly shrinks, then enlarges again to full size due to power.**

### **Cause:**

Classic symptom of excessive electrical power draw on circuit from another device/appliance that is causing a power shortage for this device (i.e., computer).

### **Solution:**

Identify and eliminate all other appliances from this circuit or move the computer.

Do one of the following:

- 1) Check the electrical circuit connected to the PC to determine if another device or appliance (e.g., coffee pot, space heater, hot plate, laser printer, etc.) is using this same circuit and drawing excessive electrical power. Eliminate it if possible.
- 2) Move the computer and display to another electrical outlet on another less-used power circuit.



## **Image suddenly shrinks, then enlarges due to unsecure power cable.**

### **Cause:**

One or more power cables is not securely plugged in or is routed poorly and often disturbed (e.g., kicked) inadvertently.

### **Solution:**

Secure all power cables and route them properly.

- 1) Make sure all power cables are securely plugged into their sockets:
  - a) The display power cable is securely plugged into the surge protector.
  - b) The base unit power cable is securely plugged into the surge protector.
  - c) The surge protector cable securely plugged into the wall receptacle.
- 2) Make sure the cables are routed and the surge protector is positioned such that they are not inadvertently bumped or kicked under the table or desk.



## **Software program problem; Call software manufacturer to fix or update driver.**

### **Cause:**

One or more software program has a specific problem (e.g., a faulty program or video driver).

### **Solution:**

Contact the software program manufacturer's technical support to report the problem and request a fix or updated video driver for the program.





## Memory manager/driver conflict; Remove all memory managers/device drivers.

### Cause:

There is a conflict between a memory manager, driver, TSR, or application.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit the AUTOEXEC.BAT and CONFIG.SYS files and remove all memory managers, device drivers, TSRs, etc. Reboot the computer. If it is OK, then add items back into the configuration one at a time until a conflict occurs. The last item added is the one causing the problem.

Use a utility to identify the conflict.

- 1) Edit AUTOEXEC.BAT and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file.
- 2) Edit CONFIG.SYS and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file and reboot the computer.
- 3) Observe the display to see if a normal image appears.
- 4) If it is OK, then add the items back into the configuration one at a time until a conflict occurs. The last item added is the one causing the problem. Use a memory management utility to identify the conflict.



## Memory address conflict; 'Exclude' video card memory address from memory manager.

### Cause:

Video card uses a memory address that was conflicts with memory managed by the memory manager.

### Solution:

***WARNING:*** Some changes made to these files may seriously affect the performance and operation of your computer.

Exclude the video card memory address from use by the memory manager.

- 1) Check the user manual for the video card to see if it uses a specific memory address, and if so, identify it.
- 2) If the video card uses a specific memory address, exclude this memory address from use by the memory manager. For example, if the card uses an address of C800-CFFF, exclude this from Windows memory management by adding the following line to the [386enh] section of SYSTEM.INI:

EMMExclude=C800-CFFF

Save the file and reboot the computer.

- 3) Observe the display to see if this corrects the display problem.



## **Wrong video adapter card settings; Change video adapter card settings.**

### **Cause:**

Video values in Setup are set incorrectly for this software program.

### **Solution:**

Identify the correct video settings from the software program documentation, run Setup and change the required settings.

- 1) Check the application manual for the required video settings (e.g., monochrome, 80-column, color, VGA, etc.).
- 2) Restart the computer and run Setup. Compare the setup values with those required for this application.
- 3) Record the current setup values and make changes to settings for this application. Save the setup and reboot computer.
- 4) Retry using the application and observe the display image.



## Video & controller card conflict; Change settings on video & controller cards.

### Cause:

A memory address, IRQ, or DMA conflict between the video card and the controller card has occurred.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Inspect the settings on both the video card and the controller card and identify the conflict. Change the setting on one card and retest. Add another card/device to system, reboot the computer and observe for conflicts. Continue the process until offender is isolated. Change setting(s) and repeat the process.

- 1) Inspect the settings on both the video card and the controller card and identify the conflict.
- 2) Change the setting(s) on one of the cards and reinstall it.
- 3) Reconnect the power and other cables and turn on the power to the computer.
- 4) Observe the base unit and display for the conflict.
  - a) If there are no conflicts, continue with Step 5.
  - b) If there is still a conflict, repeat Steps 1-4 until the conflict is resolved.
- 5) (Optional) Create a card/device inventory sheet listing each card/device, vendor, memory address, IRQ, DMA (where applicable) and driver.
- 6) Read the user manual and inspect the next device to make sure it does not use a memory address, interrupt (IRQ) or DMA channel that is already assigned. If it does, select an unused setting and [Move Jumpers](#) and/or [Change DIP Switches](#) to apply the new setting to the card or device. (Consult the card/device user manual for more information).
- 7) Turn off the computer and remove the power cables.
- 8) Install the card and connect any necessary ribbon or power cables.
- 9) Turn on the computer. Watch the boot process and the display to make sure the card/device just added creates no conflicts. [Edit AUTOEXEC.BAT](#) or [Edit CONFIG.SYS](#) and add (or uncomment) just the device driver for the card/device just installed. Save the file and reboot the computer. Rerun the hardware utility and check all assignments to make sure no conflicts exist. If the computer locks up or something does not work properly, there is a conflict between the card/device just added and what is already installed. Identify the conflicting setting(s) and change the setting(s) on ONE of the cards/devices (preferably the one just added). Be careful not to initiate additional conflicts by changing a setting. Repeat steps 7-12 to install each additional card/device, one at a time until the offender is identified. [Edit CONFIG.SYS](#) and add (or

uncomment) the memory manager (e.g., HIMEM.SYS).

Be sure to exclude from memory manager any card/device addresses assigned above. For example, to exclude the address C800-CFFF from Windows, enter the following command in the [386enh] section of SYSTEM.INI:

EMMExclude=C800-CFFF Save the file and reboot the computer. (This prevents Windows from using the video portion of memory. This prevents lockups and crashes.) [Edit AUTOEXEC.BAT](#) or [Edit CONFIG.SYS](#) and add (or uncomment) any desired TSRs or applications one at a time. Save the file and reboot the computer. Make sure they do not create new conflicts. If unable to resolve a conflict with a particular card/device, contact the card manufacturer for technical support and assistance.



## Card/device conflict; Reinstall 1 card/device at a time with its associated driver.

### Cause:

There is a memory address, interrupt (IRQ) or DMA channel conflict between one or more other cards/devices that were installed in system (between them or between them and the video and/or controller card).

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Reinstall one card/device at a time and its associated driver in the computer until the conflict is encountered. This will identify the card/device causing the conflict. Change the setting(s) on this card to eliminate the conflict and repeat the process with the remaining cards/devices.

- 1) Choose one of the following methods of conflict resolution: Remove all cards and extra devices from the base unit. Turn on the power and make the system operational. Reinstall the cards/devices one at a time until the offending card/device is isolated.

*NOTE: This is the preferred method to determine the conflict if the cause is unknown.*

- a) Pick and choose which card/device is the problem. Change the settings and try again.

- 2) If 1a is selected, do the following, if not completed already:

- a) Edit AUTOEXEC.BAT and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file and reboot the computer.
- b) Edit CONFIG.SYS and remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications. Save the file and reboot the computer.
- c) Remove base unit cover.
- d) Disconnect all cables from the installed cards (except the video and controller card).
- e) Remove each card by:
  - 1] Removing the screw from the top notch of the mounting bracket on the card.
  - 2] Touching the metal sides of the base unit to ground any static and, carefully grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements to avoid the risk of cracking the circuit boards.
  - 3] Place the card on a static-free surface nearby, noting the slot in which it was located.
- f) After the appropriate cards/devices are removed, make sure no tools or parts remain inside the base unit, reconnect the power and other cables and turn on the power to the computer.

3) Do one of the following:

- a) Run a hardware utility program (e.g., WinSleuth) to identify the assigned memory addresses, DMA channels and IRQ assignments.
- b) Run a hardware utility (e.g., Microsoft Diagnostics (MSD)) to identify the port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- 1) Choose 'IRQ Status...' from the MSD main screen.



Choose MSDIRQ Status

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- 4) Print out the screen or write down the memory addresses, IRQs and DMA assignments.
- 5) (Optional) Create a card/device inventory sheet listing each card/device, vendor, memory address, IRQ, DMA (where applicable) and driver.
- 6) Read the user manual and inspect the next device to make sure it does not use a memory address, interrupt (IRQ) or DMA channel that is already assigned. If it does, select an unused setting and Move Jumpers and/or Change DIP Switches to apply the new setting to the card or device. (Consult the card/device user manual for more information).
- 7) Turn off the power to the computer and remove all power cables.
- 8) Install the card and connect any necessary ribbon or power cables.
- 9) Turn on the power to the computer and watch the boot process and the display to make sure the card/device just added creates no conflicts. Edit AUTOEXEC.BAT or Edit CONFIG.SYS and add (or uncomment) just the device driver for the card/device just installed. Save the file and reboot the computer. Rerun the hardware utility and check all assignments to make sure no conflicts exist. If the computer locks up or something does not work properly, there is a conflict between the card/device just added and what is already installed. Identify the conflicting setting(s) and change the setting(s) on ONE of the cards/devices (preferably the one just added). Be careful not to initiate additional conflicts by changing a setting. Repeat steps 7-12 to install each additional card/device, one at a time until the offender is identified. Edit CONFIG.SYS and add (or uncomment) the memory manager (e.g., HIMEM.SYS).

Be sure to exclude from memory manager any card/device addresses assigned above. For example, to exclude the address C800-CFFF from Windows, enter the following command in the [386enh] section of SYSTEM.INI:

EMMExclude=C800-CFFF Save the file and reboot the computer. (This prevents Windows from using this portion of memory. This will prevent lockups and crashes.) Edit AUTOEXEC.BAT or Edit CONFIG.SYS and add (or uncomment) any desired TSRs or applications one at a time. Save the file and reboot the computer. Make sure they do not create new conflicts. If unable to resolve a conflict with a particular card/device, contact the card manufacturer for technical support and assistance.







## Motherboard/mainboard problem; Replace motherboard/mainboard inside computer

### Cause:

Mainboard is bad.

### Solution:

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Replace mainboard. Remove all cards, label and disconnect all wires/cables and P8 & P9 power cables to the mainboard, unscrew the mainboard and slide it out. Set the jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover](#).
- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to ease reinstallation later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.
  - c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



[Photo: Remove P8 & P9 power connectors](#)

e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

c) Place the old mainboard in a static-protective envelope for storage or transport.

6) Install the new mainboard:

a) Touch the metal sides of the base unit to ground any static.

b) Remove the mainboard from its box and from the protective static envelope and lay it down on a table.

c) Locate the jumpers or DIP switches on the mainboard.

d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design making it a good idea to review each one prior to installing the mainboard. Check these items:

1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.

2] Move Jumpers if necessary.



Photo: Moving jumpers

3] Change DIP Switches if necessary.



Photo: DIP Switches

4] CPU speed and presence of any supplemental chips.

5] Type of memory chips and amount of RAM installed (or to be installed) on board.

6] Parallel and/or serial ports.

7] Graphics adapter.

e) (Optional) Install BIOS chip.

1] Locate BIOS chip on mainboard.

2] Touch grounded metal sides of the base unit and remove old BIOS chip using chip puller. Grasp the edges firmly between the tweezers tips and pull straight up (rocking gently back and forth if necessary).

3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

f) (Optional) Install CPU chip.

1] Identify the type of CPU socket used on mainboard.

a] Standard straight-push socket. The chip is removed using a special tool and a new one is

seated by pressure.

- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its static protection envelope.
- 3} Inspect the pins on the chip to Make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing; this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pin into place and stop and examine the pins on all sides to Make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

**WARNING:** *If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, then repeat operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its static protection envelope.
- 3} Inspect the pins on the chip to Make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing; this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pin into place and stop and examine the pins on all sides to Make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent or the socket lever is not completely open.*

- 8} Close and secure the lever.

- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
  - 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its static protection envelope.
  - 3] Inspect the pins on the chip to Make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing; this renders the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pin into place and stop and examine the pins on all sides to Make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
  - 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments (e.g., 1MB, 2MB, 4MB or 8MB).
  - 3] Speed of new memory matches that already installed.
- i) (Optional) Install any additional cache or RAM memory. Do one of the following:
  - 1] Install new SIMM(s):
    - a] Touch the metal sides of the base unit to discharge any static electricity.
    - b] Remove a SIMM module from the protective static envelope.

**NOTE:** *The bottom edge has a row of gold or silver metal connectors that will seat into the*

*socket. Along that bottom edge is a cutout that will fit only one way into the socket.*

- c] Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner manual.)
- d] Grasp SIMM with thumb and two fingers by top edge and insert it into SIMM slot at an angle.
- e] Press down, applying even pressure across the chip and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Damage may occur to both the SIMM and its slot.*

- f] Repeat steps 3a-3e to install additional SIMMs.
- g] Make sure all SIMMs are at the same height and angle to the board.

2] Install new SIPP(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIPP module from the protective static envelope.  
*NOTE: One edge has a row of pins that will seat into the memory socket.*
- c] Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner manual.)
- d] Align pin 1 on the SIPP with pin 1 hole on the mainboard.
- e] Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Damage may occur to both the SIPP and its slot.*

- f] Repeat steps 4a-4e to install additional SIPPs.
- g] Make sure all SIPPs are at the same height and perpendicular to the board.

3] Install new DRAM(s):

- a] Locate the appropriate chip socket on the mainboard.
- b] Touch metal sides of the base unit to discharge static electricity.
- c] Install new DRAM chip by aligning its pins with socket and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip or damage chip socket on board.*

- d] Repeat steps 4a-4c to install additional DRAMs.
- e] Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.
- f] Check owner manual to determine if any jumpers or DIP switches on mainboard require changing so that computer will recognize the added memory.
- g] Locate the and position mounting screws and support spacers:

4] Locate holes in mainboard for mounting screws and position mounting posts in matching locations in the metal sides of the base unit.

*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*

- 5] Locate holes in mainboard for Teflon support spacers and position or install them in matching locations in the metal sides of the base unit.
- k) Touch the metal sides of the base unit to ground any static and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side such that the mainboard will lay on the 'bottom' of the case.*
- l) Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (Remember to discharge static first!)
  - a) Consult the new mainboard manual and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard locates these jumpers in different locations and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.*
- d) Reconnect any other cables to be connected to mainboard.
  - 8) Reinstall all expansion cards.
    - a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the card bottom (part with the gold-striped bars) into the appropriate slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
    - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole and tighten it securely. Repeat for each expansion card.
    - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
  - 9) Test new configuration:
    - a) Make sure no parts or tools remain in metal sides of the base unit.
    - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
    - c) Power up computer and related peripherals one at a time.
    - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer due to different or updated BIOS.*
    - e) Run several programs and access each disk drive and other installed and attached devices (watch lights and LEDs) to Make sure everything is operational.
  - 10) If unable to access drive(s), turn computer off and disconnect power cables.
    - a) Reseat offending expansion card(s).
    - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
    - c) If setup information is lost, check connection of battery pack to mainboard. (Also batteries may need to be replaced.)

- d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message about interrupt (IRQ) conflicts during use or another device (e.g., mouse) fails:
  - a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

- CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*
- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)
- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.  
OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Display unit dead, power light on due to memory manager or driver conflict.

### Cause:

There is a memory manager and/or driver conflict.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Exclude video card address from memory manager. Edit AUTOEXEC.BAT and CONFIG.SYS and remove all memory managers, drivers, TSRs and applications and screen savers. Remove boot diskette from floppy drive and reboot. Add items back to files one at a time and reboot until culprit is identified.

- 1) Read the owner manual for the video card to determine the memory address used by the video card (if used).
- 2) Make sure this address is excluded from use by memory manager (e.g., Qualitas386, QEMM, EMM386.EXE). EXAMPLE: To exclude address C800-CFFF from Windows, edit SYSTEM.INI and add the following line to the [386enh] section:  
EMMExclude=C800-CFFF
- 3) Edit AUTOEXEC.BAT and remove (comment out) all memory managers, drivers, TSRs and applications and screen savers.
- 4) Edit CONFIG.SYS and remove (comment out) all memory managers, drivers, TSRs and applications and screen savers.
- 5) Remove the boot diskette from the floppy drive.
- 6) Press CTRL+ALT+DEL twice to reboot computer (display should work fine).
- 7) Edit CONFIG.SYS and add (remove comments on) one item. Save the file and reboot computer.
- 8) As long as the display remains operational, repeat step 7 for each item.
- 9) When a problem is encountered, the last item added is causing the conflict and should be adjusted or eliminated. Replace base unit cover. Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.







## Display unit dead, power light on due to unseated cable and wrong settings.

### Cause:

Video settings on one or both cards are not set properly and VGA pass-through cable between the 2 video cards is not fully seated.

### Solution:

Identify proper settings for both cards and set them. Reinstall both video cards and reinstall VGA pass-through cable on both cards. Make sure it is properly seated.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Locate the video ribbon cable connecting both video cards.
- 2) Reseat the cable plugs to the cable connectors on each video card. Make sure the red-side of the ribbon cable is connected to pin 1.

*NOTE: Video card may have either a pin-style connector or an edge-style connector.*

- 3) Read the video card manual and identify which items should be set, and what the correct settings should be, to support 2 video card video pass-through.
- 4) Move Jumpers and/or Change DIP Switches.



Photo: Moving jumpers



Photo: DIP Switches

- 5) Reinstall both video cards.
- 6) Reconnect VGA pass-through cable.
- 7) Reinstall video cables to video cards.
- 8) Reinstall power cables and power up computer.





## Video adapter card switches set wrong; Set switches properly on each card.

### Cause:

Video switches (especially video pass-through switch) are not set properly.

### Solution:

**CAUTION:** *All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Set video switches properly on each video card.

- 1) Read the video card manual and identify which items should be set, and what the correct settings should be, to support 2 video card video pass-through.
- 2) [Move Jumpers](#) and/or [Change DIP Switches](#).



[Photo: Moving jumpers](#)



[Photo: DIP Switches](#)

- 3) Reinstall both video cards.
- 4) Reconnect VGA pass-through cable.
- 5) Reinstall video cables to video cards.
- 6) Reinstall power cables and power up computer.



## VGA pass-through cable seated wrong; Re-insert video cable between video cards.

### Cause:

VGA pass-through cable between the 2 video cards is not fully seated.

### Solution:

**CAUTION:** *All the installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Reseat VGA pass-through cable on both cards.

- 1) Locate the video ribbon cable connecting both video cards.
- 2) Reseat the cable plugs to the cable connectors on each video card. Make sure the red-side of the ribbon cable is connected to pin 1.

*NOTE: Video card may have either a pin-style connector or an edge-style connector.*



## Video adapter card not seated properly; Remove and re-insert video adapter card.

### Cause:

Video card is loose or not properly seated.

### Solution:

**CAUTION:** All the installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

Remove and reinsert the video card.

- 1) Remove base unit cover.
- 2) Locate the video card. (This is the card with the video cable attached at the rear of the base unit).
- 3) Touch the metal sides of the base unit to ground any static and, carefully grasping the video card by its edges, press straight down firmly and evenly to make sure the card is fully seated in the bus slot. Avoid side-to-side movements. (This could result in the circuit boards cracking.)
- 4) Reconnect the power cables and turn on the power to the computer.
- 5) If the display image is still not visible, reseal the video card:
  - a) Turn off the computer and disconnect the power cables.
  - b) Remove the video cable from the back of the video card.
  - c) Remove the screw from the top notch of the mounting bracket on the card.
  - d) Touch the metal sides of the base unit to ground any static and, carefully grasping the video card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements. (This could result in the circuit boards cracking.)
  - e) Grasping the video card by its edges, reinsert the card bottom (part with the gold-striped bars) into the same slot. Press straight down firmly until the card is completely seated. Avoid side-to-side movements when positioning the card (This could result in the circuit boards cracking.)
  - f) Insert the screw that was previously removed from the rear metal slot cover into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - g) Reconnect the video cable from the display unit to the socket on the back of the video card. Secure the connector with the attached screws.
  - h) Make sure no parts or tools remain in the metal sides of the base unit.
  - i) Replace all necessary cables (power, keyboard, mouse, etc.) and plug in the power cable.
  - j) Turn on the power to the computer.

**k)** Determine if the display image is visible.



## **Display unit dead, power light on due to multiple causes.**

### **Cause:**

Problem could be video pass through cable, memory or driver conflict, bad video card or mainboard, or memory, IRQ or DMA channel conflict.

### **Solution:**

***CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.*

Have a qualified computer technician perform extensive internal base unit diagnosis.





## Video cable loose causing blank screen; Secure the video cable onto the computer.

### Cause:

Video cable is not securely connected to video card connector on back of base unit.

### Solution:

Secure the video cable to the video card connector on the back of the base unit.

- 1) Turn off the power to the computer base unit and disconnect the power cable.
- 2) Locate the video card connector on the rear of the base unit



[Photo: Video cable connection.](#)

- 3) Insert the video cable plug into the video card connector. It fits only one way.  
***WARNING: Do not force the connection. Pins and/or the connector may become damaged.***
- 4) Secure the connector with the attached screws.
- 5) Reconnect the power cables and turn on the power to the computer and display unit.



## **Brightness or contrast set too low; Adjust brightness or contrast higher.**

### **Cause:**

The contrast and/or brightness controls are turned down too far.

### **Solution:**

Adjust the contrast and brightness controls until the image is clear and bright.

- 1) Open a word processing application and open a text document (place some text on the screen).
- 2) Locate the brightness and contrast controls on the display unit. Try one of the following locations:
  - a) Look for control labels.
  - b) Just underneath the lower front edge of display unit.
  - c) A small control panel door to open.
  - d) Along the left or right side of display unit.
  - e) Somewhere on the rear panel of the display unit.
- 3) Identify the brightness control. It often has a light bulb or sun label.
- 4) Identify the contrast control. It often has a half-shaded circle.
- 5) Make sure both the brightness and contrast controls are centered or turned up from the minimum setting.
- 6) Turn the contrast control back and forth until the letters on the screen appear sharp.
- 7) Turn the brightness control all the way up. Then turn it down until the light-colored glow around the screen's borders merges into the background.



## **Display unit dead, power light on due to screen blanker blanking screen.**

### **Cause:**

Screen blanker in effect blanked the screen.

### **Solution:**

Press any key (e.g., SPACEBAR) to return the screen image to normal.



## **No power at wall outlet; Move monitor to a working power outlet.**

### **Cause:**

No electrical power at wall receptacle.

### **Solution:**

Do one of the following:

- 1) Move the computer to a wall receptacle with good power.
- 2) Have the electrical power repaired at this wall receptacle.



## **Monitor power cable defective; Replace monitor power cable, if detachable.**

### **Cause:**

Monitor power cable bad.

### **Solution:**

Replace the monitor power cable (if detachable). If cable is not detachable, send entire unit for further diagnosis and repair.



## **Display unit dead, power light off due to surge protector switch off.**

### **Cause:**

Surge protector switch is turned off.

### **Solution:**

Turn surge protector switch to the ON position (the light should go on).



## **Power cable not plugged in securely; Plug both ends of power cable in securely.**

### **Cause:**

Monitor power cable is not securely plugged in.

### **Solution:**

Make sure both ends of the monitor's power cable are securely plugged into the surge protector or wall receptacle.



## **Display unit dead, power light off due to cable plugged into back of PC.**

### **Cause:**

Display unit plugged into back of PC base unit. This socket may not work.

### **Solution:**

Plug the display unit power cable directly into the surge protector or wall receptacle.





## **Display unit dead, power light off due to power switch turned off.**

### **Cause:**

Power switch on display unit is turned off.

### **Solution:**

Turn the power switch on the display unit to the ON position.



## Display blank, display unit making high-pitched whine due to bad display.

### Cause:

Display unit is bad.

### Solution:

Make sure the display unit and video adapter card match. Disconnect the data and power cables. Switch display units and reconnect the cables. Turn on the display unit and computer and check for proper operation.

*NOTE: The display unit and video adapter card inside the computer must match both in type (e.g., EGA, VGA, SVGA) and resolution (e.g., 640 by 480). If you upgrade your display unit, you must also upgrade the video card.*

- 1) Make sure the new display unit matches the video adapter card capabilities. (If necessary, run a hardware utility (e.g., Microsoft Diagnostics (MSD)) to determine the type of current video adapter card.

To run Microsoft Diagnostics:

- a) Enter MSD at the DOS prompt (this brings up the MSD main screen).



Choose MSD Video Status Screen

- b) Press 'V' or choose 'Video...' (3d button on left side) to display Video information on the video adapter card and display unit.



Video Status Screen

- c) Check the manual of the new display to determine if it will work properly with the existing video adapter card.
- 2) Save all work files, exit all applications and turn off the computer.
- 3) (Optional) If also installing a video adapter card, install it first.
- 4) Unplug the display unit's power cable from the surge protector or wall socket.
- 5) Use a small flat-tip screwdriver to loosen the screws holding the video data cable onto the connector on the back of the base unit. (TIP: Trace the video data cable from the back of the display unit to the back of the base unit.)
- 6) Carefully grasp the video cable plug and pull it straight out of the socket (**WARNING: Forcing it could damage the connector pins or socket. Make sure screws are completely loosened.**) Note the orientation of

the plug to the socket.

- 7) Remove the old display unit from the desk.
- 8) Carefully unpack the new display unit and remove all packing materials.
- 9) If the display unit base is detached, position the display unit upside down on a desk or sturdy surface and install the display base (following accompanying assembly instructions). Set the new display unit right-side up near the base unit (make sure the cables will reach). Connect the data cable to the video card socket on the back of the base unit.
  - a) Locate the same 15-pin socket that the old video cable was removed from.
  - b) Orient the plug so that it matches the socket (similar to the way the old one was removed in Step 6 above.)
  - c) Carefully insert the plug into the video card socket until it is firmly seated.

***WARNING: Do NOT force it.*** If plug does not fit, check plug orientation (it fits only one way) and make sure the correct socket is being used.)
  - d) Tighten the securing screws using the small flat-tip screwdriver.
  - e) If video cable is not permanently attached to display unit, attach it, repeating Steps 11a to 11d. Plug the display unit power cable into both the display unit and the surge protector or wall. Position the display unit at its desired location (leave plenty of slack in the cables for minor adjustments). Turn on the display unit (make sure the operation light on the display unit comes on. (If the light does not come on, check the power cable connections.) Turn on the computer. Watch the display unit for familiar information during bootup. If the display unit is on and nothing appears on the display, perhaps the video cable is not connected securely; check it. Adjust video controls (contrast, brightness, positioning) to desired levels (consult the display's owner's manual for location and instructions).



## Video card bad; Replace video card, be sure resolutions settings match monitor.

### Cause:

Video card is bad.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace video card. Make sure video resolution settings match display unit.

- 1) Update or create a System Rescue Diskette that includes currently installed drivers, AUTOEXEC.BAT, CONFIG.SYS, WIN.INI and SYSTEM.INI files. (This process may install a video driver that is incompatible with certain applications or other hardware in system.)
- 2) [Remove base unit cover.](#)  
*NOTE: If removing an old video card is not required, skip to Step 4 for installation steps.*
- 3) Remove the old video card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Place the card in a static-resistant envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 4) Install new video card:
  - a) Remove the video card from its box and from the protective static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
  - c) Read the video card manual and identify which, if any, settings need to be changed on the card to use the COM port and interrupt chosen in Step 1.
  - d) [Move Jumpers](#) and/or [Change DIP Switches](#), if necessary.



[Photo: Moving jumpers](#)



Photo: DIP Switches

- e) Identify an appropriate size expansion slot for the type of video card to be installed. Identify the required slot type by examining the row of connector pins along the bottom of the card. An older adapter may fit an 8-bit slot. Most ISA-based video cards require a 16-bit slot while a VESA Local Bus card requires an even longer slot. Choose an appropriate slot by matching the length and gaps in this row of connector pins with slots on the mainboard. Remove the rear metal expansion plate cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, insert the card bottom (part with the gold-striped bars) into the free slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - h) (Optional) If installing 2 video cards for a 2-display setup, attach the VGA pass-through cable to the pin connector or edge-style connector along the top of the video card.
- 5) Connect the video cable from the display unit to the socket on the back of the video card. Secure connector with attached screws.
  - 6) Check the display unit for a Analog/TTL switch. Make sure it is set to 'Analog' (unless it is an old digital display). **CAUTION: Setting this switch in the wrong position could damage the display unit.**
  - 7) (Optional) Some high-end video cards and displays ship with BNC connectors (twist on/off) labeled RGB (Red, Green, Blue). If supplied, they should be used because they provide better color separation and screen appearance. 2 types are available:
    - a) If RGB, connect the red cable to the color input socket marked 'Red' and so on for the others.
    - b) If composite (Ext. sync) connect the white or gray cable to 'Horizontal' and the black cable to 'Vertical'.
  - 8) Install the video driver and test new configuration:
    - a) Make sure no parts or tools remain in metal sides of the base unit.
    - b) Replace necessary cables (power, keyboard, mouse, etc.) and plug power cable into surge protector or wall outlet.
    - c) Power up computer and related peripherals one at a time. (System should boot normally, assuming there are no memory or address conflicts.)
    - d) Insert the video driver diskette that came with the videocard into floppy drive and enter the following:  
A:INSTALL (or SETUP (Refer to program instructions))  
Press ENTER
    - e) Follow installation/setup instructions.
    - f) If a specific memory address was set on card in Step 4, exclude this area from Windows management by entering the following line in the [386enh] section of SYSTEM.INI and reboot computer:  
EMMExclude=xxxx-xxxx  
(Where xxxx-xxxx is the video card address (e.g., C800-CFFF).  
(This prevents Windows from using the video portion of memory preventing lockups and crashes.)
    - g) Test video card, driver installation and display configuration by running installed programs.
  - 9) If display does not work right or a message about address or interrupt (IRQ) conflicts during use or another device (e.g., mouse) fails:
    - a) Turn computer system off and check seating of video card and all cable connections.

- b) Reread settings instructions and recheck DIP Switch and Jumper settings.
- c) Make sure proper video driver is selected.
- d) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- e) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[Example: MSD IRQ Status](#)

- f) See [IRQ Conflicts](#) for advice on eliminating interrupt conflicts.
- g) Contact video card manufacturer for technical support.

10) [Replace base unit cover.](#)

- 11) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Video card resolution settings don't match monitor; Change settings on card.

### Cause:

Video card video resolution settings do not match those required by this monitor.

### Solution:

Change the video resolution settings for the video card to match those supported by the monitor.

- 1) Check the monitor manual to determine the maximum resolution settings for this monitor.
- 2) Check the video card manual to determine how to change the video card resolution settings (via software or via changing jumpers on the video card).
- 3) Do one of the following:
  - a) Change the resolution via software. Follow the instructions accompanying the video card software for running the utility and changing the resolution settings.
  - b) Change the jumper settings on the video card.
    - 1] Remove the video card:
      - a] Remove the screw from the top notch of the mounting bracket on the card.
      - b] Touch the metal sides of the base unit to ground any static and, carefully grasping the video card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (to avoid cracking the circuit boards).
      - c] Locate the jumpers or DIP switches on the card and [Move Jumpers](#) and/or [Change DIP Switches](#), to the new settings required by the display unit.



[Photo: Moving jumpers](#)



[Photo: DIP Switches](#)

- 2] Replace the video card:
  - a] Touch the metal sides of the base unit to ground any static and, carefully grasping the video card by its edges, insert the card bottom (the part with the gold-striped bars) into the same

slot. Press straight down firmly until the card is completely seated. Avoid side-to-side movements when positioning the card (to avoid cracking the circuit boards).

- b]** Insert the screw, previously removed, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
- 3]** Connect the video cable from the monitor to the socket on the back of the video card. Secure the connector with the attached screws.
- 4]** Test the newly changed configuration:
  - a]** Make sure no parts or tools remain in the metal sides of the base unit.
  - b]** Replace all necessary cables (power, keyboard, mouse, etc.) and plug the power cable into a surge protector or wall outlet.
  - c]** Turn on the power to the computer and each related peripheral one at a time. (The system should boot normally and the monitor should not whine.)
  - d]** Test the video card, driver installation and display configuration by running any installed program.





## Display blank, display unit making high-pitched whine due to bad setting.

### Cause:

Incorrect resolution setting on video card for this display unit, bad video card, or bad display unit.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

One of the following must be done:

- 1) Check and modify the resolution settings on the video card to match the display unit.
- 2) Replace the video card.
- 3) Replace the display unit.



## Graphics display slowly due to slow video card.

### Cause:

Installed video card is slow.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the video card with a fast SVGA video card or a video coprocessor card to speed up the display of complex graphics.

- 1) Update or create a System Rescue Diskette that includes currently installed drivers, AUTOEXEC.BAT, CONFIG.SYS, and Windows .INI and .GRP files. (This process may install a video driver that is incompatible with certain applications or other hardware in system.)
- 2) Remove base unit cover.  
*NOTE: If removing an old video card is not required, skip to Step 4 for installation steps.*
- 3) Remove the old video card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Place the card in a static-resistant envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 4) Install new fast SVGA video card:
  - a) Remove the video card from its box and from the protective static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
  - c) Read the video card manual and identify which, if any, settings need to be changed on the card to use the COM port and interrupt chosen in Step 1.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo: Moving jumpers



Photo: DIP Switches

- e) Identify an appropriate size expansion slot for the type of video card to be installed. Identify the required slot type by examining the row of connector pins along the bottom of the card. An older adapter may fit an 8-bit slot. Most ISA-based video cards require a 16-bit slot while a VESA Local Bus card requires an even longer slot. Choose an appropriate slot by matching the length and gaps in this row of connector pins with slots on the mainboard. Remove the rear metal expansion plate cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, insert the card bottom (part with the gold-striped bars) into the free slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - h) (Optional) If installing 2 video cards for a 2-display setup, attach the VGA pass-through cable to the pin connector or edge-style connector along the top of the video card.
- 5) Connect the video cable from the display unit to the socket on the back of the video card. Secure connector with attached screws.
  - 6) Check the display unit for a Analog/TTL switch. Make sure it is set to 'Analog' (unless it is an old digital display). **CAUTION:** *Setting this switch in the wrong position could damage the display unit.*
  - 7) (Optional) Some high-end video cards and displays ship with BNC connectors (twist on/off) labeled RGB (Red, Green, Blue). If supplied, they should be used because they provide better color separation and screen appearance. 2 types are available:
    - a) If RGB, connect the red cable to the color input socket marked 'Red' and so on for the others.
    - b) If composite (Ext. sync) connect the white or gray cable to 'Horizontal' and the black cable to 'Vertical'.
  - 8) Install the video driver and test new configuration:
    - a) Make sure no parts or tools remain in metal sides of the base unit.
    - b) Replace necessary cables (power, keyboard, mouse, etc.) and plug power cable into surge protector or wall outlet.
    - c) Power up computer and related peripherals one at a time. (System should boot normally, assuming there are no memory or address conflicts.)
    - d) Insert the video driver diskette that came with the video card into floppy drive and enter the following:  
A:INSTALL (or SETUP (Refer to program instructions))  
Press ENTER
    - e) Follow installation/setup instructions.
    - f) If a specific memory address was set on card in Step 4, exclude this area from Windows management by entering the following line in the [386enh] section of SYSTEM.INI and reboot computer:  
EMMExclude=xxxx-xxxx  
(Where xxxx-xxxx is the video card address (e.g., C800-CFFF).  
(This prevents Windows from using the video portion of memory preventing lockups and crashes.)
    - g) Test video card, driver installation and display configuration by running installed programs.
  - 9) If display does not work right or a message about address or interrupt (IRQ) conflicts during use or another device (e.g., mouse) fails:

- a) Turn computer system off and check seating of video card and all cable connections.
- b) Reread settings instructions and recheck DIP Switch and Jumper settings.
- c) Make sure proper video driver is selected.
- d) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
- e) Identify interrupt (IRQ) assignments using the IRQ Status screen.



Example: MSD IRQ Status

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- f) See [IRQ Conflicts](#) for advice on resolving conflicts.
  - g) Contact video card manufacturer for technical support.
  - h) If all else fails, reinstall the original video card, reboot from System Recovery Diskette (updated in Step 1) and restore the original configuration. 10) [Replace base unit cover](#).
- 10) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:
- DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.
- OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD



## **Display works, but begins to hum, whine or squeal due to bad power supply.**

### **Cause:**

Power supply inside display unit is aging and about to quit.

### **Solution:**

In order to be the most cost effective, replace the display unit. Replacing the power supply inside the display unit is more costly.



## **Display unit pops, cracks and starts to smell due to dust/bad power supply.**

### **Cause:**

Excessive dust inside the display unit or defective power supply inside display unit.

### **Solution:**

Send the display unit for repair or replacement.



## **Return to main menu from multi-configuration submenu.**

**Solution:**

Press the BACKSPACE key to return to the main menu from a multi-configuration menu.



## Troubleshoot network card installation.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

If conflict is suspected, check for memory conflicts (especially in UMB) using MSD. Make sure the card memory range is excluded from EMM386.EXE use.

Do one or more of the following:

- 1) Run a hardware status program (e.g., Microsoft Diagnostics (MSD)) to determine whether there are any interrupt (IRQ) assignment conflicts.
  - a) Enter the following command at the DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Choose the 'IRQ Status...' button.



[Choose MSD IRQ Status](#)

- c) Review the list of interrupts and determine if there are any conflicts.



[Example: Choose MSD IRQ Status](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- d) If a conflict exists, refer to the network card documentation for advice on selecting a different interrupt for the network card.
- e) Select a different unused interrupt. See [IRQ Conflicts](#) for information on avoiding IRQ conflicts.

**CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

- f) [Move Jumpers](#) and/or [Change DIP Switches](#), on the network card to change the interrupt (IRQ) assignment.





Photo: Moving jumpers



Photo: DIP Switches.

- 2) Run a hardware status program (e.g., Microsoft Diagnostics (MSD)) to determine whether there are any memory conflicts with the network card.
  - a) Edit CONFIG.SYS and comment out all network drivers and EMM386.EXE in CONFIG.SYS.
  - b) Reboot the computer.
  - c) Read the card documentation to determine what upper memory area (if any) is used by the network card.
  - d) Enter the following command at the DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - e) Choose 'Memory...' from the MSD main screen.



Choose MSD Memory Map.

- f) Review the memory map on the left. It shows what memory areas are in use (i.e., If another device is using the same memory area referred to in the network card manual (Step 2c).



Memory Status

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- g) If the network card memory overlaps with another device, Move Jumpers and/or Change DIP Switches on the network card to change the memory assignment.



Photo: Moving jumpers



Photo: DIP Switches.

- 3) Make sure the memory range (if used) of the network card is excluded from use by:
  - a) EMM386.EXE, if used.

*NOTE: Edit CONFIG.SYSPCDGS004.TXT and add the 'x=aaaa-bbbb' parameter to the end of the EMM386.EXE line (where 'aaaa' is the start, and 'bbbb' is the end of the memory address range)*

*determined in step 2)c)).*

- b)** The [386enh] section of SYSTEM.INI. Add the following line to the [386enh] section of SYSTEM.INI:

EMMExclude=aaaa-bbbb

(Where 'aaaa-bbbb' is the video card address range (e.g., C800-CFFF)).

*(NOTE: This prevents Windows from using the video portion of memory, and prevents system freezes and crashes.)*



## Analyze disk using CHKDSK and scandisk.

### Solution:

With DOS 6.2 or later, ENTER the following command at the DOS prompt:

SCANDISK

Enter the following command at the DOS prompt for earlier versions of DOS:

CHKDSK

Do one of the following:

- 1) With DOS 6.2 or later, enter the following command at the DOS prompt:

SCANDISK x:

(Where x is the letter of the drive to be scanned.)

*NOTE: SCANDISK checks for, and fixes many more types of errors in a delicate fashion than CHKDSK.*

- 2) If using earlier versions of DOS, enter the following command at the DOS prompt:

CHKDSK x:

(Where x is the letter of the drive to be scanned.)

- a) If lost clusters or chains are reported, repeat the command using a /F parameter:

CHKDSK x: /F

(This will convert lost clusters and chains to files in the current directory).

- b) Unless concern is great over a critical file, delete these files to recover the disk space.

**CAUTION:** STOP if CHKDSK reports problems with the root directory or subdirectories. Running CHKDSK /F in these cases can cause severe unnecessary damage. Instead, immediately run a file/disk recovery program to identify and correct these problems.



## **Prevent screen burn in.**

### **Solution:**

Burn in is a permanent leftover image appearing on a display unit. Color displays today do not have this problem (as older monochrome units did). If concerned, use a screen saver or turn display unit off when not in use.

Do one of the following:

- 1) Install or invoke a screen saver program (This program will blank the screen and/or display a continuously moving pattern or image on the screen after the computer goes unused for a specified number of minutes.)
- 2) Turn the display unit off when it will not be used for several hours or days.



## Install/replace display unit.

### Solution:

Make sure the display unit and video adapter card match. Disconnect the data and power cables. Switch the display units and reconnect the cables. Turn on the display unit and computer and check for proper operation.

*NOTE: The display unit and video adapter card inside the computer must match both in type (e.g., EGA, VGA, SVGA) and resolution (e.g., 640 by 480). If you upgrade your display unit, you must also upgrade the video card.*

- 1) Make sure the new display unit matches the video adapter card capabilities. (If necessary, run a hardware utility (e.g., Microsoft Diagnostics (MSD))) to determine the type of current video adapter card.

To run Microsoft Diagnostics:

- a) Enter MSD at the DOS prompt (this brings up the MSD main screen).



Choose MSD Video Status Screen

- b) Press 'V' or choose 'Video...' (3d button on left side) to display Video information on the video adapter card and display unit.



Video Status Screen

- c) Check the manual of the new display to determine if it will work properly with the existing video adapter card.
- 2) Save all work files, exit all applications and turn off the computer.
- 3) (Optional) If also installing a video adapter card, install it first.
- 4) Unplug the display unit's power cable from the surge protector or wall socket.
- 5) Use a small flat-tip screwdriver to loosen the screws holding the video data cable onto the connector on the back of the base unit. (TIP: Trace the video data cable from the back of the display unit to the back of the base unit.)
- 6) Carefully grasp the video cable plug and pull it straight out of the socket (**WARNING: Forcing it could damage the connector pins or socket. Make sure screws are completely loosened.**) Note the orientation of the plug to the socket.
- 7) Remove the old display unit from the desk.
- 8) Carefully unpack the new display unit and remove all packing materials.
- 9) If the display unit base is detached, position the display unit upside down on a desk or sturdy surface and install the display base (following accompanying assembly instructions). Set the new display unit right-side

up near the base unit (make sure the cables will reach). Connect the data cable to the video card socket on the back of the base unit.

- a) Locate the same 15-pin socket that the old video cable was removed from.
- b) Orient the plug so that it matches the socket (similar to the way the old one was removed in Step 6 above.)
- c) Carefully insert the plug into the video card socket until it is firmly seated.  
***WARNING: Do NOT force it.*** If plug does not fit, check plug orientation (it fits only one way) and make sure the correct socket is being used.)
- d) Tighten the securing screws using the small flat-tip screwdriver.
- e) If video cable is not permanently attached to display unit, attach it, repeating Steps 11a to 11d. Plug the display unit power cable into both the display unit and the surge protector or wall. Position the display unit at its desired location (leave plenty of slack in the cables for minor adjustments). Turn on the display unit (make sure the operation light on the display unit comes on. (If the light does not come on, check the power cable connections.) Turn on the computer. Watch the display unit for familiar information during bootup. If the display unit is on and nothing appears on the display, perhaps the video cable is not connected securely; check it. Adjust video controls (contrast, brightness, positioning) to desired levels (consult the display's owner's manual for location and instructions).



## OS/2 System files detected; Remove OS/2 and save data on hard disk.

### Solution:

Perform the following commands to remove OS/2 and save data on hard drive:

- 1) Backup all desired data files to diskette (or another media) using the COPY command (or MS Backup).

**CAUTION:** Do not remove MS-DOS program files from disk.

- 2) Do one of the following:

- a) If Setup diskettes fit in Drive A, insert Setup Disk 1 in Drive A. Press CTRL+ALT+DEL twice to reboot computer. After Setup displays first screen, press F3 twice to quit setup.

- b) If Setup diskettes are not compatible with Drive A, create a startup diskette for Drive A.

- 1] Insert Setup Disk 1 in Drive B (in a dual drive system).

- 2] Enter the following command at the DOS prompt:

B:SETUP /F

- 3] When prompted, choose 'Install MS-DOS on Diskette in Drive A'.

- 4] When done, press CTRL+ALT+DEL twice to reboot computer from Drive A.

- 3) Enter the following command to move to Drive C:

C:

- 4) Enter the following commands at the DOS prompt to delete all the files in the OS/2 directories and subdirectories. Respond 'Yes' when prompted to confirm.

DELTREE C:\OS2

DELTREE C:\PSFONTS

DELTREE C:\SPOOL

DELTREE C:\NOWHERE

DELTREE C:\OS!2\_2.0\_D

OR

DELTREE C:\OS!2\_2.1\_D

*NOTE: If the OS/2 setup has other directories in addition to those listed above, list each remaining OS/2 directory, and use the 'DELTREE' command (as in the above examples) to delete those directories and subdirectories also.*

EXAMPLE: Some OS/2 setups may have directories named C:\DESKTOP or C:\MMOS2.

- 5) Enter the following command at the DOS prompt to create a temporary directory:

MD C:\OS2TEMP

- 6) Copy all OS/2 files in root directory (C:\) to the directory just created (EXCEPT for EA DATA.SF, OS2LDR.MSG, OS2LDR, OS2KRNL, OS2BOOT, WP DATA. SF).

COPY C:\<filename> C:\OS2TEMP

- 7) Change the attributes of the remaining OS/2 files (EA DATA.SF, OS2LDR.MSG, OS2LDR, OS2KRNL, OS2BOOT, WP DATA. SF) by entering the following commands at the DOS prompt:

A:\ATTRIB -H -S -R C:\E\*.\*

A:\ATTRIB -H -S -R C:\O\*.\*

A:\ATTRIB -H -S -R C:\W\*.\*

- 8) Delete each of these files by entering the following commands at the DOS prompt:

DEL E\*.\*

DEL O\*.\*

DEL W\*.\*

- 9) Enter the following command at the DOS prompt:

COPY C:\OS2TEMP\\*.\* C:10) Remove diskettes from all floppy drives. Press CTRL+ALT+DEL twice to reboot the computer. Insert the DOS Setup Disk 1 in Drive A (or Drive B) and enter the following command:

A:SETUP

OR

B:SETUP





## Non-MS-DOS partition detected; Use FDISK to delete old and create new partitions.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Complete Setup, backup desired data files to alternate media, use FDISK to remove old partition(s) and create new ones, format drive(s), finish Setup, recopy data files, and update System Rescue Diskette.

- 1) Choose 'Continue Setup'.
- 2) Complete the MS DOS 6.2 setup program (follow instructions).
- 3) Make sure the hard drive is accessible.
- 4) Backup all desired data files to a diskette (or another media) using the COPY command (or MS Backup).
- 5) Use FDISK to delete existing partitions and create new ones.

**CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician. They entail partitioning, high-level formatting and troubleshooting the hard drive.

- 4) Partition drive using FDISK.

*(NOTE: Each hard drive consists of one or more partitions that are either primary partitions or logical drives within an extended partition. At least one primary partition must exist for an extended partition with logical drives to be created)*

- a) Decide how many partitions to install on this hard drive. *(NOTE: Considerations include disk access speed (smaller multiple partitions increase disk access speed), ease of backups (afforded by separating programs from data) and space restrictions created in each partition by having many of them. DOS 6.2 allows partitions of up to 2GB)*

- b) Enter FDISK at the DOS prompt.

*NOTE: If there are 2 or more hard disk drives installed, FDISK refers to them as Disk 1, Disk 2, etc. (not Disk 0 and Disk 1, as in CMOS Setup.) Select '5. Change current fixed disk drive' to view a drive list, and choose the appropriate drive by entering its digit.*

- c) Create desired partitions:

- 1] Create a primary DOS partition:
- 2] Choose '1. Create DOS partition or Logical DOS Drive' and press ENTER.
- 3] Choose '1. Create Primary DOS Partition' and press ENTER.
- 4] Do one of the following:

- a] Enter 'Y' for yes when prompted to '... use maximum available size of a Primary DOS Partition and make the partition active? (Y/N)' if that is the desire. FDISK will reboot the computer (make sure DOS boot disk remains in Drive A). Assuming no other hard drives are present, skip to high-level formatting this partition in Step 7 below.
  - b] Enter 'N' for no, and then enter the size of the desired Primary DOS Partition in MB, or as a percentage of the disk space (%). (Example: If total disk size is 150MB and a 30MB partition is desired, enter either 30 or 20%.)
    - 1} Press 'ESC' to return to the previous menu.
    - 2} Choose '2. Create Extended DOS Partition' to assign the remaining space to an Extended DOS partition, and do one of the following:
      - a} Enter 'Y' for yes when prompted to '... use maximum remaining size for an Extended DOS Partition and make the partition active? (Y/N)' if that is the desire. FDISK will reboot the computer (make sure DOS boot disk remains in Drive A). Assuming no other hard drives are present, skip to high-level formatting this partition in Step 7 below.
      - b} Enter 'N' for no, and then enter the desired size of the Extended DOS Partition in MB, or as a percentage of the disk space (%). (Example: If total disk size is 150MB with 100MB remaining a two 50MB partitions are desired, enter either 50 or 33%.) Repeat this process for the remaining space.
  - 5] (Optional) Choose '3. Create Logical Drive(s) in the Extended DOS Partition' to create additional logical drives in this partition.
  - 6] Press 'ESC' twice to return to the main menu.
  - 7] Choose '2. Set active partition', and designate one of the partitions in the list as active. (This will designate the boot partition) Enter the number of the partition to make active in the box (e.g., 1 or 2), and press ENTER.
  - 8] Press 'ESC' to return to main menu.
  - 9] Press 'ESC' to return to DOS.
  - 10] Press CTRL+ALT+DEL twice to reboot the computer (for the changes to take effect).
- 6) High-level format drive using the operating system.
  - a) Format the boot partition (usually Drive C) by entering the following command at the DOS prompt:  
 FORMAT C: /S /V  
 (Under DOS, this will format Drive C, transfer the system files and COMMAND.COM, and make Drive C bootable.)
  - b) If the disk was partitioned into multiple partitions, format each remaining logical drive in order by entering the following command at the DOS prompt:  
 FORMAT x:  
 (Where x is the logical name of each remaining drive (e.g., D, E, F, etc.).)
  - c) After all logical drives are formatted, remove the boot diskette from Drive A and press CTRL+ALT+DEL twice to reboot the computer (it should now boot properly from the hard drive).
- 7) Test operation of the hard drive and each of its partitions, by running one or more commands that access it to ensure proper configuration. EXAMPLES: Perform a directory, copy and read several files, then delete them. Also, test each floppy disk drive to make sure their operation was not disturbed.
- 8) Insert MS DOS 6.2 Setup Disk 1 in Drive A.
- 9) Enter the following command at the DOS prompt:  
 A:SETUP

OR

B:SETUP Configure the hard drive using the Setup program (following instructions). Copy saved files to Drive C from diskette using COPY command or MS Backup. Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.



## **How to upgrade to DOS 6.2 from OS/2 with OS/2 Boot manager without DOS.**

### **Solution:**

Perform the following steps to remove OS/2 and save data on hard drive:

Save all wanted files to diskette or another media using COPY command. Reboot DOS with Setup Disk 1, and remove OS/2 or files. When finished, copy files back to hard drive.

- 1) Backup all desired data files to diskette (or another media) using the COPY command (or MS Backup).
- 2) Insert MS-DOS 6.2 Setup Disk 1 in Drive A.
- 3) Press CTRL+ALT+DEL twice to reboot computer.
- 4) Choose 'Remove OS/2' or 'Remove files' when prompted.
- 5) Complete 'Setup' (following instructions).
- 6) Copy saved files to Drive C from diskette using COPY command or MS Backup.



## How to upgrade to MS-DOS 6.2 without OS/2 Dual boot or Boot manager.

### Solution:

Boot into OS/2 and save all wanted files to diskette or another media using COPY command. Reboot DOS with Setup Disk 1 and remove partition/files. When finished, copy files back to hard drive.

- 1) Reboot computer into OS/2.
- 2) Backup all desired data files to diskette (or another media) using the COPY command (or MS Backup).  
***CAUTION:** Do not remove OS/2 system files from disk.*
- 3) Insert MS-DOS 6.2 Setup Disk 1 in Drive A.
- 4) Press CTRL+ALT+DEL twice to reboot computer.
- 5) Choose 'Remove partition or files' when prompted by 'Setup'.
- 6) Complete 'Setup' (following instructions).
- 7) Copy saved files to Drive C from diskette using COPY command or MS Backup.



## Rebooting computer into different configurations under DOS 6.x.

### Solution:

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Define startup menu in CONFIG.SYS, and add common and distinct configuration blocks containing commands for each configuration. Enter common commands in AUTOEXEC.BAT first, then use the CONFIG variable to branch to a different command subset using GOTO command. Reboot and test each configuration.

- 1) Enter the following command at the DOS prompt to make backup copies of AUTOEXEC.BAT and CONFIG.SYS:  
  
COPY C:\AUTOEXEC.BAT AUTOEXEC.OLD  
COPY C:\CONFIG.SYS CONFIG.OLD
- 2) Enter the following commands to print a copy of AUTOEXEC.BAT and CONFIG.SYS:  
PRINT AUTOEXEC.BAT (When prompted for a port, enter:)  
LPT1 (or LPT2, where ever printer is assigned)  
PRINT CONFIG.SYS
- 3) Review the configuration/installation section of each application owner manual, and identify the required command line items to create an optimal configuration for that application.
- 4) Write new AUTOEXEC.BAT and CONFIG.SYS files containing only the commands necessary to support that configuration.
- 5) Review each CONFIG.SYS file and identify common commands. Add any additional items that should always be available (e.g., DOSKEY) to this list.
- 6) Compare all configuration file sets to determine if any are similar enough to eliminate one and share another.
- 7) Edit CONFIG.SYS and assemble these components into a new multi-config CONFIG.SYS, as follows:
  - a) Create a menu with menu items for each different configuration. CONFIG.SYS EXAMPLE:  
[MENU]  
MENUITEM=Red  
MENUITEM=Green  
MENUITEM=Blue  
SUBMENU=Individual Users

MENUDEFAULT=RED, 30

MENUCOLOR=15,1

NUMLOCK=OFF

*NOTE: This example defines a menu with 4 entries: First, three menu items start different configurations (defined below). The 4th leads to a submenu with configurations for different users. After 30 seconds the configuration is set to RED. The menu will appear in white (15) on a blue (1) background.*

*NOTE: When using menu, to return to the main menu from a multi-configuration submenu, press BACKSPACE key.*

- b) Create a [COMMON] block with the CONFIG.SYS shared commands that must be loaded first for each configuration (see below).
- c) Create separate blocks containing distinct commands for each menu item (preceded by a block label) (see below).
- d) Create a final [COMMON] block to contain shared commands added later (e.g., when new applications are installed) (see below).

CONFIG.SYS EXAMPLE (continued):

[COMMON]

DOS=HIGH

BUFFERS=30

DEVICE=C:\DOS\HIMEM.SYS

[RED]

FILES=40

DEVICE=C:\DOS\EMM386.EXE 1024

[GREEN]

FILES=30

DEVICE=C:\NET\NETWORK.SYS

[BLUE]

FILES=50

SHELL=C:\DOS\COMMAND.COM /E:1024 /P

DEVICE=C:\CDROM\CDROM.SYS /D:MSCD000

[COMMON]

- 8) Edit AUTOEXEC.BAT and assemble these components into blocks to execute a different set of commands for each different configuration, as follows:

- a) List the commands common to all blocks first in the file (see below).
- b) Enter the following command next. (It tells DOS to find the block matching the value of the environment variable and execute only the commands in it.)

GOTO %config%

- c) Create command blocks for each different configuration that contain commands specific to that configuration. End each with the statement 'GOTO END'. (See below)

AUTOEXEC.BAT EXAMPLE:

C:\DOS\SMARTDRV.EXE

```
SET TEMP=C:\TEMP
C:\DOS\MSAV
GOTO %CONFIG%
:RED
PATH=C:\DOS;C:\LOTUS
123
GOTO END
:GREEN
PATH=C:\DOS;C:\DESKPUB
C:\DOS\MOUSE.COM
PUBLISH
GOTO END
:BLUE
PATH=C:\DOS;C:\UTILS;C:\NETWORK
NET LOGON RICH /Y
GOTO END
:END
```

*NOTE: This AUTOEXEC.BAT always loads SmartDrive first, sets TEMP, and starts the MS Antivirus program. Then, it moves to the block whose title matches the current value of the environment variable CONFIG, executes those commands (bypassing commands under other named blocks) and goes to the end.*

- 9) Save the new AUTOEXEC.BAT AND CONFIG.SYS, reboot the computer and test each configuration. Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.

*NOTE: MemMaker, the DOS program for analyzing AUTOEXEC.BAT and CONFIG.SYS to optimize memory, will not support multiple configuration files. Run MemMaker separately on files that contain only one configuration at a time. Then, map those optimized results back into the multiple configuration version.*





## Rebooting computer for different configuration under MS-DOS 3.x, 4.x, 5.0.

### Solution:

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Use a REBOOT.COM program along with different batch files to copy different AUTOEXEC.BAT and CONFIG.SYS files to C:\ and reboot the computer before using each application program that requires a different configuration.

- 1) Create a new directory on the hard drive to store multiple AUTOEXEC.BAT and CONFIG.SYS files (e.g., CONFIGS). Enter the following command at the DOS prompt:  
MD C:\CONFIGS
- 2) Write AUTOEXEC.BAT and CONFIG.SYS files for each different desired configuration. Edit the current files, make appropriate changes and save them to the CONFIGS directory, giving them descriptive names (e.g., NORMAL.BAT, NORMAL.SYS and ZOOM286.BAT and ZOOM286.SYS).
- 3) Obtain a copy of REBOOT.COM or enter the following DEBUG script into an executable file. Place REBOOT.COM in a directory in the path statement (e.g., C:\BT).

```
A 100
MOV AH,0D
INT 21h
MOV AX, 40
MOV DS,AX
DS:
OR BYTE PTR [17],0C
MOV AX,4F53
INT 15h
DS:
MOV WORD PTR [72],1234
JMP F000:FFF0
(Leave line blank)
R CX
```

20

N REBOOT.COM

W

Q

*NOTE: This REBOOT.COM file is compatible with SmartDrive, because it flushes the write-behind cache before rebooting.*

- 4) Create a separate batch file for each different configuration, that will also boot the computer into that configuration, as follows. Give them descriptive filenames with a .BAT suffix (e.g., NORM.BAT and ZOOM.BAT), and place them in a directory in the path statement (e.g., C:\BT).

EXAMPLE of NORM.BAT batch file to reboot with the normal configuration:

COPY C:\CONFIGS\NORMAL.BAT C:\AUTOEXEC.BAT

COPY C:\CONFIGS\NORMAL.SYS C:\CONFIG.SYS

REBOOT.COM

- 5) Enter the following command at the DOS prompt to reboot the computer into a normal configuration:

NORM

*NOTE: For future reference, DOS 6.x includes a special multiple configuration feature that uses standard batch files. Consider upgrading to these more recent DOS versions.*



## How to configure DOS for optimal performance.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Load DOS high, and TSRs, drivers and special programs used into UMA. Use the latest versions of memory managers and SmartDrive. Adjust files, buffers and environment space. Do not load items not used (e.g., mouse driver for DOS applications that do not use the mouse).

Do one or all of the following, when possible, to increase system performance with MS-DOS:

- 1) Upgrade to the latest MS-DOS version (at least version 5.0) and load DOS into the high memory area (HMA or the first 64KB of extended memory) by using the following command in CONFIG.SYS:  
DOS-HIGH, UMB
- 2) Make sure the most recent versions of HIMEM.SYS, EMM386.EXE, RAMDRIVE.SYS and SMARTDRV.EXE are located in the directories referenced in the path commands loading them in CONFIG.SYS. (Windows 3.1 provides more recent versions than those that came with MS-DOS 5.0.)
- 3) Use HIMEM.SYS, and make sure it is loaded first in CONFIG.SYS.
- 4) Load SMARTDRV.EXE in AUTOEXEC.BAT, and allocate the largest amount of memory possible to it.
- 5) Set the files command in CONFIG.SYS to 30, unless one or more often used applications requires more.  
FILES=30
- 6) Do one of the following:
  - a) Set the buffers command in CONFIG.SYS to 10 if using SMARTDRV.EXE. A higher setting will decrease performance.  
BUFFERS=10
  - b) If not using SMARTDRV.EXE, set buffers command in CONFIG.SYS to 20. This reduces disk access times, but uses more conventional memory.
- 7) Install a RAMDrive, and set the Windows TEMP environment variable to it if there is a shortage of hard drive space (or using a diskless workstation) and there is plenty of available memory (> 6MB). This especially improves performance for Print Manager and programs that create many temporary files (.TMP).
- 8) Use EMM386.EXE if running DOS applications requiring expanded memory (or to load TSRs and drivers into the upper memory area or UMA).
- 9) Load only required TSRs, drivers and special programs. Load them into the upper memory area to save conventional memory, when possible. Specify a smaller environment space with the /E switch of the shell command in CONFIG.SYS. (NOTE: 256KB is the default)  
SHELL=C:\DOS\COMMAND.COM /E:1024 /P Remove command lines for mouse drivers from

AUTOEXEC.BAT and CONFIG.SYS, if not using the mouse for non-Windows applications.



## Configure hardware for optimal performance.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Purchase a large hard drive and set it to use the optimal interleave. Add extended memory. Remove unnecessary files, use disk caching and defragment drives often.

Do one or all of the following, when possible, to increase hardware performance.

- 1) Add additional extended memory to the computer.
- 2) Purchase the largest hard drive affordable.
- 3) Determine and use the optimal hard drive interleave for the system.

*NOTE: Hard drives are often formatted with a slow interleave. Some utilities (e.g., SpinRite) can determine and set the optimum hard drive interleave without reformatting the disk (or losing any data).*

- 4) If the system has a memory expansion board capable of both expanded and extended memory, configure all of it as extended memory. Only use EMM386.EXE to emulate expanded memory when required by DOS-based applications. Otherwise, stick to extended memory for Windows. In this case, load the expanded memory driver first in CONFIG.SYS, followed by HIMEM.SYS AND EMM386.EXE.

EXAMPLE:

DEVICE=C:\EMMBOARD.SYS

DEVICE=C:\DOS\HIMEM.SYS

DEVICE=C:\EMM386.EXE RAM 1024 x=C000-C7FF

- 5) Use disk caching for disk access, especially disk reads.
- 6) Defragment hard disk drives often to reduce disk access times by defragmenting files and grouping them together on the disk.
- 7) Remove unnecessary programs and files (e.g., .BAK, .TMP and README) from the disk.



## How to use DoubleSpace to create and maintain compressed disks.

### Solution:

**WARNING:** *Any changes made to these files will seriously affect the performance and operation of your computer.*

Create and maintain compressed disks by running DBLSPACE from the DOS prompt.

- 1) Enter DBLSPACE at the DOS prompt. (Program will ask permission to add DBLSPACE.SYS to CONFIG.SYS to control where DBLSPACE.BIN resides.) Respond 'Yes'.
- 2) Do one of the following:
  - a) Choose 'Express Setup' to compress an entire disk for the first time (e.g., C:).
  - b) Choose 'Custom Setup' to add one or more compressed drives to an existing hard drive.
- 3) DoubleSpace actions:

When initially compressing an entire disk, it scans the disk to locate the Windows swap file (which cannot be compressed) and determines the amount of free disk space. DoubleSpace reserves the swap file plus about 2MB of space and creates its own volume out of the remaining free space. Then it proceeds to copy all other files from the normal portion of the disk into the compressed volume and then delete them. When done, it assigns the compressed volume the logical name of the original volume (e.g., C:) and the physical disk (with the swap file and the hidden file DBLSPACE.nnn) a new logical drive letter (e.g., H:).

*NOTE: Certain ordinary DOS commands do not work on DoubleSpaced drives (e.g., CHKDSK, DEFRAG). They have special DoubleSpace counterparts that perform these functions. Refer to DOS documentation on DoubleSpace.*

**CAUTION:** *Do not use file/disk utilities that wipe files/programs from disk on DoubleSpaced drives. Also do not delete the DBLSPACE.nnn, DBLSPACE.BIN, DBLSPACE.INI OR DBLSPACE.OUT files from the host drive.*



## How to maintain optimal hard disk performance.

### Solution:

Delete unnecessary programs and files, delete .TMP files, run SCANDISK and DEFRAG often. Use a permanent (contiguous) swap file for Windows. Employ a cache.

- 1) Delete all temporary files (.TMP) often. (Only when Windows is NOT running.)
- 2) Delete application programs no longer in use.
- 3) Delete unnecessary files from disk (especially Windows files). These include .BAK files, README files, installation programs, unnecessary drivers for video, printers etc. that are installed but not available as devices, unnecessary fonts.

***CAUTION:** Do NOT delete files without certain knowledge of their purpose. This could disable certain programs. See user manuals for details.*

- 4) Run SCANDISK (rather than CHKDSK) often to catch and fix problems early.
- 5) Run DEFRAG or another optimization program often (daily for heavy users, weekly for the rest).
- 6) Create a permanent swap file of adequate size for Windows (rather than a temporary one).

***NOTE:** Do this immediately after running DEFRAG so that the permanent swap file will be contiguous.*

- 7) Use a disk caching program (e.g., SmartDrive) and adjust the caching parameters to maintain low to moderate risk of data loss while reducing repeated disk access.



## How to use DEFRAG (DOS, Windows 3.x).

### Solution:

Run DEFRAG or another 3d party product often to eliminate file fragmentation on hard drives and speed up performance.

*NOTE: To defragment a double-spaced drive, use DBLSPACE /DEFRAGMENT.*

- 1) Reboot the computer with a clean RAM to prevent TSR conflicts with the defragmentation program:
  - a) Insert the boot diskette in Drive A.
  - b) Press CTRL+ALT+DEL twice to reboot computer.
- 2) Run a disk defragmentation program (e.g., DEFRAG in MS-DOS 6x).
  - a) Enter the following command at the DOS prompt to provide a path for DOS commands:  
PATH=C:\;C:\DOS (or a location where the COMMAND.COM file and DOS files are stored on the hard drive)
  - b) Enter DEFRAG at the DOS prompt.
  - c) Select the drive to be optimized (e.g., C:). (It will perform a quick analysis of fragmentation and report results along with a graphical layout of the disk drive).
  - d) Select 'Optimization Method...' under 'Optimize'.
  - e) Choose one of the following:
    - 1] 'Full Optimization' to defragment files and reorganize them so that all the unused space is contiguous at the end.
    - 2] 'Unfragment Files Only' to reassemble fragmented files, perhaps leaving empty gaps between them.
  - f) Select 'Begin optimization' or press ALT-B to start.
  - g) Choose 'OK' when done.
  - h) Do one of the following:
    - 1] Choose 'Another Drive' to optimize another drive (e.g., D:). (Then repeat steps 2d-2g.)
    - 2] Choose 'Exit DEFRAG' to return to the DOS prompt.
  - i) Remove the boot diskette from the A drive.
  - j) Press CTRL+ALT+DEL twice to reboot computer.

**CAUTION:** Always reboot the computer after running DEFRAG.

*NOTE: If DEFRAG freezes the computer or refuses to run, stop the operation and run a file/disk recovery utility to analyze and repair the problem. Then reboot the computer and rerun DEFRAG.*







## How to configure a new hard disk drive.

### Solution:

Turn on the computer, run setup, low-level format MFM (OR ST506) and ESDI disk, partition disk and format each logical drive. Test the configuration, install the operating system, reinstall the cover and update the rescue diskette.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Make sure all external cables are reinstalled and power up computer.
  - a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Insert boot diskette in Drive A.
  - d) Power up computer and display unit one at a time.
- 2) Run Setup to set the drive type in CMOS as follows:

*NOTE: In most cases, the drive has not been formatted yet, so it cannot be read at this point.*

**CAUTION:** *Setup usually refers to installed disks using the names Disk 0 for the first and Disk 1 for the second, etc. Make sure the proper one is selected.*

- a) If the new drive is the exact same brand, model and size, no changes are required.
- b) MFM (OR ST506) drive: There should be a 'Drive Type' number associated with this model and size drive. Check the documentation that came with the system or drive.
- c) ESDI drive: Most ESDI drive controllers work by setting the drive type to 1. This indicates a drive is present; translation of specific characteristics is done automatically by the controller.
- d) IDE drive: An IDE drive may or may not have a BIOS-supported type in the drive listing. Select the drive type that matches the characteristics (heads, cylinders, sectors, size) of the new drive, or select 'User Defined' drive type and enter the correct cylinders, heads, size, etc.

**CAUTION:** *DO NOT set a user defined hard disk type so that the computer believes the hard disk is LARGER than it actually is (e.g., 515MB for a 420MB drive). This may damage the hard disk!*

- e) SCSI drive: Choose the 'Not install' or 'No Drive Present' option. (The SCSI host adapter automatically handles translation.) *NOTE: To boot from this SCSI drive, the host adapter must be set to pretend to be a 'standard AT-style controller'.*

If installing a drive larger than 1GB or more than 2 drives, a special driver may be required. Check the controller manual to determine whether Moving Jumpers is required or if this is handled by chip firmware.

- 3) Low-level format drive (if applicable). (This prepares the drive to receive an operating system (high-level) format.

- a) MFM (OR ST506) and ESDI drives require low-level formatting using a program provided with either the drive or controller. Remove the boot diskette from Drive A and insert the manufacturer's setup diskette. Follow program instructions.

**CAUTION:** Make sure the correct drive is selected (the first drive is usually Drive 0 and the second Drive 1). Selecting the wrong drive will permanently destroy all data on drive.

*NOTE:* New hard disk drives are NOT perfect: they often contain a few defects in the surface. These bad sectors are excluded from use so that no data is stored there.

- b) IDE drives do not require a low-level format. They are low-level formatted at the factory.

**WARNING:** DO NOT low-level format a IDE drive. It will render the drive useless.

- c) SCSI drives do not require a low-level format. They are low-level formatted at the factory.

4) Partition drive using FDISK. (*NOTE: Each hard disk consists of partitions that are either primary partitions or logical drives within an extended partition.*)

- a) Decide what type of operating system configuration is desired and how many partitions of each type to install on this hard disk. (*NOTE: Considerations include number of operating systems, disk access speed (smaller multiple partitions increase disk access speed), ease of backups (afforded by separating programs from data) and room restrictions created by having multiple partitions. DOS 6.2 allows partitions up to 2GB in size.*)

- 1] DOS only. Use the DOS FDISK and FORMAT command.

- 2] DOS and OS/2 Dual Boot. First use the DOS FDISK and FORMAT command and install DOS on the hard disk.

- 3] OS/2 only. Use the OS/2 FDISK command and format the hard disk as a part of the OS/2 installation procedure.

- b) Remove the manufacturer's drive setup diskette from Drive A and reinsert the boot diskette.

- c) Type FDISK at the DOS prompt or FDISK at the OS/2 prompt. (The OS/2 version is identical to the DOS version except for the interface.)

*NOTE: If there are 2 or more hard disk drives installed, FDISK refers to them as Disk 1, Disk 2, etc. (not Disk 0 and Disk 1 as in CMOS Setup.) Select '5. Change current fixed disk drive' to view a drive list and choose the appropriate drive by entering its digit.*

- d) Create desired partitions:

- 1] DOS FDISK.

- a] Create a primary DOS partition:

- b] Choose '1. Create DOS partition or Logical DOS Drive' and press ENTER.

- c] Choose '1. Create Primary DOS Partition' and press ENTER.

- d] Do one of the following:

- 1} Type 'Y' for yes when prompted to '... use maximum available size of a Primary DOS Partition and make the partition active? (Y/N)' if that is the desire. FDISK will reboot the computer (make sure DOS boot disk remains in Drive A). Assuming no other hard disks are present, skip to high-level formatting this partition in Step 7 below.

- 2} Type 'N' for no and then enter the size of the desired Primary DOS Partition in MB or percent of the disk space (%). (Example: If total disk size is 150MB and a 30MB partition is desired, enter either 30 or 20%.)

- a} Press ESC to return to previous menu.

- b} Choose '2. Create Extended DOS Partition' to assign the remaining space to an Extended DOS partition and do one of the following:

- 1> Type 'Y' for yes when prompted to '... use maximum remaining size for an Extended DOS Partition and make the partition active? (Y/N)' if that is the desire. FDISK will reboot the computer (make sure DOS boot disk remains in Drive A). Assuming no other hard disks are present, skip to high-level formatting this partition in Step 7 below.
- 2> Type 'N' for no and then enter the desired size of the Extended DOS Partition in MB or percent of the disk space (%). (Example: If total disk size is 150MB with 100MB remaining a two 50MB partitions are desired, enter either 50 or 33%.) Repeat this process for the remaining space.
- c} (Optional) Choose '3. Create Logical Drive(s) in the Extended DOS Partition' to create additional logical drives in this partition.
- d} Press ESC twice to return to main menu.
- e} Choose '2. Set active partition' and designate one of the partitions in the list as active. (This will designate the boot partition.) Type the number of the partition to make active in the box (e.g., 1 or 2) and press ENTER.
- f} Press ESC to return to main menu.
- g} Press ESC to return to DOS.
- h} Press CTRL+ALT+DEL to reboot the computer (for changes to take effect).

## 2] OS/2 FDISK.

- a] Delete any existing partitions by using the arrow keys to highlight the partition and then select 'Delete partition' and press ENTER to delete it from the disk. Repeat this step for all existing partitions on the disk.
- b] Highlight the unused partition entry with the up/down arrow keys.
- c] Press ENTER to display the options menu again.
- d] Select 'Install Most'.
- e] Choose whether to position 'Boot Manager' at the beginning or end of the disk (Recommend the first 1MB). (This allocates the space for 'Boot Manager'; it will be installed later.)
- f] Select 'Create partition...' and press ENTER to create a primary disk partition for each operating system (OS/2 last). See [DOS-OS/2 Partitioning Example](#).
  - 1} Type the size of the partition in MB and specify whether it should be a primary partition or a logical drive within an extended partition. (*NOTE: DOS or OS/2 should be set up as the first primary partition.*)
  - 2} Use the 'Options' menu to change the parameters of that partition.
  - 3} Use the 'Startable' item to select the partition to be in control (usually 'Boot Manager' only).
  - 4} Use the 'Selectable' item to designate which choices will appear on the 'Boot Manager' startup menu.
- g] After checking table, press F3. FDISK asks to confirm selections before exiting.
- h] Proceed with installing OS/2. (If configuration is OS/2 only, the OS/2 installation procedure will high-level format the drive. Skip the next step.

## 5) High-level format drive using the operating system.

- a) Format the boot partition (usually Drive C) by entering the following command at the DOS or OS/2 prompt:  
 FORMAT C: /S /V

(Using DOS, this will format Drive C, transfer the system files and COMMAND.COM, making Drive C bootable.)

- b) If the disk was partitioned into multiple partitions, format each remaining logical drive in sequence by entering the following command at the DOS or OS/2 prompt:

FORMAT x:

(Where x is the logical name of each remaining drive (e.g., D, E, F, etc.).

- c) After all logical drives are formatted, remove the boot diskette from Drive A and press CTRL+ALT+DEL to reboot the computer (it should boot fine from the hard disk).
- 6) Test operation of the hard disk drive and each of its partitions by running one or more commands that access it to Make sure proper configuration. Examples: Perform a directory, copy and read several files and then delete them. Also test functionality of each floppy disk drive to make sure their operation was not disturbed.
  - 7) If unable to access drive(s), turn computer off and disconnect power cables.
    - a) Make sure controller card is fully seated.
    - b) Recheck all ribbon and power cable connections to both the controller card and disk drives. Make sure the cables are routed correctly and each connection is secure.
    - c) Reconnect the power, reboot and retest drive access.
  - 8) If still unable to access one or more drives but computer seems to boot OK from boot diskette in Drive A, run Setup and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
  - 9) If problems persist, try one or more of the following steps:
    - a) Reread installation instructions and make sure data cables are routed properly and drives are connected in proper sequence.
    - b) Check jumper and DIP switch settings on all drives with those specified in the installation instructions (especially if there is more than one hard disk drive installed).
    - c) If 2 IDE drives do not work right, try switching the master/slave relationship. If they are from different manufacturers, consider exchanging one for a drive from the other manufacturer.
    - d) If this is a SCSI installation, recheck all SCSI ID assignments to make sure there are no conflicts. Also make sure the last device is terminated.
    - e) If the computer must be turned on several times before it works properly, the power supply may be too weak or going bad. This prevents the hard disk from coming up to speed in a timely manner.
  - 10) Replace base unit cover.

The logo for CyberMedia, featuring the word "CyberMedia" in a stylized, italicized, red font with a registered trademark symbol (®) at the end.

Photo: Replacing cover

- 11) Install operating system (i.e., DOS or OS/2) on boot partition (i.e., Drive C). Follow instructions accompanying operating system software.

- 12) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD



## See if math coprocessor improves performance; Classify type & amount of work.

### Solution:

A math coprocessor will provide the greatest benefit to graphical engineering and statistical or computation-intensive applications on a computer without a coprocessor (built-in or add-on).

- 1) Classify the type and amount of work being done on the computer.
- 2) Determine if a math coprocessor may help, by analyzing whether a significant amount of work falls into the graphical engineering (e.g., AutoCAD) or statistical computation (with heavy use of floating point calculations) areas.
  - a) If not, then a math coprocessor will probably not improve computer performance.
  - b) If a significant amount of work does fall into these areas, then further research is warranted. Check the user manual (or contact technical support) for each applicable software application, to determine their use of coprocessor functions.
- 3) Run a hardware status program (e.g., Microsoft Diagnostics (MSD)) to determine if a math coprocessor is an option, and if one is already installed.
  - a) Choose 'Computer...' from the MSD main screen.



[MSD Choose Computer](#)

- b) Identify the processor type and write it down.



[Example: CPU & Coprocessor Status](#)

- c) Identify whether a 'Math Coprocessor' is installed.
  - 1] 'Internal' means a coprocessor is built into the CPU chip (e.g., 486DX chip).
  - 2] 'None' means a coprocessor is not installed.
  - 3] Another entry (e.g., 287, 387DX) means that a coprocessor is already installed.
- 4) If a coprocessor is not installed, examine the following table to determine the appropriate coprocessor to match this processor. [Select a Math Coprocessor](#)





## Replace mainboard.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover.](#)



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.
  - c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



[Photo: Remove P8 & P9 power connectors](#)



- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
  - a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
  - a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).
    - 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.  
*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*
  - f) (Optional) Install CPU chip.
    - 1] Identify the type of CPU socket used on mainboard.
      - a] Standard straight-push socket. The chip is removed using a special tool and a new one is

seated by pressure.

- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

***CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.***

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

***WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.***

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.

- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
  - 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
  - 1] Type of memory required (e.g., DRAM, SIMMs, SIPPs).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).
  - 3] Speed of new memory matches that already installed.
- i) (Optional) Install any additional cache or RAM memory. Do one of the following:
  - 1] Install new SIMM(s):
    - a] Touch the metal sides of the base unit to discharge any static electricity.
    - b] Remove a SIMM module from the protective anti-static envelope.

**NOTE:** *The bottom edge has a row of gold or silver metal connectors that will seat into the*

*socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c] Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.
- e] Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

- f] Repeat steps 3)a)-3)e) to install additional SIMMs.
- g] Make sure all SIMMs are at the same height and angle to the board.

**2] Install new SIPP(s):**

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c] Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
- e] Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

- f] Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.
- g] Make sure all SIPPs are at the same height and perpendicular to the board.

**3] Install new DRAM(s):**

- a] Locate the appropriate chip socket on the mainboard.
- b] Touch metal sides of the base unit to discharge static electricity.
- c] Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

- d] Repeat steps 4a-4c to install additional DRAMs.
- e] Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.
- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
- g] Locate and position mounting screws and support spacers:
- h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.

*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*

- i] Locate holes in mainboard for Teflon support spacers, and position or install them in

matching locations in the metal sides of the base unit.

- j) Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.

*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*

- k) Secure mainboard in place by placing screws in the mounting posts and tightening them.

7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)

- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
- b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
- c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

**WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.

- d) Reconnect any other cables to be connected to mainboard.

8) Reinstall all expansion cards.

- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
- b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
- c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.

9) Test new configuration:

- a) Make sure no parts or tools remain in metal sides of the base unit.
- b) Replace necessary cables (power, keyboard, video) and plug in power cable.
- c) Power up computer and related peripherals one at a time.
- d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*
- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.

10) If unable to access drive(s), turn computer off and disconnect power cables.

- a) Reseat offending expansion card(s).
- b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
- c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)

- d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
  - a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Install/replace second floppy disk drive.

### Solution:

Remove the cover, disconnect the drive cables and remove the old drive. Set the drive selection switches on the new floppy disk, install the drive in a bay in the reconnect cables. Turn on the computer, run setup, test the configuration, reinstall the cover and update the rescue diskette.

**CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

*NOTE: If not removing an old floppy disk drive, skip to Step 3 for installation instructions.*

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Remove old floppy disk:

- a) Remove the data ribbon cable from the drive by grasping the cable and connector and pulling it out of the drive socket. Fold it back out of the way.



Photo: Remove floppy ribbon cable

- b) Remove the power cable from the drive by pulling on the white plug (**WARNING: Do not pull on the 4 colored wires**). Fold it back out of the way.



Photo: Remove floppy power cable

- c) Remove the drive bay by removing the two screws holding it to the front of the base unit and carefully lifting it out. (*NOTE: If floppy disk is slotted in a drive bay with one or more other devices (e.g., hard disk drive(s) or CD-ROM) disconnect ribbon and power cables from them first. Then remove drive bay.*)
- d) Remove the two (or more) retaining screws from the left and right sides of the drive bay.



Photo: Side screws

- e) Remove the old floppy disk drive from the drive bay and set it aside in a safe place.
- 3) Install the new floppy disk:



- a) Set drive-select jumpers. Unfortunately, manufacturers have not agreed upon a standard for locating or designating jumpers. Read the instruction manual accompanying drive for details. Otherwise, here are some tips:

1] Look in the center rear of the drive to locate the jumpers.



Photo: Set floppy drive select jumper

2] Do one of the following (especially if using a 7-segment twisted-pair 34-wire drive cable) to set jumper for the second drive:

- a] If labels DS0 and DS1 are used, set the jumper for DS1.  
b] If labels DS1 and DS2 are used, set the jumper for DS2.

*NOTE: If installing multiple floppy drives, set all of them for drive 2. This means the drive designation is determined by the drive's position on the cable (the drive attached at the end of the cable is always drive 1 or Drive A). (Example: To swap designations for floppy drives A and B, simply swap cable connectors.)*

- b) Check to see if the new drive fits the slot in the drive bay. Three options are available:
- 1] New drive is the same size as the old one and it fits perfectly.  
2] Drive bay is for an older computer (e.g., AT) and drive rails are required.  
3] New drive is larger than the old drive (unlikely). If an adapter kit is installed, remove it. Otherwise locate another larger drive bay.  
4] New drive is smaller than the old drive. Install an adapter kit (e.g., to enable a 3.5 inch drive to fit in a 5.25 inch drive bay).
- c) Turn the drive bay on its side and slide the floppy disk into the drive bay. (Make sure the end of the drive with the connectors is oriented toward the rear of the base unit.) Line up the holes for the mounting screws and insert them.



Photo: Side screws

Turn the drive bay on the other side and secure it with mounting screws.

***WARNING: DO NOT use longer screws or over-tighten them. This may cause the screw to enter the internal circuit board or the drive case and damage the drive.***

- d) Slide the drive bay back into place and resecure it to the base unit.

*(NOTE: If installing in a standard drive bay, attach ribbon and power cables first (especially if in bottom bay).)*

- e) Reconnect any cables disconnected from other devices in this drive bay.  
f) Connect the power cable to the socket on the rear of the drive (it is molded to fit only one way).



Photo: Connect floppy power cable

*NOTE: Some newer 3.5 inch drives have a smaller 4-pronged power connector resembling a set of long jumper pins. If the power supply does not have a connector this size, an adapter plug should be shipped with the 3.5 inch drive kit.*



- g) Connect the ribbon data cable, coming from the controller card, to the large connector on the rear of the floppy disk drive (red or blue side to Pin 1). (Cheap or old cables often cause lots of problems. If new cables are supplied, use them.)



Photo: Connect floppy ribbon cable

*NOTE: Some newer 3.5 inch drives have pin connections for the data cable. Included in the drive kit should be an adapter plug to facilitate using a standard edge connector. It slides over the pins and has a standard edge connector on the other side.*

- h) Make sure other cable connections to drives and controller card are secure.
- 4) Reinstall external cables and power up computer.
- a) Make sure no parts or tools remain in metal sides of the base unit.
- b) Replace necessary cables (power, keyboard, video) and plug in power cable.
- c) Power up computer and display unit one at a time.
- 5) Run Setup to set the drive type in CMOS as follows:
- a) If the new drive is the exact same size as the old drive and no other switches were made, no changes in setup are required.
- b) If the new drive is a different size and/or changes in other drives were made, then the floppy drive designations and/or sizes need adjusted.
- c) If the new drive is an additional floppy disk drive, then be sure to set the drive type.
- 6) Test operation of the floppy disk drive(s) by running one or more commands that access it to Make sure proper configuration. Examples: Perform a directory, copy and read several files and then delete them. Also test functionality of each hard disk drive to make sure their operation was not disturbed.

*NOTE: If the diskette has not been formatted, the computer will not be able to read it and will generate an error message. Format the disk first.*

- 7) If unable to assess drive(s), try the following steps in sequence:
- a) Rerun Setup and check and correct the settings for those items. b) Turn the computer off and disconnect the power cables.
- c) Make sure controller card is fully seated.
- d) Recheck all ribbon and power cable connections to both the controller card and disk drives. Make sure the cables are routed correctly and each connection is secure.
- e) Reconnect the power, reboot and retest drive access.
- 8) If problems persist, perform the following steps:
- a) Reread installation instructions and make sure data cables are routed properly and drives are connected in proper sequence.
- b) Check drive jumper settings on all floppy drives with those specified in the installation instructions (especially if there is more than one floppy disk drive installed).
- 9) Replace base unit cover.



Photo: Removing cover

- 10) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-

specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUTOEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## How to install an Adaptec AHA-1540/1542 SCSI host adapter.

### Solution:

Remove the base unit cover, set jumpers/DIP switches and termination on the Adaptec SCSI host adapter and insert it in an empty slot, connect the ribbon cables from SCSI devices, power up, run setup (if device change) and test access each device, replace the cover and update the rescue diskette.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

This section explains how to install several [Adaptec SCSI host adapter models](#).

*NOTE: If removing an old SCSI host adapter is not required, skip to Step 3 for installation steps.*

#### 1) [Remove base unit cover.](#)



[Photo: Removing cover](#)

#### 2) Remove the old SCSI host adapter:

- a) Carefully disconnect drive ribbon cables from SCSI host adapter and set them aside.
- b) Remove the screw from the top notch of the mounting bracket on the card.
- c) Touch the metal sides of the base unit to ground any static and, grasping the SCSI host adapter by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
- d) Place the card in a static-resistant envelope.
- e) If not inserting a replacement card in this slot, replace the rear metal slot plate and secure it in place with a screw.

#### 3) Install new SCSI host adapter:

- a) Remove the SCSI host adapter from its box and the protective anti-static envelope.
- b) Locate the jumpers or DIP switches on the card, and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
- c) Read the SCSI host adapter manual and identify which, if any, settings must be changed on the card for this particular computer and its disk drives.

See [Adaptec SCSI host settings](#) for a list of factory settings and other possible options. *(NOTE: These standard settings reduce the likelihood of conflict.)*

- d) The AHA-1540 and AHA-1542 adapters must have both the first and last device in the SCSI chain terminated. Devices in the middle should have terminators disabled or removed. Therefore:

- 1] If there are (1) only internal devices or (2) only external devices, terminate the host adapter.
  - 2] If there are both internal and external devices, DO NOT terminate the host adapter.
- e) To terminate the 'B' model adapters(AHA-1540B and AHA-1542B), disable termination by removing the installed bus terminators.
  - f) Terminate the 'C' model adapters (AHA1540C and AHA-1542C) by hardware switch or host adapter configuration software.
  - g) Recommend leaving the data transfer rate set at 5MB/second.
  - h) NOTES on SCSI devices. SCSI devices must be assigned a unique ID number (0-8). The SCSI devices at the end of the chain must be terminated. All devices connected between the SCSI controller card and the last device must be assigned a unique ID, and not be terminated.
    - 1] Usually, set the first SCSI hard disk to ID #0 and the second SCSI hard disk to ID #1.
    - 2] Make sure the last SCSI device installed is terminated. (Common practice is to assign drive 0 to SCSI ID #0, terminate it and place it at the furthest end of the SCSI chain.) If this hard disk is the only SCSI device, its termination jumper should be set.
    - 3] Keep a log (perhaps on sticker inside base unit) of SCSI device IDs, drivers and BIOS locations to prevent conflicts. Recommend installing one SCSI device at a time.
  - i) [Move Jumpers](#) and/or [Change DIP Switches](#), if necessary.



[Photo: Moving jumpers](#)



[Photo: DIP Switches](#)

- j) Identify a free expansion slot of proper size, and remove the rear metal slot cover.
- k) Adjust memory assignment. The AHA-1540 and AHA-1542 adapters often use the same upper memory address as other devices (e.g., network cards). Manually reconfigure the adapter memory address by [Moving Jumpers](#) and/or [Changing DIP Switches](#), if necessary.



[Photo: Moving jumpers](#)



[Photo: DIP Switches](#)

- l) Touch the metal sides of the base unit to ground any static electricity and, grasping the SCSI host adapter by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - m) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
  - n) Connect the disk drive and other SCSI device ribbon cables to the new SCSI host adapter. Check the manual to verify connector orientation and gently insert the cable connector into the card connection.

*(NOTE: Usually the red or blue side of ribbon cable connects to pin 1. Pin 1 usually faces toward front of base unit, away from mounting bracket) Make sure the other end of the ribbon cable is securely connected to the disk drive or other device. (NOTE: SCSI drives have 50-pin ribbon cable.)*

*NOTE: The AHA-1540C and AHA-542C adapters are sensitive to the cable type. Cables must conform to the SCSI-II standard (impedance of 110-132 ohms). Cable-related problems are likely with an external cable, because external cables usually have an impedance of 60-80 ohms. Short external cables may help eliminate signal loss problems.*

- 4) Test new configuration:
  - a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video), and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) If also installing a new disk drive, boot from system diskette and run [Setup](#) to update drive type.
  - e) Test-access each disk drive and device in system to Make sure proper configuration.

- 5) If unable to access drive(s), turn computer off and disconnect power cables. Try one or more of the following:

*NOTE: The AHA1540B and AHA-1542B may require a BIOS and firmware upgrade. Contact Adaptec BBS: (408) 945-7727.*

- a) Recheck all SCSI ID assignments to make sure there are no conflicts. Also, make sure the last device on each end is terminated.
  - b) Reseat SCSI host adapter.
  - c) Recheck all ribbon and power cable connections to both the SCSI host adapter and disk drives.
  - d) Reconnect the power, reboot and retest drive access.
- 6) If still unable to access one or more drives, but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 7) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
  - a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



#### MSD IRQ Status example

**CAUTION:** *Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 8) [Replace base unit cover.](#)
- 9) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD





## How to install or replace a SCSI host adapter.

### Solution:

Remove the base unit cover, set jumpers/DIP switches and termination on the SCSI host adapter and insert it in an empty slot, connect the ribbon cables from the SCSI devices, power up, run setup (if device change) and test each device, replace the cover and update the rescue diskette.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

*NOTE: If removing an old SCSI host adapter is not required, skip to Step 3 for installation steps.*

1) Remove base unit cover.



Photo: Removing cover

2) Remove the old SCSI host adapter:

- a) Carefully disconnect drive ribbon cables from SCSI host adapter and set them aside.
- b) Remove the screw from the top notch of the mounting bracket on the card.
- c) Touch the metal sides of the base unit to ground any static and, grasping the SCSI host adapter by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
- d) Place the card in a static-resistant envelope.
- e) If not inserting a replacement card in this slot, replace the rear metal slot plate and secure it in place with a screw.

3) Install new SCSI host adapter:

- a) Remove the SCSI host adapter from its box and the protective anti-static envelope.
- b) Locate the jumpers or DIP switches on the card, and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
- c) Read the SCSI host adapter manual and identify which, if any, settings must be changed on the card for this particular computer and its disk drives. *(NOTE: Standard settings given reduce the likelihood of conflict.)*

- 1] With only internal devices, install SCSI host adapter with termination enabled (devices at either end of the SCSI chain (i.e., host adapter) must be terminated).

*NOTE: Newer SCSI host adapters automatically switch to enable termination when required during the cold boot.*

- 2] If there are both internal and external SCSI devices, disable termination, because the SCSI

adapter will be in the middle.

- d) NOTES on SCSI devices. SCSI devices must be assigned a unique ID number (0-8). The SCSI devices at the end of the chain must be terminated. All devices connected between the SCSI controller card and the last device, must be assigned a unique ID and not be terminated.
  - 1] Usually, set the first SCSI hard disk to ID #0 and the second SCSI hard disk to ID #1.
  - 2] Make sure the last SCSI device installed is terminated. (Common practice is to assign drive 0 to SCSI ID #0, terminate it and place it at the furthest end of the SCSI chain.) If this hard disk is the only SCSI device, its termination jumper should be set.
  - 3] Keep a log (perhaps on sticker inside base unit) of SCSI device IDs, drivers and BIOS locations to prevent conflicts. Recommend installing one SCSI device at a time.
- e) [Move Jumpers](#) and/or [Change DIP Switches](#), if necessary.



[Photo: Moving jumpers](#)



[Photo: DIP Switches](#)

- f) Identify a free expansion slot of the proper size, and remove the rear metal slot cover.
  - g) Touch the metal sides of the base unit to ground any static and, grasping the SCSI host adapter by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - h) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
  - i) Connect the disk drive and other SCSI device ribbon cables to the new SCSI host adapter. Check the manual to verify connector orientation and gently insert the cable connector into the card connection. *(NOTE: Usually the red or blue side of ribbon cable connects to pin 1. Pin 1 usually faces toward front of base unit, away from mounting bracket)* Make sure the other end of the ribbon cable is securely connected to the disk drive or other device. *(NOTE: SCSI drives have 50-pin ribbon cable.)*
- 4) Test new configuration:
    - a) Make sure no parts or tools remain in metal sides of the base unit.
    - b) Replace necessary cables (power, keyboard, video), and plug in power cable.
    - c) Power up computer and related peripherals one at a time.
    - d) If also installing a new disk drive, boot from system diskette and run [Setup](#) to update drive type.
    - e) Test-access each disk drive and device in system to Make sure proper configuration.
  - 5) If unable to access drive(s), turn computer off and disconnect power cables.
    - a) Recheck all SCSI ID assignments to Make sure there are no conflicts. Also make sure the last device on each end is terminated.
    - b) Reseat SCSI host adapter.
    - c) Recheck all ribbon and power cable connections to both the SCSI host adapter and disk drives.
    - d) Reconnect the power, reboot and retest drive access.
  - 6) If still unable to access one or more drives, but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.



- 7) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



MSD IRQ Status example

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See IRQ Conflicts for advice on resolving conflicts.
- 8) Replace base unit cover.
- 9) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## How to install CMOS battery.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Record CMOS setup, remove the base unit cover, remove the old battery, install the new battery, power up the computer, run Setup and complete all required information. Reboot the computer, test the configuration, power down and replace the base unit cover.

- 1) Run Setup and capture setup information (print or write it down) if its there (if battery is not completely gone).
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Locate battery unit. Location, type, quantity and size vary by computer model. Try one of the following.



Photo: Computer battery location 1



Photo: Computer battery location 2

- a) Look for a AA-size battery pack taped to the side of the power supply with wires leading to contacts on the mainboard.
  - b) Look for a cube-shaped battery taped to the side of the power supply with wires leading to contacts on the mainboard.
  - c) Look for a battery cylinder mounted directly on the mainboard.
  - d) If not located yet, look for a chip labeled 'Dallas' with a battery located inside.
- 4) Note the orientation (positive and negative terminals) of the batteries in their socket.
  - 5) Carefully remove the old batteries, check model number, type and size and set them aside for proper disposal.
  - 6) Do one of the following:
    - a) Insert the new batteries in the socket, orienting them (positive and negative terminals) in the same fashion as the old ones removed.

- b) Obtain a new battery pack (holder for batteries), perhaps of a different design, that provides the same voltage as the old one and install it. Insert new batteries according to instructions and connect the wire leads to the appropriate socket on the mainboard.
- 7) Make sure battery wire leads are still securely connected to mainboard.
- 8) Reconnect power and other cables to base unit and power up computer.
- 9) Run Setup (all information will be blank or set to defaults). Type all information (i.e., date, time, hard disk and floppy disk types, memory configuration) and save, exit and reboot computer. *(NOTE: If previous setup information was lost, consult system manual to determine hard disk type. Obtain remaining information (e.g., floppy disk types, memory) from personal observation.)*
- 10) Turn computer off, wait 15 seconds, and turn computer back on.
- 11) Test configuration (setup) information by accessing each disk drive and checking date and time. If they are correct, the new batteries are correctly installed and working properly.
- 12) If configuration is retained, then batteries are working properly. If not, the following steps in sequence:
  - a) If only 1 or 2 items are not working properly, then rerun Setup and check and correct the settings for those items.
  - b) Turn the computer off and disconnect the power cables. Reseat the batteries, checking them for proper orientation (positive end to positive terminal). Reconnect power cables, power up computer and retest.
  - c) Turn the computer off and disconnect the power cables. Remove the batteries and test them in a battery tester or replace them with a fresh set if one is not available. Reseat good batteries, ensuring they are oriented correctly and fully seated. Reconnect power cables, power up computer and retest.
- 13) Replace base unit cover.



Photo: Replacing cover

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## How to add math coprocessor.

### Solution:

Remove the base unit cover, locate and identify the coprocessor chip and/or socket. Discharge any static and remove the old chip. Discharge static, remove the new chip from its static-proof bag, inspect the pin alignment, orient the chip to the socket, and insert the chip. Press in place to secure. Power up the computer and test.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

*NOTE 1: Most recent CPU chips build the math coprocessor function into the CPU chip. This means that a separate math coprocessor for these CPU chips is unnecessary. This applies only to 286 and 386 CPU computers.*

*NOTE 2: If removing an old coprocessor chip is not required, skip to Step 4 for installation steps.*

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Locate and identify the coprocessor chip.
  - a) Shape and size: Both 286 and 386 coprocessor chips are square (perhaps with 1 corner cut off). Older chips cover the entire mounting pad. Newer chips use a Zero Insertion Force (ZIF) socket. The coprocessor chip (or socket) is about 1.5 inches square and, along with the CPU, perhaps one of the largest chips (sockets) mounted on the mainboard. The exact location depends on the size of the computer case and the shape of the mainboard.
  - b) Labels: Coprocessors are usually labeled in large letters with the manufacturer's name (e.g., Intel), and the chip model.
  - c) If unable to locate the coprocessor or socket, consult the user manual for orientation and coprocessor location.
- 3) Remove the old coprocessor chip from the standard straight-push socket:
  - a) Touch the metal sides of the base unit to ground any static.
  - b) Use a chip puller or small screwdriver to slowly and carefully work the chip loose by prying first at each corner and then along each edge to loosen it. Continue this process until chip is almost loose.

**WARNING:** *Do not bend the delicate gold pins with the tool or by lifting one side to high.*
  - c) When the chip is almost loose, grasp it along two sides using the chip puller tool and lift it straight up and out.
  - d) Put the coprocessor chip into a protective anti-static envelope.

- 4) Insert the new coprocessor chip into the standard straight-push socket:
  - a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the coprocessor chip from its protective anti-static envelope.
  - c) Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing; this renders the chip unusable.
  - d) Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- e) Center the chip over the socket (there may be more holes than pins).
- f) Set the pin into place and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

***CAUTION:** If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- g) Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

***WARNING:** If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, then repeat operation.*

- 5) Test new configuration:
  - a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up display unit and base unit.
  - d) Update the configuration of any software that makes use of the coprocessor chip. (See respective user manuals for instructions.)
  - e) Test several applications that make use of the coprocessor to make sure that coprocessor chip is functioning properly.

8) Replace base unit cover.

- 9) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD





## How to replace or upgrade the CPU chip.

### Solution:

Remove the cover, locate and identify the CPU chip and the mounting socket type. Discharge static and remove the old chip. Discharge static, remove the new chip from its static-proof bag, inspect the pin alignment, orient the chip to the socket, and insert the chip. Close the lever or press in place to secure. Power up the computer.

**CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

*NOTE: If removing an old CPU chip is not required, skip to Step 5 for installation steps.*

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Locate and identify the CPU chip.



Photo: Locating CPU chip

- a) Shape and size: Both 486 and 386 CPU chips are square (perhaps with 1 corner cut off). Older chips cover the entire mounting pad. Newer chips use a Zero Insertion Force (ZIF) socket. The CPU chip is about 1.5 inches square, and probably the largest chip mounted on the mainboard. The exact location depends on the size of the computer case and the shape of the mainboard.
- b) Labels: CPUs up to the 486DX2/66 are labeled in large letters with the manufacturer's name (e.g., Intel), and the chip model. Clock doubled chips (e.g., 486DX2/66 and Pentium) are covered with a heat sink-that is sometimes labeled. Others are not labeled.
- c) Newer CPU chips may be completely or partially covered by a heat sink or a small fan unit.



Photo: CPU with heat sink/fan

- d) If unable to locate the CPU, consult the user manual for orientation and CPU location.

*NOTE: IBM PS/Valuepoint computers require the disk drive housing to be removed to access the CPU chip.*

- 3) Identify the type of CPU socket used on mainboard.

- a) Standard straight-push socket. The chip is removed using a special tool, and a new one is seated by

pressure.

- b) Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 4) Remove the old CPU chip. Do one of the following:

- a) Standard straight-push socket.

- 1] Touch the metal sides of the base unit to ground any static.
- 2] Use a chip puller to slowly and carefully work the chip loose, by prying first at each corner and then along each edge to loosen it. Continue this process until chip is almost loose.

***WARNING: Do not bend the delicate gold pins with the tool or by lifting one side to high.***

- 3] When the chip is almost loose, grasp it along two sides using the chip puller tool and lift it straight up and out.
- 4] Put the CPU chip into a protective anti-static envelope.

- b) Zero Insertion Force (ZIF) sockets.

- 1] Touch the metal sides of the base unit to ground any static.
- 2] Locate a lever or a square-shaped handle around 3 sides of the CPU chip. Lift handle and move it back as far as it will go.



Photo: Open lever on ZIF socket

- 3] Grasp the edges of the CPU chip between finger and thumb and lift it straight up, clearing the socket.
- 4] Put the CPU chip into a protective anti-static envelope.

- 5) Insert the new CPU chip. Do one of the following:

- a) Standard straight-push socket.

- 1] Touch the metal sides of the base unit to ground any static.
- 2] Remove the CPU chip from its protective anti-static envelope. 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing; this renders the chip unusable.
- 4] Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pin into place and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

***CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.***

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.





Photo: Pressing processor into place

**WARNING:** *If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, then repeat operation.*

- b) Zero Insertion Force (ZIF) sockets.
  - 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the CPU chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing; this renders the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pin into place and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7] Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent or the socket lever is not completely open.*

- 8] Close and secure the lever.
- 6) Replace disk drive unit(s) and all cables, if any removed.
  - 7) Test new configuration:
    - a) Make sure no parts or tools remain in metal sides of the base unit.
    - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
    - c) Power up display unit and base unit.
    - d) Test several DOS commands and application software to make sure that CPU chip is functioning properly.
  - 8) Replace base unit cover.



Photo: Replacing cover

- 9) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:
  - DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.
  - OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS(OS/2 version), STARTUP.CMD







## How to install a second hard disk drive.

### Solution:

Backup all files, remove the cover, disconnect all drive cables and remove the old drive. Set the jumpers and drive selection switches on the new hard drive, install the drive in a bay and reconnect the cables. Turn on the computer, run setup, low-level format MFM and ESDI disk, partition disk, format each logical drive and test.

**CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

*NOTE: If removing an old coprocessor chip is not required, skip to Step 4 for installation steps.*

- 1) Backup all desired application programs and data files using a network, tape backup unit or diskettes.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove old hard disk:
  - a) Remove the data ribbon cable from the drive by grasping the cable and connector and pulling it out of the drive socket. Fold it back out of the way.



Photo: Remove hard disk ribbon cable

- b) Remove the power cable from the drive by pulling on the white plug (**WARNING: Do not pull on the 4 colored wires).** Fold it back out of the way.



Photo: Remove hard disk power cable

- c) Remove the drive bay by removing the two screws holding it to the front of the base unit and carefully lifting it out. (*NOTE: If hard disk is slotted in a drive bay with one or more other devices (e.g., floppy disk drive(s) or CD-ROM) disconnect the ribbon and power cables from them first. Then remove drive bay.*)
  - d) Remove the two (or more) retaining screws from the left and right sides of the drive bay.



Photo: Side screws

- e) Remove the old hard disk drive from the drive bay and set it aside in a safe place.

- 4) Install the new hard disk:
- a) Set jumpers and drive selection switches.



Photo: Set hard disk drive select jumper

- 1] MFM and ESDI drives do not require termination but the drive number must be set (e.g., 0 and 1 OR 1 and 2). Advanced drives may have other options that must be set for proper operation. Follow drive installation instructions.
- 2] IDE drives require moving Jumpers and/or changing DIP Switches as follows:
  - a] If there is only one IDE drive, set it to 'Master'.
  - b] If there are two IDE drives, set the one to be used as the boot disk to 'Master' and the other to 'Slave'. There may also be a jumper on the first drive to indicate that there is a second drive. See drive installation instructions for details.

*(NOTE: Often IDE drives from different manufacturers do not cooperate well together. Try to use drives from the same manufacturer.)*
- 3] SCSI drives must be assigned a unique ID number (0-8). The SCSI device at the end of the chain is terminated. All connected between the SCSI controller card and the last device must be assigned a unique ID and not be terminated. Refer to documentation for moving Jumpers and/or changing DIP Switches.
  - a] Usually, set the first SCSI hard disk to ID #0 and the second SCSI hard disk to ID #1.
  - b] Make sure the last SCSI device installed is terminated. (Common practice is to assign drive 0 to SCSI ID #0, terminate it and place it at the furthest end of the SCSI chain.) If this hard disk is the only SCSI device, its termination jumper should be set.
  - c] Keep a log (perhaps on sticker inside base unit) of SCSI device IDs, drivers and BIOS locations to prevent conflicts. Recommend installing one SCSI device at a time.
- b) Check to see if the new drive fits the slot in the drive bay. Three options are available:
  - 1] New drive is the same size as the old one and it fits perfectly.
  - 2] Drive bay is for an older computer (e.g., AT) and drive rails are required.
  - 3] New drive is larger than the old drive (unlikely). If an adapter kit is installed, remove it. Otherwise locate another larger drive bay.
  - 4] New drive is smaller than the old drive. Install an adapter kit (e.g., to enable a 3.5 inch drive to fit in a 5.25inch drive bay.
- c) Turn the drive bay on its side and slide the hard disk into the drive bay. (Make sure the end of the drive with the connectors is oriented toward the rear of the base unit.) Line up the holes for the mounting screws and insert them. Turn the drive bay on the other side and secure it with mounting screws.



Photo: Side screws

- WARNING: DO NOT use longer screws or over-tighten them. This may cause the screw to enter the internal circuit board or the drive case and damage the drive.**
- d) Slide the drive bay back into place and resecure it to the base unit.
- NOTE: If installing in a standard drive bay, attach ribbon and power cables first (especially if in*

*bottom bay).*

- e) Connect the power cable to the socket on the rear of the drive (it is molded to fit only one way).



Photo: Connect hard disk power cable

- f) Connect the ribbon data cable, coming from the controller card, to the large connector on the rear of the hard disk drive (red or blue side to Pin1). (Cheap or old cables often cause lots of problems. If new cables are supplied, use them.)



Photo: Connect hard disk ribbon cable

- 1] MFM, RLL and ESDI drives/controllers use a 34-wire ribbon cable.
- 2] ESDI drives/controllers use a 40-wire ribbon cable.
- 3] SCSI drives/controllers use a 50-wire ribbon cable.
- g) Make sure other cable connections to drives and controller card are secure.
- 5) Reinstall external cables and power up computer.
  - a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Insert boot diskette in Drive A.
  - d) Power up computer and display unit one at a time.
- 6) Run Setup to set the drive type in CMOS as follows:

*NOTE: In most cases, the drive has not been formatted yet, so it cannot be read at this point.*

**CAUTION:** Setup usually refers to installed disks using the names Disk 0 for the first and Disk 1 for the second, etc. Make sure the proper one is selected.

- a) If the new drive is the exact same brand, model and size, no changes are required.
- b) MFM drive: There should be a 'Drive Type' number associated with this model and size drive. Check the documentation that came with the system or drive.
- c) ESDI drive: Most ESDI drive controllers work by setting the drive type to 1. This indicates a drive is present; translation of specific characteristics is done automatically by the controller.
- d) IDE drive: An IDE drive may or may not have a BIOS-supported type in the drive listing. Select the drive type that matches the characteristics (heads, cylinders, sectors, size) of the new drive, or select 'User Defined' drive type and enter the correct heads, cylinders, size, etc.

**CAUTION:** DO NOT set a user defined hard disk type so that the computer believes the hard disk is LARGER than it actually is (e.g., 515MB for a 420MB drive). This may damage the hard disk!

- e) SCSI drive: Choose the 'Not install' or 'No Drive Present' option. (The SCSI host adapter automatically handles translation.) *NOTE: To boot from this SCSI drive, the host adapter must be set to pretend to be a 'standard AT-style controller'.*

If installing a drive larger than 1GB or more than two drives, a special driver may be required. Check the controller manual to determine whether Moving Jumpers is required or if this is handled by chip firmware.

- 5) Low-level format drive (if applicable). (This prepares the drive to receive an operating system (high-level) format.

- a) MFM (or ST506) and ESDI drives require low-level formatting using a program provided with either the drive or controller. Remove the boot diskette from Drive A and insert the manufacturer's setup diskette. Follow program instructions.

**CAUTION:** Make sure the correct drive is selected (the first drive is usually Drive 0 and the second Drive 1). Selecting the wrong drive will permanently destroy all data on drive.

*NOTE:* New hard disk drives are NOT perfect; they often contain a few defects in the surface. These bad sectors are excluded from use so that no data is stored there.

- b) IDE drives do not require a low-level format. They are low-level formatted at the factory.

**WARNING:** DO NOT low-level format a IDE drive. It will render the drive useless.

- c) SCSI drives do not require a low-level format. They are low-level formatted at the factory.

6) Partition drive using FDISK. (*NOTE: Each hard disk consists of partitions that are either primary partitions or logical drives within an extended partition.*)

- a) Decide what type of operating system configuration will be used and how many partitions will be installed on this hard disk. *NOTE: Considerations include number of operating systems, disk access speed (smaller multiple partitions increase disk access speed), ease of backups (afforded by separating programs from data) and room restrictions created by having multiple partitions. DOS 6.2 allows partitions up to 2GB.*

1] DOS only. Use the DOS FDISK and FORMAT command.

2] DOS and OS/2 Dual Boot. First use the DOS FDISK and FORMAT command. 3] OS/2 only. Use the OS/2 FDISK and FORMAT commands.

- b) Type FDISK at the DOS prompt or FDISK at the OS/2 prompt. (The OS/2 version is identical to the DOS version except for the interface.)

*NOTE: When there are 2 or more hard disk drives installed, FDISK refers to them as Disk 1, Disk 2, etc. (not Disk 0 and Disk 1 as in CMOS Setup.) Select '5. Change current fixed disk drive' to view a drive list and choose the appropriate drive by entering its digit.*

- c) Create desired partitions using DOS or OS/2 FDISK:

1] Choose '5. Change current fixed disk drive' and press ENTER (a list of recognized disk drives is displayed).

2] Type the number of the fixed disk drive just installed (usually 2 or 3, NOT 1) and press ENTER (returns to main menu).

3] Choose '1. Create DOS partition or Logical DOS Drive' and press ENTER.

4] Choose '2. Create Extended DOS Partition' and press ENTER.

5] Do one of the following:

a] Type 'Y' for yes when prompted to '... use maximum available size of a Primary DOS Partition and make the partition active? (Y/N)' if that is what is desired. FDISK will reboot the computer. Skip to high-level formatting this partition in Step 7 below.

b] Type 'N' for no and then enter the size of the desired Extended DOS Partition in MB or percent of the disk space (%). (Example: If total disk size is 150MB and a 30MB partition is desired, enter either 30 or 20%.)

1} Press ESC to return to previous menu.

2} Choose '2. Create Extended DOS Partition' to assign the remaining space to an Extended DOS partition and do one of the following:

a} Type 'Y' for yes when prompted to '... use maximum remaining size for an Extended DOS Partition and make the partition active? (Y/N)' if that is the desire. FDISK will reboot the computer. Assuming no other hard disks are present, skip to high-

level formatting this partition in Step 7 below.

- b) Type 'N' for no and then enter the desired size of the Extended DOS Partition in MB or percent of the disk space (%). (Example: If total disk size is 150MB with 100MB remaining a two 50MB partitions are desired, enter either 50 or 33%.) Repeat this process for the remaining space.
  - 3} (Optional) Choose '3. Create Logical Drive(s) in the Extended DOS Partition' to create additional logical drives in this partition.
  - 4} Press ESC twice to return to main menu.
  - 5} Choose 2. Set active partition' and designate one of the partitions in the list as active. (This will designate the boot partition.) Type the number of the partition to make active in the box (e.g., 1 or 2) and press ENTER.
  - 6} Press ESC to return to main menu.
  - 7} Press ESC to return to DOS.
  - 8} Press CTRL+ALT+DEL to reboot the computer (for changes to take effect).
- 7) High-level format drive using the operating system.
- a) Format each logical drive in sequence by entering the following command at the DOS or OS/2 prompt:  
FORMAT x:  
  
(Where x is the logical name of each drive on this disk (e.g., D, E, F, etc.).
  - b) After all logical drives are formatted, remove the boot diskette from Drive A and press CTRL+ALT+DEL to reboot the computer (it should boot fine from the hard disk).
- 8) Test operation of the new hard disk drive and each of its partitions by running one or more commands that access it to Make sure proper configuration. Examples: Perform a directory, copy and read several files and then delete them. Also test functionality of each floppy disk drive to make sure their operation was not disturbed.
- 9) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Make sure controller card is fully seated.
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives. Make sure the cables are routed correctly and each connection is secure.
  - c) Reconnect the power, reboot and retest drive access.
- 10) If still unable to access one or more drives but computer seems to boot OK from boot diskette in Drive A, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 11) If problems persist, try one or more of the following steps:
- a) Reread installation instructions and make sure data cables are routed properly and drives are connected in proper sequence.
  - b) Check jumper and DIP switch settings on all drives with those specified in the installation instructions (especially if there is more than one hard disk drive installed).
  - c) If 2 IDE drives do not work right, try switching the master/slave relationship. If they are from different manufacturers, consider exchanging one for a drive from the other manufacturer.
  - d) If this is a SCSI installation, recheck all SCSI ID assignments to make sure there are no conflicts. Also make sure the last device is terminated.
  - e) If the computer must be turned on several times before it works properly, the power supply may be too weak or going bad. This prevents the hard disk from coming up to speed in a timely manner.



- 12) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 13) Install operating system (i.e., DOS or OS/2) on boot partition (i.e., Drive C). Follow instructions accompanying operating system software.
- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## How to install a controller card.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Remove the base unit cover, set jumpers/DIP switches on the card, insert the card in an empty slot, connect the ribbon cables from the drives, power up, run setup (if drive change) and test each drive, replace the cover and update the rescue diskette.

*NOTE: If removing an old controller card is not required, skip to Step 3 for installation steps.*

- 1) Remove base unit cover.
- 2) Remove the old controller card:
  - a) Carefully disconnect drive ribbon cables from controller card and set them aside.
  - b) Remove the screw from the top notch of the mounting bracket on the card.
  - c) Touch the metal sides of the base unit to ground any static and, grasping the controller card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - d) Place the card in a static-resistant envelope.
  - e) If not inserting a replacement card in this slot, replace the rear metal slot plate and secure it in place with a screw.
- 3) Install new controller card:
  - a) Remove the controller card from its box and the protective anti-static envelope.
  - b) Locate the jumpers or DIP switches on the card, and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
  - c) Read the controller card manual and identify which, if any, settings must be changed on the card for this particular computer and its disk drives. *(NOTE: Standard settings given reduce the likelihood of conflict.)*
    - 1] Card address (Standard settings: CC00 or C800)
    - 2] Interrupt (IRQ) (Standard settings: IRQ14 or IRQ15)
    - 3] Enable/disable floppy disk controller and DMA settings. (Some cards must be set--read manual.)
    - 4] Enable/disable or configure hardware cache. (Some cards must be set--read manual.)
    - 5] New EISA and MCA systems set these items via software configuration files.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



### Photo-Moving jumpers



### Photo-DIP Switches

- e) Identify a free expansion slot of proper size, and remove the rear metal slot cover.
- f) Touch the metal sides of the base unit to ground any static and, grasping the controller card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily).
- g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
- h) Connect the disk drive ribbon cables to the new controller card. Check the manual to verify connector orientation, and gently insert the cable connector into the card connection. *(NOTE: Usually the red or blue side of ribbon cable connects to pin 1. Pin 1 usually faces toward front of base unit, away from mounting bracket)* Make sure the other end of the ribbon cable is securely connected to the disk drive or other device. *(NOTE: SCSI drives have a 50-pin ribbon cable, IDE drives have a 40-pin cable, and ESDI and MFM (or ST506) drives are connected with two cables.)*

- 4) Test new configuration:
  - a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video), and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) If also installing a new disk drive, boot from system diskette and run Setup to update drive type.
  - e) Test-access each disk drive in system to Make sure proper configuration.
- 5) If unable to access drive(s), turn computer off and disconnect power cables.
  - a) Reseat controller card.
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) Reconnect the power, reboot and retest drive access.
- 6) If still unable to access one or more drives, but computer seems to operate OK, run Setup and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 7) If message appears about interrupt (IRQ) conflicts during use, or another device (e.g., mouse) fails:
  - a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



### MSD IRQ Status example

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 8) [Replace base unit cover.](#)
- 9) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.  
OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## How to install or replace a video card.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Update the System Rescue Diskette, remove the base unit cover, remove the old card, set the address/IRQ, install the video card, connect the video cable, turn on the computer and install the new video driver. Run programs to test the configuration and replace the cover.

- 1) Update or create a System Rescue Diskette that includes currently installed drivers, AUTOEXEC.BAT, CONFIG.SYS, WIN.INI and SYSTEM.INI files. (This process may install a video driver that is incompatible with certain applications or other system hardware)
- 2) Remove base unit cover.



Photo: Removing cover

*NOTE: If removing an old video card is not required, skip to Step 4 for installation steps.*

- 3) Remove the old video card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Place the card in a static-resistant envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 4) Install new video card:
  - a) Remove the video card from its box and the protective anti-static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
  - c) Read the video card manual and identify which, if any, settings must be changed on the card to use the COM port and interrupt chosen in Step 1.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo-Moving jumpers



### Photo-DIP Switches

e) Identify a proper size expansion slot for the type of video card to be installed. Identify the required slot type by examining the row of connector pins along the bottom of the card. An older adapter may fit an 8-bit slot. Most ISA-based video cards require a 16-bit slot; while a VESA Local Bus or PCI card requires an even longer slot. Choose a proper slot by matching the length and gaps in this row of connector pins with slots on the mainboard. Remove the rear metal expansion plate cover.

- f) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
  - h) (Optional) If installing 2 video cards for a 2-display setup, attach the VGA pass-through cable to the pin or edge-style connector along the top of the video card.
- 5) Connect the video cable from the display unit to the socket on the back of the video card. Secure connector with attached screws.
- 6) Check the display unit for a Analog/TTL switch. Make sure it is set to 'Analog' (unless it is an old digital display). **CAUTION:** *Setting this switch in the wrong position could damage the display unit.*
- 7) (Optional) Some high-end video cards and displays ship with BNC connectors (twist on/off) labeled RGB (Red, Green, Blue). If supplied, use them, because they provide better color separation and screen appearance. Two types are available: If RGB, connect the red cable to the color input socket marked 'Red', and so on for the others. If composite (Ext. sync) connect the white or gray cable to 'Horizontal' and the black cable to 'Vertical'.
- 8) Install the video driver and test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, mouse, etc.) and plug power cable into surge protector or wall outlet.
  - c) Power up computer and related peripherals one at a time. (System should boot normally, assuming there are no memory or address conflicts.)
  - d) Insert the video driver diskette that came with the video card into Drive A and enter the following:  
A: (Press ENTER)  
INSTALL or SETUP (Refer to program instructions)
  - e) Follow installation/setup instructions.
  - f) If a specific memory address was set on card in Step 4, exclude this area from Windows management by entering the following line in the [386enh] section of SYSTEM.INI, and reboot computer:  
EMMExclude=aaaa-bbbb  
(Where 'aaaa-bbbb' is the video card address (e.g., C800-CFFF)). *(NOTE: This prevents Windows from using the video portion of memory, and prevents system freezes and crashes.)*
  - g) Test video card, driver installation and display configuration by running installed programs.
- 9) If display does not work right, a message about address or interrupt (IRQ) conflicts appears during use, or another device fails (e.g., the mouse):
- a) Turn computer system off, and check seating of video card and all cable connections.

- b) Reread settings instructions, and recheck DIP Switch and Jumper settings.
- c) Make sure proper video driver is selected.
- d) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
- e) Identify interrupt (IRQ) assignments using the IRQ Status screen.



MSD IRQ Status example

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- f) See IRQ Conflicts for advice on resolving conflicts.
  - g) Contact video card manufacturer for technical support.
  - h) If all else fails, reinstall the original video card, reboot from System Recovery Diskette (updated in Step 1) and restore the original configuration.
- 10) Replace base unit cover .
- 11) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.  
OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## **No accelerator card; Install a graphics accelerator card to improve performance.**

### **Solution:**

If the computer seems to be straining to keep up with displaying graphics-based information to the display screen (especially in Windows), a graphics accelerator card may significantly improve system performance.





## How to determine if video card and monitor are compatible.

### Solution:

If the old display is VGA, it will probably work with a new video card, although resolution and color quality may not be the greatest.

- 1) Obtain the manual for the old monitor and attempt to match its specifications with those of the new video card, as follows:
  - a) Type: CGA, EGA, VGA, SVGA, etc.
  - b) Resolution: Pixel dots in rows and columns (e.g., 640 x 480, 800 x 600, 1024 x 768).
  - c) Mode: The combination of resolution and colors (i.e., the number of colors available for display within a given resolution). (Examples: 640 x 480 with 256 colors, 800 x 600 with 16 colors)
  - d) Refresh rate: How fast both the video card and display can repaint the screen picture (attempt to match).
  - e) Display technology: Digital versus analog. New video cards require analog displays; older digital displays will not work.
- 2) If it appears that the display and the adapter card will work together, try it and see.

**CAUTION:** *Using refresh rates that do not match those expected by the monitor, can damage the monitor.*

  - a) Install the video card.
  - b) Connect the display unit cables.
  - c) Turn on the computer and display unit.
  - d) Install the closest matching video driver.
- 3) If it does not work, try a different video driver (e.g., perhaps the video card manufacturer has a new version available).
- 4) If it still does not work, upgrade the display unit.



## How to configure COM ports (parallel or serial).

### Solution:

**CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

Select a free port (serial or parallel) and associated interrupt, and configure the device accordingly. Connect the cables, power up the device and computer, and install the driver and associated software. Run the software and test the operational configuration.

- 1) Determine ports and interrupt requests (IRQs) available in computer via software.
  - a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- c) Identify port assignments and write them down.



[MSD COM Portsscreen](#)

- d) Choose 'LPT Ports...' from MSD main screen.



[Choose MSD LPT Ports Screen](#)

- e) Identify port assignments and write them down.



[MSD LPT Ports Configuration Screen](#)

- f) Identify interrupt (IRQ) assignments using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ)

*assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- 2) Turn computer off and disconnect power cables.
- 3) Move base unit out so back is visible.
- 4) Identify what serial and parallel ports are present (and their designation, if possible).
  - a) Look at back of base unit for 9-pin or 25-pin connector slots.
    - 1] PS/2 style base units have ports directly attached to mainboard, and appear in a straight line along the bottom of base unit rear.
    - 2] Most other base units have ports mounted along back left side of the unit, or mounted on back of cards in one or more slots.



Ports on other units Photo

- b) Serial ports usually appear as a 9-pin male connection, often above/beside a 25-pin parallel port female socket (often connected to a printer). Serial ports are often labeled COM1 or COM2.
    - c) One or more serial ports may also appear as a 25-pin male connection, often in the card slot next to the serial/parallel card slot, or mounted on left side of base unit..
- 5) Compare the parallel and serial ports identified via software in diagnostics program, with those located on rear of base unit, to determine which one(s) may be available.
- 6) If adequate ports are not available, remove base unit cover and do one of the following:



Photo: Removing cover

- a) Inspect I/O card to determine if an external serial connector socket is attached via narrow ribbon cable, or if there is an empty connector for an external serial connector on I/O card. Do one of the following:
      - 1] If an external serial connector is attached, mount and use it. Be sure to set address and IRQ jumpers to properly activate this serial connection socket.
      - 2] If an empty connector is available on card, obtain an external serial connector, and mount and connect it to the card. Be sure to set address and IRQ jumpers to properly activate this serial connection socket.
    - b) Consider installing an I/O card with multiple ports or replacing an older I/O card with a new one with additional capacity (also, serial ports that use the later model 16550A UART chip are recommended).
- NOTE: See Install I/O card for detailed steps for both options.*
- 7) Determine proposed location and designation of device(s).
- 8) Position device(s) in suitable locations (within data cable reach and near to power source).
- 9) Run cabling between computer and each printer. *(NOTE: If running serial cable, use original device serial cable if possible. Serial cable wiring schemes differ from cable to cable. Parallel cables are all wired identically. If device is printer, make sure different-looking Centronics connector is positioned at printer location.)*
- 10) Make sure computer is turned off and power cables are disconnected.
- 11) Do one or both of the following:

- a) Connecting a device with a PARALLEL cable:
- 1] Connect parallel data cable to similar socket on rear of device. Secure with attachment pins or screws.
  - 2] Plug device power cable into surge protector or power receptacle.
- 3] Orient the data cable connector so the pin-shape matches the socket shape, and connect it to the parallel port socket on the back of base unit that was determined in Step 7), above. (**CAUTION: Do not force connection! Pin damage may result.**) *Secure connection with attached screws.*
- 4] Reconnect power cables and turn on computer power.
  - 5] Install software driver for device.
  - 6] Make sure proper parallel port is selected if device is printer (e.g., LPT1 or LPT2, etc.).
  - 7] If new device does not work, or another device no longer works (e.g., the mouse), try one or more of the following:
    - a] Make sure all cables are securely connected to desired ports.
    - b] Make sure that device is turned on and properly set up.
    - c] Make sure software is directing output to the desired parallel port.
    - d] Edit AUTOEXEC.BAT, and make sure output is not being redirected to another port.  
EXAMPLE: MODE COM1:=LPT1: (This example command redirects all output for the parallel port LPT1 to the serial port COM1.)
    - e] Check for interrupt (IRQ) conflict:
      - 1} Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
      - 2} Choose 'LPT Ports...' from MSD main screen.



[Choose MSD LPT Ports Screen](#)

- 3} Identify port assignments and write them down.



[MSD LPT Ports Configuration Screen](#)

- 4} Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 5} Select an item to change to eliminate the conflict. See [IRQ Conflicts](#) for advice on resolving conflicts.

- 6} Turn computer off and disconnect power cables.
- 7} Disconnect all data cables to I/O card.
- 8} Remove I/O card and [Move Jumpers](#) to desired settings. Refer to I/O card manual for instructions.
- 9} Reinstall I/O card.
  - 10} Reconnect all data cables to I/O card.
  - 11} Reconnect power cables to base unit and turn computer on.
  - 12} Rerun hardware status program to determine if the conflict is eliminated.
  - 13} Repeat test activity.
  - 14} Repeat Step viii until problem solved.

**b) Connecting a device with a SERIAL cable:**

- 1] Orient the 9-pin serial cable connector on end of cable to similar serial socket on rear of device. Secure with attachment screws.
- 2] Plug device power cable (or adapter cable) into surge protector or power receptacle.
- 3] Orient the other data cable serial connector so the pin-shape matches the socket shape, and connect it to the selected serial port socket on back of base unit, determined in Step 7 above. Secure connection with attached screws.
- 4] Reconnect power cables to computer and turn power on.
- 5] Make sure device driver is installed for this device.
- 6] Make sure proper serial port is selected (e.g., COM1 or COM2, etc.).
- 7] Set the same serial communications package configuration and hand-shaking parameters on BOTH printer and computer (DOS or OS/2) serial port. These include baud rate, parity, data bits, stop bits and buffer settings. The most common settings are: 9600 baud, no parity, 8 data bits, 1 stop bit and continue sending data when buffer full (p) (e.g., 9600,n,8,1,p). Refer to printer manual for instructions on setting this configuration by [changing DIP Switches](#) and/or [moving Jumpers](#).

**12) If device does not function, try one or more of the following:**

- a) Make sure all cables are securely connected to desired ports.
- b) Make sure device is turned on, online and properly configured.
- c) Make sure software is directing output to the desired serial port.
- d) [Edit AUTOEXEC.BAT](#) and make sure output is not being redirected to another port.

EXAMPLE: MODE COM1:=LPT1: (This example command redirects all output for the parallel port LPT1 to the serial port COM1.)

**e) Check for interrupt (IRQ) conflict:**

- 1] Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- 2] Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- 3] Identify port assignments and write them down.



[MSD COM Ports example](#)

- 4] Identify interrupt (IRQ) conflicts using the IRQ Status screen, and write them down.



[MSD IRQ Status example](#)

**CAUTION:** *Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- 5] Select an item to change to eliminate the conflict. See [IRQ Conflicts](#) for advice on resolving conflicts.
- 6] Turn computer off and disconnect power cables.
- 7] Disconnect all data cables to I/O card.
- 8] Remove I/O card and change IRQ by [Moving Jumpers](#) to desired settings. If an IRQ is changed, also change the address to correspond to the new IRQ. Refer to I/O card manual for instructions.
- 9] Reinstall I O card.
  - 10] Reconnect all data cables to I/O card.
  - 11] Reconnect power cables to base unit and turn computer on.
  - 12] Rerun hardware status program to determine if the conflict is eliminated.
  - 13] Repeat test activity.
  - 14] Repeat Step 12) until problem is solved.



## How to install a sound card.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Choose a free address/interrupt, remove the cover, set the address/IRQ, install the sound card, connect the speaker cables to the sound card, turn on the computer and run the sound card install program. Run sound effects to test the configuration and replace the cover.

- 1) Determine card addresses and interrupt requests (IRQs) available in computer via software.
  - a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify card addresses and interrupt (IRQ) assignments using the IRQ Status screen and write them down.



### MSD IRQ Status example

**CAUTION:** *Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) Choose a free address and a free interrupt and write them down. See Serial & Parallel Port Configuration Standards for advice.
- 2) Remove base unit cover.



### Photo: Removing cover

- 3) Install new sound card:
  - a) Remove the sound card from its box and the protective anti-static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
  - c) Read the sound card manual and identify which, if any, settings must be changed on the card to use the COM port and interrupt chosen in Step 1.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



#### Photo-Moving jumpers



#### Photo-DIP Switches

- e) Identify a free expansion slot of proper size (i.e., 8-bit, 16-bit, etc.) and remove the rear metal slot cover.
- f) Touch the metal sides of the base unit to ground any static and, grasping the sound card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
- g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
- 4) Remove external speakers and cables from packing material. Connect the speaker wires to speakers and plug cable into the jack marked 'Out' on rear of sound board on back of base unit. See sound card/speaker instructions for details.
- 5) Either connect speaker to power adapter and plug into wall receptacle or insert batteries in each speaker. Make sure On/Off and Volume switches are properly positioned. See speaker installation instructions for details.
- 6) (Optional) If external microphone or MIDI input device is available, connect their cables into rear of sound card in the jacks marked 'Mic' and 'MIDI in' respectively.
- 7) Install the software application(s) that will use the sound card and test new configuration:
  - a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video), and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Insert diskette containing application program into Drive A, and enter the following:  
A: (Press ENTER)  
INSTALL or SETUP (Refer to program instructions)
  - e) Follow installation/setup instructions.
  - f) Test sound card and speaker configuration and software installation by running programs that produce sound effects.
- 8) If no sounds are heard, or a message about interrupt (IRQ) conflicts is displayed during use, or another device (e.g., the mouse) fails:
  - a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



#### MSD IRQ Status example

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard



*interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
  - d) Turn computer off, disconnect power and telephone cables, remove sound card and change address and/or IRQ settings. Reinstall card and test again.
- 9) [Replace base unit cover](#).
- 10) Create/update System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:
- DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.
- OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## How to install fax/modem or fax card.

### Solution:

**CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

Choose a free COM port/interrupt, remove the base cover, set the COM port/IRQ, install the fax/modem, connect the phone lines to the fax/modem, turn on the computer and run a communications package install program. Dial out and fax to test, and replace the cover.

- 1) Determine COM ports and interrupt requests (IRQs) available in computer via software.
  - a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)



- c) Identify port assignments and write them down. [MSD](#)

[COM Ports example](#)

- d) Identify interrupt (IRQ) assignments using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- e) Choose a free COM port and its corresponding interrupt, and write them down. See [Serial & Parallel Port Configuration Standards](#) for advice.
- 2) [Remove base unit cover.](#)



[Photo: Removing cover](#)

- 3) Install new fax/modem card:

- a) Remove the fax/modem card from its box and from the protective anti-static envelope.
- b) Locate the jumpers or DIP switches on the card, and lay the card down on the static envelope with the jumpers/DIP switches in view.
- c) Read the expansion card manual and identify which, if any, settings must be changed on the card to use the COM port and interrupt chosen in Step 1.
- d) [Move Jumpers](#) and/or [Change DIP Switches](#), if necessary.



[Photo-Moving jumpers](#)



[Photo-DIP Switches](#)

- e) Identify a free expansion slot of proper size, and remove the rear metal slot cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
- 4) Plug a standard single-line telephone cable into the phone jack labeled 'line' or 'line in' on the back of the fax/modem card, and plug the other end into a telephone wall jack. See



[Connecting lines to fax/modem Photo.](#)

(If jacks are not labeled, consult fax/modem user manual.)

- 5) (Optional) If fax/modem has 2 jacks and a desk phone on same line is also desired, plug the telephone cable connected to telephone into 2nd jack on fax/modem card labeled 'phone' or 'line out'. (This allows normal telephone use when fax/modem is not being used.
- 6) Install communications application and test fax/modem operation:
  - a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video), and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Insert diskette containing communications/fax program into Drive A and enter the following:  
A: (Press ENTER)  
INSTALL or SETUP (Refer to program instructions)
  - e) Follow installation/setup instructions, responding with correct serial (COM) port and interrupt used during installation (See step 1).
  - f) Test application software installation and fax/modem, by entering a local working dial-up telephone number and the corresponding communications configuration settings. Try an online dial-up, and both sending and receiving a fax.
- 7) If fax/modem software generates error message about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):

- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- b) Choose 'Com Ports...' from MSD main screen.



[MSD Choose Com Ports screen](#)

- c) Identify port assignments.



[MSD COM Ports example](#)

- d) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- e) See [IRQ Conflicts](#) for advice on resolving conflicts.
- f) Turn computer off, disconnect power and telephone cables, remove fax/modem card and change port and/or IRQ settings. Reinstall card and test again.
- 8) [Replace base unit cover](#).
- 9) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## How to install an internal modem.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Choose a free COM port/interrupt, remove the base unit cover, set the COM port/IRQ, install the modem card, connect the telephone lines to modem, turn on the computer, run the install program in the communications package. Dial out to test, and replace the cover.

- 1) Determine COM ports and interrupt requests (IRQs) available in computer via software.
  - a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- c) Identify port assignments and write them down.



[MSD COM Ports example](#)

- d) Identify interrupt (IRQ) assignments using the IRQ Status screen and write them down.



[MSD IRQ Status example](#)

**CAUTION:** *Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- e) Choose a free COM port and its corresponding interrupt, and write them down. See [Serial & Parallel Port Configuration Standards](#) for advice.
- 2) [Remove base unit cover.](#)



[Photo: Removing cover](#)

- 3) Install new modem card:

- a) Remove the modem card from its box and from the protective anti-static envelope.
- b) Locate the jumpers or DIP switches on the card, and lay the card down on the static envelope with the jumpers/DIP switches in view.
- c) Read the expansion card manual and identify which, if any, settings must be changed on the card to use the COM port and interrupt chosen in Step 1).
- d) [Move Jumpers](#) and/or [Change DIP Switches](#), if necessary.



[Photo-Moving jumpers](#)



[DIP Switches-Photo](#)

- e) Identify a free expansion slot of proper size and remove the rear metal slot cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
- 4) Plug a standard single-line telephone cable into the phone jack labeled 'line' or 'line in' on the back of the modem card, and plug the other end into a telephone wall jack. (If jacks are not labeled, consult modem user manual.)



[Connecting lines to modem Photo](#)

5) (Optional) If modem has 2 jacks and a desk phone on same line is also desired, plug the telephone cable connected to telephone into 2nd jack on modem card labeled 'phone' or 'line out'. (This allows normal telephone use when modem is not being used.)

6) Install communications application and test modem operation:

- a) Make sure no parts or tools remain in metal sides of the base unit.
- b) Replace necessary cables (power, keyboard, video), and plug in power cable.
- c) Power up computer and related peripherals one at a time.
- d) Insert diskette containing communications program into Drive A and enter the following:

A: (Press ENTER)

INSTALL or SETUP (Refer to program instructions)

- e) Follow installation/setup instructions, responding with correct serial (COM) port and interrupt used during installation (See step 1).
- f) Test application software installation and modem, by entering a local working dial-up telephone number and the corresponding communications configuration settings.

7) If modem software generates error message about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):

- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- b) Choose 'Com Ports...' from MSD main screen.



[MSD Choose Com Ports screen](#)

- c) Identify port assignments.



[MSD COM Ports example](#)

- d) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- e) See [IRQ Conflicts](#) for advice on resolving conflicts.
- f) Turn computer off, disconnect power and telephone cables, remove modem card and change port and/or IRQ settings. Reinstall card and test again.
- 8) [Replace base unit cover](#).
- 9) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:
- DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.
- OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD



## How to edit CONFIG.SYS using any available editor.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit the CONFIG.SYS file using any available editor. Save the file and reboot the computer for changes to take effect.

EDIT/CHANGE CONFIG.SYS file, using one of the following procedure sets, depending on the current environment:

- 1) Edit CONFIG.SYS from MS-DOS:
  - a) Enter the following commands at the DOS prompt:  
COPY C:\CONFIG.SYS C:\CONFIG.OLD  
EDIT C:\CONFIG.SYS
  - b) Use the arrow keys to move to the line(s) to be changed.
  - c) Add new command lines or edit existing lines.
  - d) Review all changes, checking for correct spelling (e.g., commands, directories, filenames) and command syntax.
  - e) Enter the following keystrokes to save the file:
    - 1] Press ALT+F (file menu).
    - 2] Press X (exit).
    - 3] Press ENTER (save file and exit editor).
  - f) Press CTRL+ALT+DEL to reboot computer for changes to take effect.
- 2) Edit CONFIG.SYS from WINDOWS 95:
  - a) Choose the Windows 95 'Start' button to access the 'Start' menu.
  - b) Select 'Programs' and select 'Accessories'.
  - c) Select 'Notepad'.
  - d) Select the 'File' menu and select 'Open'.
  - e) Enter the following in 'Filename' box.  
C:\CONFIG.SYS
  - f) Select the 'File' menu and select 'Save as...'.
  - g) Enter the following in the 'Filename' box.



C:\CONFIG.OLD

- h)** Choose the 'Save' button.
- i)** Use the arrow keys to move to the line(s) to be changed.
- j)** Add new command lines or edit existing lines.
- k)** Review all changes, checking for correct spelling (e.g., commands, directories, filenames) and command syntax.
- l)** Select the 'File' menu and select 'Save as...'.  
**m)** Enter the following in the 'Filename' box.

C:\CONFIG.SYS

- n)** Choose the 'Save' button.
- o)** Select the 'File' menu and select 'Exit' to close 'Notepad'..
- p)** Reboot the computer for changes to take effect.

**TIPS:**

- 1)** To make temporary changes, place REM (remarks command) at the beginning of each command line to be changed. Then try booting with this configuration. Or, copy lines to be changed, put a REM at the beginning of the original lines, and change only the copies. This preserves the original configuration of each command line in case changes do not work properly.
- 2)** Make sure a semicolon follows each path component in the PATH= command line.
- 3)** Make sure the backslash (\) is used in path statements (not forward slash (/)).



## How to edit AUTOEXEC.BAT file using any available editor.

### Solution:

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Edit the AUTOEXEC.BAT file using any available editor. Save the file and reboot the computer for changes to take effect.

EDIT/CHANGE AUTOEXEC.BAT file, using one of the following procedure sets, depending on the current environment:

- 1) Edit the AUTOEXEC.BAT file from MS-DOS:
  - a) Enter the following commands at the DOS prompt:  
COPY C:\AUTOEXEC.BAT C:\AUTOEXEC.OLD  
EDIT C:\AUTOEXEC.BAT
  - b) Use the arrow keys to move to the line(s) to be changed.
  - c) Add new command lines or edit existing lines.
  - d) Review all changes, checking for correct spelling (e.g., commands, directories, filenames) and command syntax.
  - e) Enter the following keystrokes to save the file:
    - 1] Press ALT+F (file menu).
    - 2] Press X (exit).
    - 3] Press ENTER (save file and exit editor).
  - f) Reboot computer for changes to take effect.
- 3) Edit the AUTOEXEC.BAT file from WINDOWS 95:
- 4) Edit CONFIG.SYS from WINDOWS 95:
  - a) Choose the Windows 95 'Start' button to access the 'Start' menu.
  - b) Select 'Programs' and select 'Accessories'.
  - c) Select 'Notepad'.
  - d) Select the 'File' menu and select 'Open'.
  - e) Enter the following in 'Filename' box.

C:\AUTOEXEC.BAT

- f)** Select the 'File' menu and select 'Save as...!.
- g)** Enter the following in the 'Filename' box.  
C:\AUTOEXEC.OLD
- h)** Choose the 'Save' button.
- i)** Use the arrow keys to move to the line(s) to be changed.
- j)** Add new command lines or edit existing lines.
- k)** Review all changes, checking for correct spelling (e.g., commands, directories, filenames) and command syntax.
- l)** Select the 'File' menu and select 'Save as...!.
- m)** Enter the following in the 'Filename' box.

C:\AUTOEXEC.BAT

- n)** Choose the 'Save' button.
- o)** Select the 'File' menu and select 'Exit' to close 'Notepad'..
- p)** Reboot the computer for changes to take effect.

#### TIPS

- 1)** To make temporary changes, place REM (remarks command) at the beginning of each command line to be changed. Then try booting with this configuration. Or, copy lines to be changed, put REM at the beginning of each of the original lines, and change only the copies. This preserves the original configuration of each command line in case changes do not work properly.
- 2)** Load MSCDEX, the Microsoft CD-ROM extensions, before SMARTDrive. This way, the CD-ROM drive will also be cached: an easy way to increase its performance. If the AUTOEXEC.BAT lines that load MSCDEX and SMARTDrive are reversed (i.e., the SMARTDRV line loads first), MS-DOS will not recognize the CD-ROM drive when it sets up SMARTDrive. Consequently, the CD-ROM drive will not be cached.
- 3)** Make sure a semicolon follows each path component in the PATH= command line.
- 4)** Make sure the backslash (\) is used in path statements (not the forward slash (/)).
- 5)** Use full pathnames, including the drive letter, in the PATH statement. Since DOS uses the pathnames just as they are entered, if a user types a command from a default drive other than C: (e.g., the A: drive), DOS will not find the intended command. For example, if the user tries to use the command EDIT while the default drive is A:, and the PATH to DOS files is given as 'DOS', DOS will not find the DOS editor because it will look for it in the directory 'A:\DOS'. If the PATH is specified as 'C:\DOS', there will be no problem.
- 6)** Load TSRs before setting environment variables with the SET command. When a TSR loads, it reserves a memory block for its own copy of all defined environment variables. Thus, the more environment variables already defined when the TSR loads, the more memory space taken by that TSR. If the lines in AUTOEXEC.BAT that load TSRs are put before the lines that SET environment variables, the amount of memory used by the TSR environment blocks will be smaller.
- 7)** Do not use APPEND in AUTOEXEC.BAT. APPEND uses memory that could be used by other applications and is a poor substitute for better hard drive organization. It may also result in data files being 'lost' in unknown directories. For example, APPEND will allow an application to open a data file in a remote directory without specifying the complete pathname. This file may be changed or updated, and saved to a different directory. All changes to the original file (in the original unspecified directory) may seem to be 'lost'; yet they are actually stored in a different copy of the file in a different location. This is unnecessarily confusing.

- 8) Use full pathnames to run external programs, i.e. programs that are not part of DOS. This includes SMARTDRV, MOUSE, MSCDEX, and any other commands that are not handled directly by COMMAND.COM. DOS can execute programs faster if it knows exactly where to go to find the programs. Searching through the directories given in the PATH statement takes up time that could be better used to load programs.
- 9) Editing the AUTOEXEC.BAT file to change more than a few lines is a risky and complicated process. Get a good MS-DOS reference book that gives detailed descriptions of what each line in the AUTOEXEC.BAT file does, and examples of how the lines should look with various computer configurations.



## How to resolve IRQ conflicts.

### Solution:

Use a hardware utility (e.g., Microsoft Diagnostics (MSD)) to identify port address and interrupt assignments, and pinpoint IRQ conflicts. Record current assignments and change one item at a time until conflict resolved.

- 1) Determine currently assigned ports and interrupt requests (IRQs) in computer via software.
  - a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD)) to identify port and interrupt (IRQ) assignments. Enter the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Choose 'Com Ports...' from MSD main screen.



[MSD Choose COM Ports screen](#)

- c) Identify port assignments and write them down.



[MSD COM Ports screen](#)

- d) Choose 'LPT Ports...' from MSD main screen.



[Choose MSD LPT Ports Screen](#)

- e) Identify port assignments and write them down.



[MSD LPT Ports Configuration Screen](#)

- f) Identify interrupt (IRQ) assignments using the IRQ Status screen and write them down.



[IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 2) Try one of the following, in sequence, until problem is solved:
- a) Select an unused address and IRQ. See [Serial & Parallel Port Configuration Standards](#).
  - b) Try assigning one serial device to COM1 (or COM3) and the second to COM2 (or COM4).
  - c) Assign one conflicting peripheral to IRQ 5 or IRQ 7 (If computer is 286 or higher CPU model).
  - d) Make sure mouse is not using a COM port that is sharing an interrupt with another device (e.g., COM1 and 3 share interrupt 4).
  - e) If device x is installed on COM1 and device y is installed on COM2, and they conflict, try reversing the assignments (i.e., device x to COM2 and device y to COM1).
  - f) Use trial and error to find an IRQ that works.

*NOTE: If an IRQ that is in use is inadvertently chosen, no harm is done; the other device simply will not work. Keep trying different IRQs until one works without creating other conflicts.*



## Install/replace ethernet card.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Remove the base unit cover, set the jumpers/DIP switches on the card, insert the card in an empty slot, connect the ribbon cables (if applicable), install the driver, power up and test the computer system and peripherals, replace the cover and update the rescue diskette.

*NOTE: If removing an old ethernet card is not required, skip to Step 3 for installation steps.*

1) Remove base unit cover.



Photo: Removing cover

2) Remove the old ethernet card:

- a) Remove the screw from the top notch of the mounting bracket on the card.
- b) Touch the metal sides of the base unit to ground any static and, grasping the ethernet card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
- c) Place the card in a static-resistant envelope.
- d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.

3) Install new ethernet card:

- a) Remove the ethernet card from its box and the protective anti-static envelope.
- b) Locate the jumpers or DIP switches on the card and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
- c) Read the ethernet card manual and identify which, if any, settings must be changed on the card for this particular computer.
- d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo-Moving jumpers



#### Photo-DIP Switches

- e) Identify a free expansion slot of proper size, and remove the rear metal slot cover.
- f) Touch the metal sides of the base unit to ground any static and, grasping the ethernet card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - h) If the ethernet card attaches to another device, connect the two devices using the supplied ribbon cable. Check the manual to verify connector orientation, and gently insert the cable connector into the card connection and the other device.
  - i) Attach additional ports to back of base unit in provided 9-pin or 25-pin holes, if desired. Connect ribbon cables between proper pins on the ethernet card and the ports.
  - j) Attach desired peripherals to new ports.
- 4) Install drivers and test new configuration:
  - a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video), and plug in power cable.
  - c) Turn on the computer and related peripherals one at a time.
  - d) Install networking software from diskette that accompanies the card, following the installation/setup instructions in the card's manual.
  - e) Locate logon and access instructions in manual and logon to check that network is functioning properly.

*NOTE: If problems arise, check cable attachments on this computer and others on the network.*

  - f) Power down computer system and remove network connection before replacing base unit cover.
  - g) Replace base unit cover.
  - h) Reconnect network connection.
  - i) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:
    - DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.
    - OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD





## How to install or replace an I/O card.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Remove the base unit cover, set the jumpers/DIP switches on the card, insert the card in an empty slot, connect the ribbon cables (if applicable), install the driver, power up and test the computer system and peripherals, replace the cover and update the rescue diskette.

**NOTE:** If removing an old I/O card is not required, skip to Step 3 for installation steps.

1) Remove base unit cover.



Photo: Removing cover

2) Remove the old I/O card:

- a) Remove the screw from the top notch of the mounting bracket on the card.
- b) Touch the metal sides of the base unit to ground any static and, grasping the I/O card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
- c) Place the card in a static-resistant envelope.
- d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.

3) Install new I/O card:

- a) Remove the I/O card from its box and the protective anti-static envelope.
- b) Locate the jumpers or DIP switches on the card and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
- c) Read the I/O card manual and identify which, if any, settings must be changed on the card for this particular computer. See Serial & Parallel Port Configuration Standards for additional advice.
- d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo-Moving jumpers



#### Photo-DIP Switches

- e) Identify a free expansion slot of proper size, and remove the rear metal slot cover.
- f) Touch the metal sides of the base unit to ground any static and, grasping the I/O card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated (especially if it is an EISA card).

Avoid side-to-side movements when positioning the card (circuit boards crack easily).

- g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - h) If the I/O card attaches to another device, connect the two devices using the supplied ribbon cable. Check the manual to verify connector orientation, and gently insert the cable connector into the card connection and the other device.
  - i) Attach additional ports to back of base unit in provided 9-pin or 25-pin holes, if desired. Connect ribbon cables between proper pins on the I/O card and the ports.
  - j) Attach desired peripherals to new ports.
- 4) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video), and plug in power cable.
  - c) Turn on the computer and related peripherals one at a time.
  - d) Run hardware diagnostic utility (e.g., Microsoft Diagnostics (MSD)) and select 'Serial Ports' to determine if all ports are active and seen by system.
  - e) Make sure there are no interrupt (IRQ) conflicts. If there are, note conflict and select another IRQ setting for one of the devices. See [IRQ Conflicts](#) for further advice.
  - f) Test application software that uses each port to Make sure proper configuration.
  - g) [Replace base unit cover.](#)
  - h) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.  
OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## How to change CMOS or run Setup for a PS/2 Model 30 or PS/1 computer.

### Solution:

Press special keystroke combination per instructions on display when booting computer (e.g., DEL or CTRL+ALT+ESC or CTRL+ALT+ENTER).

- 1) Press a specific keystroke combination while computer is booting.

*(NOTE: Look for instructions on screen while computer is booting.) Often this keystroke combination is CTRL+ALT+ESC or CTRL+ALT+ENTER.*

- 2) Carefully read and follow instructions on the Setup screen for setting and changing various items.
- 3) The Setup screen usually contains items like the following:

BIOS SETUP PROGRAM

Date (mm/date/year): Mon, August 1, 1994

Time (hour/min/sec): 10:30:01

Base memory: 640KB

Extended memory: 2816

Expanded memory: 0

	CylIn	Head	WPcom	LZone	Sect	Size
Hard disk 0:	Type 40	820 6	820	820	17	41 MB

Hard drive 1: None

Floppy drive A: 1.2 MB, 5 1/4

Floppy drive B: 1.44 MB, 3 1/2

Primary Display: VGA/EGA

Keyboard: Installed

ESC:Exit      Arrow keys to select/edit    F5 to Save/Exit/Reboot

**CAUTION:** Beware of changing the hard drive type definition. Changing this is dangerous, because entering the wrong type can cause the primary hard drive (e.g., C:\) to seem to disappear. This means the computer will not completely boot, and DOS and other files on the hard drive will NOT be available.

- 4) Use the arrow keys to navigate between items, and to bring up valid entries for each item.
- 5) When done, save the information to CMOS by following the instructions on the screen (e.g., F5 to Save).
- 6) Upon exiting Setup, the computer will reboot with the new setup information.
- 7) If the configuration is not correct, reboot and press the Setup key combination to reenter Setup.

- 8) Change selected items and repeat steps 5-7.

RECOMMENDATION: Make a copy of the computer's CMOS setup information (using a utility) and store it on the System Rescue Diskette in a safe place.



## Run CMOS setup for a EISA computer.

### Solution:

Press special keystroke combination per instructions on display when the computer boots (e.g., DEL or CTRL+ALT+ESC or CTRL+ALT+ENTER). Also run the EISA Configuration Utility if changing adapter cards.

- 1) Press a specific keystroke combination while computer is booting.  
*(NOTE: Look for instructions on screen while computer is booting) Often this keystroke combination is CTRL+ALT+ESC or CTRL+ALT+ENTER.*

- 2) Carefully read and follow instructions on the Setup screen for setting and changing various items.

- 3) The Setup screen usually contains items like the following:

BIOS SETUP PROGRAM

Date (mm/date/year): Mon, August 1, 1994

Time (hour/min/sec): 10:30:01

Base memory: 640KB

Extended memory: 2816

Expanded memory: 0

	Cyln	Head	WPcom	LZone	Sect	Size
Hard disk 0: Type 40	820	6	820	820	17	41 MB

Hard drive 1: None

Floppy drive A: 1.2 MB, 5 1/4

Floppy drive B: 1.44 MB, 3 1/2

Primary Display: VGA/EGA

Keyboard: Installed

ESC:Exit      Arrow keys to select/edit    F5 to Save/Exit/Reboot

**CAUTION:** Beware of changing the hard drive type definition. Changing this is dangerous, because entering the wrong type can cause the primary hard drive (e.g., C:\) to seem to disappear. This means the computer will not completely boot, and DOS and other files on the hard drive will NOT be available.

- 4) Use the arrow keys to navigate between items, and to bring up valid entries for each item.
- 5) When done, save the information to CMOS by following the instructions on the screen (e.g., F5 to Save).
- 6) Upon exiting Setup, the computer will reboot with the new setup information.
- 7) If the configuration is not correct, reboot and press the Setup key combination to reenter Setup.
- 8) Change selected items and repeat Steps 5-7.

- 9) EISA computers. If an adapter card change is made, EISA computer users must run the EISA Configuration Utility to inform computer of hardware changes. The utility usually is provided on diskette with all EISA adapter cards. Refer to running instructions accompanying the card.

RECOMMENDATION: Make a copy of the computer's CMOS setup information (using a utility) and store it on the System Rescue Diskette in a safe place.



## How to change CMOS or run Setup for a PS/2 MCA (except Model 30) computer.

### Solution:

Insert the Boot Reference Diskette into Drive A and press CTRL+ALT+DEL.

- 1) Insert the Boot Reference Diskette into Drive A and press CTRL+ALT+DEL. (Computer will boot into setup utility.)
- 2) Carefully read and follow instructions on the Setup screen for setting and changing various items.
- 3) The Setup screen usually contains items like the following:

BIOS SETUP PROGRAM

Date (mm/date/year): Mon, August 1, 1994

Time (hour/min/sec): 10:30:01

Base memory: 640KB

Extended memory: 2816

Expanded memory: 0

	Cyln	Head	WPcom	LZone	Sect	Size
Hard disk 0: Type 40	820	6	820	820	17	41 MB

Hard drive 1: None

Floppy drive A: 1.2 MB, 5 1/4

Floppy drive B: 1.44 MB, 3 1/2

Primary Display: VGA/EGA

Keyboard: Installed

ESC:Exit      Arrow keys to select/edit    F5 to Save/Exit/Reboot

**CAUTION:** Beware of changing the hard drive type definition. Changing this is dangerous, because entering the wrong type can cause the primary hard drive (e.g., C:\) to seem to disappear. This means the computer will not completely boot, and DOS and other files on the hard drive will NOT be available.

- 4) Use the arrow keys to navigate between items, and to bring up valid entries for each item.
- 5) When done, save the information to CMOS by following the instructions on the screen (e.g., F5 to Save).
- 6) Upon exiting Setup, the computer will reboot with the new setup information.
- 7) Remove Boot Reference Diskette from Drive A before rebooting.
- 8) If configuration is not correct, reinsert Boot Reference Diskette into Drive A and reboot computer to reenter Setup.

- 9) Change selected items and repeat steps 5) through 7).

RECOMMENDATION: Make a copy of the computer's CMOS setup information (using a utility) and store it on the System Rescue Diskette in a safe place.





## How to change CMOS or run Setup for Pentium, 486, or 386 computer.

### Solution:

Press special keystroke combination per instructions on display when the computer boots (e.g., DEL or CTRL+ALT+ESC or CTRL+ALT+ENTER).

- 1) Press a specific keystroke combination while computer is booting.

*(NOTE: Look for instructions on screen while computer is booting.) Often this keystroke combination is CTRL+ALT+ESC or CTRL+ALT+ENTER.*

- 2) Carefully read and follow instructions on the Setup screen for setting and changing various items.
- 3) The Setup screen usually contains items like the following:

BIOS SETUP PROGRAM

Date (mm/date/year): Mon, August 1, 1994

Time (hour/min/sec): 10:30:01

Base memory: 640KB

Extended memory: 2816

Expanded memory: 0

	Cyln	Head	WPcom	LZone	Sect	Size
Hard disk 0: Type 40	820	6	820	820	17	41 MB

Hard drive 1: None

Floppy drive A: 1.2 MB, 5 1/4

Floppy drive B: 1.44 MB, 3 1/2

Primary Display: VGA/EGA

Keyboard: Installed

ESC:Exit      Arrow keys to select/edit    F5 to Save/Exit/Reboot

**CAUTION:** Beware of changing the hard drive type definition. Changing this is dangerous, because entering the wrong type can cause the primary hard drive (e.g., C:\) to seem to disappear. This means the computer will not completely boot, and DOS and other files on the hard drive will NOT be available.

- 4) Use the arrow keys to navigate between items, and to bring up valid entries for each item.
- 5) When done, save the information to CMOS by following the instructions on the screen (e.g., F5 to Save).
- 6) Upon exiting Setup, the computer will reboot with the new setup information.
- 7) If the configuration is not correct, reboot and press the Setup key combination to reenter Setup.

- 8) Change selected items and repeat steps 5) through 7).

RECOMMENDATION: Make a copy of the computer's CMOS setup information (using a utility) and store it on the System Rescue Diskette in a safe place.



## How to change CMOS or run Setup for a 286(AT) computer.

### Solution:

Insert the Boot Reference Diskette into Drive A and press CTRL+ALT+DEL.

- 1) Insert the Boot Reference Diskette into Drive A and press CTRL+ALT+DEL. (Computer will boot into setup utility.)
- 2) Carefully read and follow the instructions on the Setup screen for setting and changing various items.
- 3) The Setup screen usually contains items like the following:

BIOS SETUP PROGRAM

Date (mm/date/year): Mon, August 1, 1994

Time (hour/min/sec): 10:30:01

Base memory: 640KB

Extended memory: 2816

Expanded memory: 0

	Cyln	Head	WPcom	LZone	Sect	Size
Hard disk 0: Type 40	820	6	820	820	17	41 MB

Hard drive 1: None

Floppy drive A: 1.2 MB, 5 1/4

Floppy drive B: 1.44 MB, 3 1/2

Primary Display: VGA/EGA

Keyboard: Installed

ESC:Exit      Arrow keys to select/edit    F5 to Save/Exit/Reboot

**CAUTION:** Beware of changing the hard drive type definition. Changing this is dangerous, because entering the wrong type can cause the primary hard drive (e.g., C:\) to seem to disappear. This means the computer will not completely boot, and DOS and other files on the hard drive will NOT be available.

- 4) Use the arrow keys to navigate between items, and to bring up valid entries for each item.
- 5) When done, save the information to CMOS by following the instructions on the screen (e.g., F5 to Save).
- 6) Upon exiting Setup, the computer will reboot with the new setup information.
- 7) Remove Boot Reference Diskette from Drive A before rebooting.
- 8) If configuration is not correct, reinsert Boot Reference Diskette into Drive A and reboot computer to reenter Setup.

- 9) Change selected items and repeat steps 5) through 7).

RECOMMENDATION: Make a copy of the computer's CMOS setup information (using a utility) and store it on the System Rescue Diskette in a safe place.



## How to run the EISA configuration utility.

**Solution:**

Copy EISA card configuration file for new adapter card onto computer, and run EISA Configuration Utility. Follow instructions on screen to configure any changes made in adapter card installation (card changes or slot location changes).



## How to improve laser printer performance.

### **Solution:**

Laser printer performance generally CAN be improved by adding additional memory and/or obtaining additional font cartridges or software (e.g., PostScript).

Do one or more of the following:

- 1) Examine laser printer mainboard and review user manual to determine if laser printer can accommodate additional memory, the type of memory required, and the minimum and maximum increments that can be added.
- 2) Examine laser printer and review user manual to determine if laser printer can accommodate additional font cartridges and which ones available might be of use for user tasks.
- 3) Research availability and usefulness of obtaining additional fonts and images in software form that can be downloaded into laser printer memory, as required, from the computer.
- 4) Determine feasibility of adding hard drive unit to printer to store and quickly retrieve graphic and font libraries.



## How to configure a serial or parallel printer.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Determine the ports and interrupts available through the software and by examining hardware. Run the cables and connect to the desired parallel or serial sockets on the computer. Configure the software and attempt to print to each printer. Resolve any interrupt (IRQ) conflicts that arise.

- 1) Determine the ports and interrupt requests (IRQs) available in the computer via the software.
  - a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD)) to identify the port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Choose 'Com Ports...' from MSD main screen.



MSD Choose COM Ports screen

- c) Identify port assignments and write them down.



MSD COM Portsscreen

- d) Choose 'LPT Ports...' from MSD main screen.



Choose MSD LPT Ports Screen

- e) Identify port assignments and write them down.



MSD LPT Ports Configuration Screen

- f) Identify interrupt (IRQ) assignments using the IRQ Status screen and write them down.



### MSD IRQ Status example

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- 2) Turn computer off and disconnect power cables.
- 3) Move base unit out so back is visible.
- 4) Identify what serial and parallel ports are present (and their designation, if possible).
  - a) Look at the back of the base unit for 9-pin or 25-pin connector slots.
    - 1] PS/2 style base units have ports directly attached to the mainboard and in a straight line along the bottom of the rear of the base unit.
    - 2] Most other base units have ports mounted along the left side of the rear of the base unit or mounted on the back of cards in one or more slots.



### Ports on other units Photo

- b) Serial ports usually are a 9-pin male connector, often directly adjacent (above/beside) to a 25-pin parallel port female socket (which is often connected to a printer). Serial ports are often labeled as COM1 or COM2.
  - c) One or more serial ports may also appear as a 25-pin male connector, often in the card slot next to the serial/parallel card slot, or mounted on the left side of the base unit.
- 5) Compare the parallel and serial ports identified via software (in a diagnostics program) with those located on rear of base unit to determine which one(s) may be available.
- 6) If adequate ports are not available, remove base unit cover and do one of the following:
- a) Inspect the I/O card to determine if an external serial connector socket is attached via a narrow ribbon cable, or if there is an empty connector for an external serial connector on the I/O card. Do one of the following:
    - 1] If an external serial connector is attached, mount and use it. Be sure to set address and IRQ jumpers to properly activate this serial connection socket.
    - 2] If an empty connector is available on the card, obtain an external serial connector, mount it, and connect it to the card. Be sure to set address and IRQ jumpers to properly activate this serial connection socket.
  - b) Consider installing an I/O card with multiple ports or replacing an older I/O card with a new one that has additional capacity.
- NOTE: See Install I/O card <Text>PCDGS041.TXT for detailed steps for both options.*
- 7) Determine the proposed location and designation of the printers, and the location of the computer, using the following guidelines:
- a) Parallel printing is faster than serial printing.
  - b) Parallel printer cables longer than 15-25 feet will probably not work.
  - c) Serial printer cables may extend to 100-200 feet and are a good choice for remote printers.
  - d) Number and type of ports available on computer.



- 8) Position printers in suitable locations (within data cable reach and near to power source).
- 9) Run cables between the computer and each printer.

*(NOTE: If running serial cable, use original printer serial cable if possible. Serial cable wiring schemes differ from cable to cable. Parallel cables are all wired identically: make sure the different-looking Centronics style connector is put at the printer location.) Make sure the computer is turned off and that the power cables are disconnected. Do one or both of the following:*

**a) Connecting a printer with a PARALLEL cable:**

- 1] Connect the Centronics connector on the parallel data cable to similar socket on the rear of the printer. Secure it with attachment pins.
- 2] Plug the printer power cable into a surge protector or power receptacle.
- 3] Orient the data cable connector so the pin-shape matches the socket shape, and connect it to the parallel port socket on the back of base unit determined in Step 7 above. **(WARNING: Do not force the connection! The pins may be damaged.)** Secure the connection with the attached screws.
- 4] Make sure the paper tray is loaded, and turn the printer power on.
- 5] Reconnect the power cables to the computer, and turn the power on.
- 6] Make sure the printer driver is installed for this printer.
- 7] Make sure the proper parallel port is selected (e.g., LPT1 or LPT2, etc.).
- 8] If the printer does not print or another device no longer works (e.g., the mouse), try one or more of the following:
  - a] Make sure all cables are securely connected to desired ports.
  - b] Make sure that the printer is on, is on line and loaded with paper.
  - c] Make sure the software is directing output to the desired parallel port.
  - d] Edit AUTOEXEC.BAT and make sure the output is not being redirected to another port.  
 EXAMPLE: MODE COM1:=LPT1: (This example command redirects all output for the parallel port LPT1 to the serial port COM1.)
  - e] Check for an interrupt (IRQ) conflict:
    - 1} Run a hardware status program (e.g., Microsoft Diagnostics (MSD)) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':  
 C:\DOS\MSD
    - 2} Choose 'LPT Ports...' from MSD main screen.



Choose MSD LPT Ports Screen

- 3} Identify port assignments and write them down.



MSD LPT Ports Configuration Screen

- 4} Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



#### MSD IRQ Status example

- 5} Select an item to change to eliminate the conflict. See IRQ Conflicts for advice on resolving conflicts.
- 6} Turn the computer off and disconnect the power cables.
- 7} Disconnect all data cables to the I/O card.
- 8} Remove the I/O card and Move Jumpers to the desired settings. Refer to the I/O card manual for instructions.
  - 9} Reinstall the I/O card.
  - 10} Reconnect all data cables to the I/O card.
  - 11} Reconnect power cables to the base unit and turn the computer on.
  - 12} Rerun a hardware status program to determine if the conflict is eliminated.
  - 13} Rerun the print job.
  - 14} Repeat Step 8] until the problem is solved.

#### b) Connecting a printer with a SERIAL cable:

- 1] Orient the 9-pin serial cable connector at the printer end, to the similar serial socket on the rear of the printer. Secure it with attachment screws.
- 2] Plug the printer power cable into a surge protector or power receptacle.
- 3] Orient the other data cable serial connector so that the pin-shape matches the socket shape, and connect it to the selected serial port socket on the back of the base unit determined in Step 7 above. (**WARNING: Do not force connection! The pins may be damaged.**) Secure the connection with attached screws.
- 4] Make sure the paper tray is loaded, and turn the printer power on.
- 5] Reconnect the power cables to the computer, and turn the power on.
- 6] Make sure the printer driver is installed for this printer.
- 7] Make sure the proper serial port is selected (e.g., COM1 or COM2, etc.).
- 8] Set the same serial communications package configuration and hand-shaking parameters on BOTH the printer and computer (DOS) serial port. These include baud rate, parity, data bits, stop bits and buffer settings. The most common settings are: 9600 baud, no parity, 8 data bits, 1 stop bit and continue sending data when buffer full (p) (e.g., 9600,n,8,1,p). Refer to the printer manual for instructions on setting this configuration by changing DIP Switches and/or moving Jumpers.
- 9] If the printer does not print, try one or more of the following:
  - a] Make sure all cables are securely connected to the desired ports.
  - b] Make sure the printer is turned on, is on line and is loaded with paper.
  - c] Make sure the software is directing output to the desired serial port.
  - d] Edit AUTOEXEC.BAT and make sure the output is not being redirected to another port.  
EXAMPLE: MODE COM1:=LPT1: (This example command redirects all output for the parallel port LPT1 to the serial port COM1.)
  - e] Check for an interrupt (IRQ) conflict:
    - 1} Run a hardware status program (e.g., Microsoft Diagnostics (MSD)) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD

- 2} Choose 'Com Ports...' from MSD main screen.



Com Ports

- 3} Identify the port assignments and write them down.



Assignments

- 4} Identify interrupt (IRQ) conflicts using the IRQ Status screen and write them down.



MSD IRQ Status example

- 5} Select an item to change to eliminate the conflict. See IRQ Conflicts for advice on resolving conflicts.
- 6} Turn the computer off and disconnect power cables.
- 7} Disconnect all the data cables to the I/O card.
- 8} Remove the I/O card and change the IRQ by Moving Jumpers to desired settings. If an IRQ is changed, also change the address to correspond to the new IRQ. Refer to I/O card manual for instructions.
- 9} Reinstall the I/O card.
- 10} Reconnect all data cables to the I/O card.
- 11} Reconnect power cables to the base unit and turn the computer on.
- 12} Rerun a hardware status program to determine if the conflict is eliminated.
- 13} Rerun the print job.
- 14} Repeat Step 9] until the problem is solved.



## Get two computers to share one printer.

### **Solution:**

Install a manual or automatic A/B switch box.

- 1) Weigh the cost versus usage and convenience to determine whether a manual or automatic A/B switch is a better solution.
- 2) Obtain the desired A/B switch.
- 3) Route the parallel printer cables from the LPT1 parallel port on the back of each computer to the 'Input' connectors on the back of the A/B switch.
- 4) Route a 3rd parallel printer cable from the 'Output' connector on the back of the A/B box to the parallel port on the back of the printer.
- 5) Mark on the A/B switch which computer is 'A' and which computer is 'B'.
- 6) Turn on both computers and the printer.
- 7) Turn the A/B selector switch to the 'A' position and print from the first computer.
- 8) Turn the A/B selector switch to the 'B' position and print from the second computer.
- 9) If one or both computers do not print, make sure the parallel printer cables are secure. If the computer still will not print, run the computer parallel cable directly to the printer and try to print.



## How to install a dot matrix printer.

### Solution:

Unpack the printer and remove all internal locks and packing material. Install cards/memory and set the DIP switches, if applicable. Install the ribbon cartridge, attach the data and power cables, turn on the printer and watch POST. Turn on the power to the computer, install the corresponding print driver and run the test print job.

- 1) Unpack the printer. Carefully remove all the external packing material and locate the instruction book and printer installation software.
  - 2) Compare the inventory list to all the parts and components to make sure that all necessary parts are included.
  - 3) Open the printer and carefully remove all locks and packing material used to prevent component movement and damage during shipment.
  - 4) Check the manual to determine if any [DIP Switches](#) must be set to work properly with the computer(s). [Changing DIP Switches](#).
- (NOTE: Many of these settings are now recognized and made automatically via software.)*
- 5) Install any accessory cards, following the instructions in the manual.
  - 6) Locate and open the package containing the ink and containers (It may be in the carton with the printer or in a separate box.)
  - 7) Install the printer ribbon according to the instruction manual. Make sure the ribbon is slotted correctly and the print head freely moves from side to side. Remove the slack from ribbon by turning the knob on the top of the ribbon cartridge.
  - 8) Assemble and install the paper tray or tractor-feed paper following the instruction manual.
  - 9) Install any optional font cartridges. Attach the power cable in the socket on the rear of the printer and plug it into a surge protector or wall outlet. Connect the data cable to the socket on the rear of the printer. Connect the other end to the port (usually 25-pin connector to the parallel port) on the back of the computer base unit. Turn on the ink jet printer and watch the [POST](#). Normally this concludes with the printer generating a sample print page. (Optional) To make sure the printer itself is functioning properly, perform a self-test. This is initiated by pressing a certain button combination or holding down a button combination while turning on the printer. (See the 'Self-test' instructions in the printer's instruction manual). Turn on the computer. Install the printer driver (usually from Windows). Follow the installation instructions on the software or in the manual. [Update or add device to Windows](#). Designate this printer as the primary (default) printer. Attempt to print a document to the dot matrix printer.

*NOTE: The following print jobs are listed in increasing order of difficulty. If the printer does not print, perform these print jobs in sequence to help pinpoint the problem.*

- a) Go to a DOS window and print a short text file. (This is the simplest test of printing data from the computer. Enter the following command:

## PRINT AUTOEXEC.BAT

When asked for a port, enter:

LPT1

- b) Open a Windows word processing application and create or open a 1-page text file and attempt to print it.
  - 1] Open or create the document.
  - 2] Open 'Printer Setup' and make sure that the new printer appears and is selected.
  - 3] Close 'Printer Setup'.
  - 4] Open 'Print' and print the document.
- c) Open a graphics application and attempt to print a graphic (especially if printer supports color). If documents do not print, try one or more of the following, in sequence, until the problem is solved.
  - 1] Turn off the power to the printer.
  - 2] Wait 15 seconds and turn it back on (this clears the printer memory, returns all settings back to defaults and will report any problems (e.g., paper jam).
  - 3] Check the data cable connections to make sure they are connected securely to the proper ports.
  - 4] Verify that the port selected in the computer matches the physical connection (i.e., LPT1 is selected in the computer when printer cable is connected to LPT1).
  - 5] Clear the print queue by deleting all print jobs. Make sure the new printer is set as the 'Default Printer'.
  - 6] Check the printer to make sure the selection for tractor-feed or friction -feed (single sheets) is set properly.
  - 7] Also check the software application to make sure the selections match the printer designations and the correct size paper is loaded.
  - 8] It only takes 1 fault to prevent printing. Performing these troubleshooting steps in sequence often perpetuates a lack of printing due to circular errors. If this appears to be the case, recommend performing all tasks at once prior to re-attempting to print (i.e., recycle the printer, check cables, clear print queue, etc., then reprint).



## How to install an ink jet printer.

### Solution:

Unpack the printer and remove all internal locks and packing material. Install cards/memory and set the DIP switches, if applicable. Install the ribbon cartridge, attach the data and power cables, turn on the printer and watch POST. Turn on the power to the computer, install the corresponding print driver and run the test print job.

- 1) Unpack the printer. Carefully remove all the external packing material and locate the instruction book and printer installation software.
- 2) Compare the inventory list to all the parts and components to make sure that all necessary parts are included.
- 3) Open the printer and carefully remove all locks and packing material used to prevent component movement and damage during shipment.
- 4) Check the manual to determine if any DIP Switches must be set to work properly with the computer(s). Changing DIP Switches.  
*(NOTE: Many of these settings are now recognized and made automatically via software.)*
- 5) Install any accessory cards, following the instructions in the manual.
- 6) Locate and open the package containing the ink and containers (It may be in the carton with the printer or in a separate box.)
- 7) Install the printer ribbon according to the instruction manual. Make sure the ribbon is slotted correctly and the print head freely moves from side to side. Remove the slack from ribbon by turning the knob on the top of the ribbon cartridge.
- 8) Assemble and install the paper tray or tractor-feed paper following the instruction manual.
- 9) Install any optional font cartridges. Attach the power cable in the socket on the rear of the printer and plug it into a surge protector or wall outlet. Connect the data cable to the socket on the rear of the printer. Connect the other end to the port (usually 25-pin connector to the parallel port) on the back of the computer base unit. Turn on the ink jet printer and watch the POST. Normally this concludes with the printer generating a sample print page. (Optional) To make sure the printer itself is functioning properly, perform a self-test. This is initiated by pressing a certain button combination or holding down a button combination while turning on the printer. (See the 'Self-test' instructions in the printer's instruction manual). Turn on the computer. Install the printer driver (usually from Windows). Follow the installation instructions on the software or in the manual. Update or add device to Windows. Designate this printer as the primary (default) printer. Attempt to print a document to the dot matrix printer.

*NOTE: The following print jobs are listed in increasing order of difficulty. If the printer does not print, perform these print jobs in sequence to help pinpoint the problem.*

- a) Go to a DOS window and print a short text file. (This is the simplest test of printing data from the computer. Enter the following command:

## PRINT AUTOEXEC.BAT

When asked for a port, enter:

LPT1

- b)** Open a Windows word processing application and create or open a 1-page text file and attempt to print it.
  - 1]** Open or create the document.
  - 2]** Open 'Printer Setup' and make sure that the new printer appears and is selected.
  - 3]** Close 'Printer Setup'.
  - 4]** Open 'Print' and print the document.
- c)** Open a graphics application and attempt to print a graphic (especially if printer supports color). If documents do not print, try one or more of the following, in sequence, until the problem is solved.
  - a)** Turn off the power to the printer.
  - b)** Wait 15 seconds and turn it back on (this clears the printer memory, returns all settings back to defaults and will report any problems (e.g., paper jam).
  - c)** Check the data cable connections to make sure they are connected securely to the proper ports.
  - d)** Verify that the port selected in the computer matches the physical connection (i.e., LPT1 is selected in the computer when printer cable is connected to LPT1).
  - e)** Clear the print queue by deleting all print jobs. Make sure the new printer is set as the 'Default Printer'.
  - f)** Check the printer to make sure the selection for tractor-feed or friction -feed (single sheets) is set properly.
  - g)** Also check the software application to make sure the selections match the printer designations and the correct size paper is loaded.
  - h)** It only takes 1 fault to prevent printing. Performing these troubleshooting steps in sequence often perpetuates a lack of printing due to circular errors. If this appears to be the case, recommend performing all tasks at once prior to re-attempting to print (i.e., recycle the printer, check cables, clear print queue, etc., then reprint).





## How to install a toner cartridge in a laser printer.

### Solution:

Turn off the laser printer and open the top latch. Remove the old cartridge. Unpack the new toner cartridge and insert it into the printer. Pull the plastic tab to remove the protective strip, close the printer top, refill the paper tray, turn on the printer and print the documents.

- 1) Turn off the laser printer.
- 2) Remove all paper and papers trays.
- 3) Open the top by pressing the button to release the latch.

***CAUTION:** If the laser printer has been on for an extended time period, several internal components will be extremely HOT! Either let the printer cool for 15 minutes or be extremely careful not to get burned.*

- 4) Remove the old cartridge:
  - a) Carefully grasp the cartridge and lift it straight out.
  - b) (Optional) Clean any dust, dirt and toner from the visible parts inside the printer. Consult the owner's manual for specific locations and instructions on cleaning materials and techniques.
- 5) (Optional) Consider extending the usable life of the old cartridge by several hundred pages prior to discarding or recycling it and installing a new one as follows:
  - a) Remove the cartridge (as discussed in Step 3).
  - b) Grasp the cartridge in the center with one hand and hold it out at full arms-length away from the body over the floor (this minimizes the chances of getting toner dust on clothes and documents).
  - c) Gently tip the cartridge back and forth from side to side (about 45 degrees each way) about 6 times to redistribute the toner evenly throughout the length of the cartridge.
  - d) Reinsert the old cartridge back into the printer gently, close the door, turn on the printer and run several test prints. If quality problems continue after page 5, repeat this procedure again. If problems do not clear up, recycle or discard the old cartridge and install a new one.
- 6) Install the new cartridge:
  - a) Remove the toner cartridge from the container and carefully remove all packing material.
  - b) Orient the toner cartridge (refer to the diagram) and carefully insert it into the opening behind the printer door until it is firmly seated.

***CAUTION:** Do not force or jam cartridge. It will fit properly one way.*
  - c) Locate the plastic tab used to seal the cartridge during shipment. Hold the cartridge in place with one hand and grasp the tab with the other hand. Pull the long plastic filmstrip straight and steadily away from the cartridge. (This uncovers the opening to the toner). Discard the plastic strip.
  - d) After making sure the toner cartridge is fully seated, close the lid until the latch clicks.

***CAUTION:*** *Do not force the lid closed. If the lid will not close, the toner cartridge is NOT seated properly.*

- 7) Refill and reinstall the paper tray(s).
- 8) Turn on the laser printer and watch the POST. Normally this concludes with the printer generating a sample print page.
- 9) Print several pages of a document before judging the print quality substandard.
- 10) Recycle or discard the old toner cartridge (following local disposal instructions).



## How to install a laser printer.

### Solution:

Unpack printer and remove all internal locks and packing material. Install cards/memory and set DIP switches, if applicable. Install toner cartridge, attach data and power cables, turn on the printer and watch POST. Power up computer, install print driver and run test print job.

- 1) Unpack the printer. Remove any external packing material and locate the instruction book and printer installation software.
- 2) Inventory all parts and components using the inventory list in the manual.
- 3) Open the printer and carefully remove all locks and packing material used to prevent component movement and damage during shipment.
- 4) If additional adapter cards or memory are to be installed, complete this task now, following the instructions in the manual.
- 5) Check the manual to determine if any DIP Switches must be set to work properly with the computer(s).  
Changing DIP Switches.  
*(NOTE: Many of these settings are now recognized and made automatically via software.)*
- 6) Locate and open the toner cartridge. (It may be in the carton with the printer or in a separate box.)
- 7) Open the top door of the laser printer and follow the instructions listed there or on the accompanying cartridge to install it. Common instructions example:
  - a) Press the button to open the printer door and raise it up.
  - b) Remove the toner cartridge from the container and carefully remove all the packing material.
  - c) Orient the toner cartridge. (Refer to the diagram on the inside of the printer door.) Carefully insert it into the opening below the printer door until it is firmly seated.  
**CAUTION: Do not force or jam the cartridge. It will fit properly one way.**
  - d) Locate the plastic tab used to seal the cartridge during shipment. Hold the cartridge in place with one hand and grasp the tab with the other hand.
  - e) Pull the long plastic film strip straight and steadily away from the cartridge. (This uncovers the opening to the toner).
  - f) Discard the plastic strip.
  - g) While making sure the cartridge is fully seated, close the lid until the latch clicks.  
**CAUTION: Do not force the lid closed. If the lid will not close, the toner cartridge is NOT seated properly.**
- 8) Assemble and install the paper tray(s) following the instruction manual.
- 9) Install any optional font cartridges. Attach the power cable in the socket on the rear of the printer and plug

it into a surge protector or wall outlet. Connect the data cable to the socket on the rear of the printer. Connect the other end to the port (usually 25-pin connector to the parallel port) on the back of the computer base unit. Turn on the laser printer and watch the POST. Normally this concludes with the printer generating a sample print page. (Optional) To make sure the printer itself is functioning properly, perform a self-test. This is initiated by pressing a certain button combination or holding down a button combination while turning the printer on (see the 'Self-test' instructions in the printer's instruction manual). Turn on the power to the computer. Install the printer driver (usually from Windows). Follow the installation instructions on the software or in the manual. Update or add device to Windows. Designate this printer as the primary (default) printer. Attempt to print a document to the dot matrix printer.

*(NOTE: The following print jobs are listed in increasing order of difficulty. If the printer does not print, perform these print jobs in sequence to help pinpoint the problem.*

- a)** Go to a DOS window and print a short text file. (This is the simplest test of printing data from the computer. Enter the following command:  
PRINT AUTOEXEC.BAT  
When asked for a port, enter:  
LPT1
- b)** Open a Windows word processing application and create or open a 1-page text file and attempt to print it.
  - 1]** Open or create the document.
  - 2]** Open 'Printer Setup' and make sure that the new printer appears and is selected.
  - 3]** Close 'Printer Setup'.
  - 4]** Open 'Print' and print the document.
- c)** Open a graphics application and attempt to print a graphic (especially if printer supports color). If documents do not print, try one or more of the following, in sequence, until the problem is solved.
  - a)** Turn off the power to the printer.
  - b)** Wait 15 seconds and turn it back on (this clears the printer memory, returns all settings back to defaults and will report any problems (e.g., paper jam).
  - c)** Check the data cable connections to make sure they are connected securely to the proper ports.
  - d)** Verify that the port selected in the computer matches the physical connection (i.e., LPT1 is selected in the computer when printer cable is connected to LPT1).
  - e)** Clear the print queue by deleting all print jobs. Make sure the new printer is set as the 'Default Printer'.
  - f)** Check the printer to make sure the selection for tractor-feed or friction -feed (single sheets) is set properly.
  - g)** Also check the software application to make sure the selections match the printer designations and the correct size paper is loaded.
  - h)** It only takes 1 fault to prevent printing. Performing these troubleshooting steps in sequence often perpetuates a lack of printing due to circular errors. If this appears to be the case, recommend performing all tasks at once prior to re-attempting to print (i.e., recycle the printer, check cables, clear print queue, etc., then reprint.





## Install internal tape backup unit.

### Solution:

Remove the base unit cover, insert the backup unit in an empty bay, connect the power cable and data ribbon cable, and install the software. Turn on the power to and test both the computer and backup unit, replace the cover and update the rescue diskette.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Install new tape backup unit:
  - a) Locate an empty drive bay (consider removing a second (e.g., 5 1/4 inch) floppy drive if necessary).  
*NOTE: Be sure to run Setup to update CMOS and remove drive designation if floppy drive is removed.*
  - b) Slide tape backup unit into drive bay. Do one of the following:
    - 1] If unit has slide rails, secure drive in bay by inserting two screws along front of rails.
    - 2] If no side rails are present, fasten drive in bay by fastening two screws in each side of the bay/drive.
  - c) Locate an unused power cable/connector coming from power supply and plug it into the power socket on rear of tape backup unit.
  - d) Attach the supplied ribbon cable to the back of the tape backup unit and the other end to the disk controller card. Check the manual to verify connector orientation and gently insert the cable connector into the card connection and the other device.
- 3) Reinstall cables and power up computer.
  - a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
- 4) Install tape backup unit software and test new configuration:
  - a) Install tape backup unit software from diskette, following the installation/setup instructions in the drive's manual. Usually enter one of the following commands:  
A:INSTALL or A:SETUP
  - b) Test operation and configuration of the tape backup system by backing up and restoring some files to disk
  - c) Replace base unit cover.



Photo: Removing cover

**d)** Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Floppy drive defective; Install/replace floppy disk drive.

### Solution:

Remove the cover, disconnect the drive cables and remove the old drive. Set the drive selection switches on the new floppy disk, install the drive in the bay and reconnect the cables. Turn on the computer, run the setup program, test the configuration, reinstall the cover and update the rescue diskette.

**CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Remove old floppy disk:

- a) Remove the data ribbon cable from the drive by grasping the cable and connector and pulling it out of the drive socket. Fold it back out of the way.



Photo: Remove floppy ribbon cable

- b) Remove the power cable from the drive by pulling on the white plug (**WARNING: Do not pull on the 4 colored wires**). Fold it back out of the way.



Photo: Remove floppy power cable

- c) Remove the drive bay by removing the two screws holding it to the front of the base unit and carefully lifting it out. *(NOTE: If floppy disk is slotted in a drive bay with one or more other devices (e.g., hard disk drive(s) or CD-ROM) disconnect ribbon and power cables from them first. Then remove drive bay.*
- d) Remove the two (or more) retaining screws from the left and right sides of the drive bay.



Photo: Side screws

- e) Remove the old floppy disk drive from the drive bay and set it aside in a safe place.



3) Install the new floppy disk:

- a) Set drive-select jumpers. Unfortunately, manufacturers have not agreed upon a standard for locating or designating jumpers. Read the instruction manual accompanying drive for details. Otherwise, here are some tips:

1] Look in the center rear of the drive to locate the jumpers.



Photo: Set floppy drive select jumper

2] Do one of the following (especially if using a 7-segment twisted-pair 34-wire drive cable) to set jumper for the second drive:

a] If labels DS0 and DS1 are used, set the jumper for DS1.

b] If labels DS1 and DS2 are used, set the jumper for DS2.

*NOTE: If installing multiple floppy drives, set all of them for drive 2. This means the drive designation is determined by the drive's position on the cable (the drive attached at the end of the cable is always drive 1 or Drive A). (Example: To swap designations for floppy drives A and B, simply swap cable connectors.)*

- b) Check to see if the new drive fits the slot in the drive bay. Three options are available:

1] New drive is the same size as the old one and it fits perfectly.

2] Drive bay is for an older computer (e.g., AT) and drive rails are required.

3] New drive is larger than the old drive (unlikely). If an adapter kit is installed, remove it. Otherwise locate another larger drive bay.

4] New drive is smaller than the old drive. Install an adapter kit (e.g., to enable a 3.5 inch drive to fit in a 5.25 inch drive bay).

- c) Turn the drive bay on its side and slide the floppy disk into the drive bay. (Make sure the end of the drive with the connectors is oriented toward the rear of the base unit.) Line up the holes for the mounting screws and insert them.



Photo: Side screws

Turn the drive bay on the other side and secure it with mounting screws.

**WARNING: DO NOT use longer screws or over-tighten them. This may cause the screw to enter the internal circuit board or the drive case and damage the drive.**

- d) Slide the drive bay back into place and resecure it to the base unit.

*NOTE: If installing in a standard drive bay, attach ribbon and power cables first (especially if in bottom bay).*

- e) Reconnect any cables disconnected from other devices in this drive bay.

- f) Connect the power cable to the socket on the rear of the drive (it is molded to fit only one way).



Photo: Connect floppy power cable

*NOTE: Some newer 3.5 inch drives have a smaller 4-pronged power connector resembling a set of long jumper pins. If the power supply does not have a connector this size, an adapter plug should be*

*shipped with the 3.5 inch drive kit.*

- g) Connect the ribbon data cable, coming from the controller card, to the large connector on the rear of the floppy disk drive (red or blue side to Pin 1). (Cheap or old cables often cause lots of problems. If new cables are supplied, use them.)



Photo: Connect floppy ribbon cable

*NOTE: Some newer 3.5 inch drives have pin connections for the data cable. Included in the drive kit should be an adapter plug to facilitate using a standard edge connector. It slides over the pins and has a standard edge connector on the other side.*

- h) Make sure other cable connections to drives and controller card are secure.
- 4) Reinstall external cables and power up computer.
    - a) Make sure no parts or tools remain in metal sides of the base unit.
    - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
    - c) Power up computer and display unit one at a time.
  - 5) Run Setup to set the drive type in CMOS as follows:
    - a) If the new drive is the exact same size as the old drive and no other switches were made, no changes in setup are required.
    - b) If the new drive is a different size and/or changes in other drives were made, then the floppy drive designations and/or sizes need adjusted.
  - 6) Test operation of the floppy disk drive(s) by running one or more commands that access it to Make sure proper configuration. Examples: Perform a directory, copy and read several files and then delete them. Also test functionality each hard disk drive to make sure their operation was not disturbed.

*NOTE: If the diskette has not been formatted, the computer will not be able to read it and will generate an error message. Format the disk first.*
  - 7) If unable to assess drive(s), try the following steps in sequence:
    - a) Rerun Setup and check and correct the settings for those items.
    - b) Turn the computer off and disconnect the power cables.
    - c) Make sure controller card is fully seated.
    - d) Recheck all ribbon and power cable connections to both the controller card and disk drives. Make sure the cables are routed correctly and each connection is secure.
    - e) Reconnect the power, reboot and retest drive access.
  - 8) If problems persist, perform the following steps:
    - a) Reread installation instructions and make sure data cables are routed properly and drives are connected in proper sequence.
    - b) Check drive jumper settings on all floppy drives with those specified in the installation instructions (especially if there is more than one floppy disk drive installed).
  - 9) Replace base unit cover.



Photo: Replacing cover

**10)** Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## CD-ROM not installed right; Re-install CD-ROM drive & reinstall in Windows.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Remove the base unit cover, set the jumpers/DIP switches on the card, insert the card in an empty slot, connect the data/power cables, install the driver, turn on the power to and test the computer system and peripherals, replace the cover and update the rescue diskette.

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Install new CD-ROM card:

*NOTE: If internal CD-ROM drive uses a SCSI card and a SCSI card is already installed in base unit, the internal CD-ROM unit may be connected to the existing SCSI card instead of installing an additional SCSI card (See instruction manual).*

- a) Remove the CD-ROM card from its box and from the protective anti-static envelope.
- b) Locate the jumpers or DIP switches on the card, and lay the card down on the static envelope with the jumpers/DIP switches in view.
- c) Read the CD-ROM card manual and identify which, if any, settings must be changed on the card for this particular computer.
- d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo-Moving jumpers



Photo-DIP Switches

- e) Identify a free expansion slot of the appropriate size, and remove the rear metal slot cover.
- f) Touch the metal sides of the base unit to ground any static and, grasping the CD-ROM card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily).

- g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
- 3) Internal CD-ROM unit only:
- a) Locate an empty drive bay (consider removing a second (e.g., 5 1/4 inch) floppy drive if necessary).  
*NOTE: Be sure to run Setup to update CMOS and remove a drive designation if a floppy drive is removed.*
  - b) Slide CD-ROM unit into drive bay. Do one of the following:
    - 1] If unit has slide rails, secure drive in bay by inserting two screws along front of rails.
    - 2] If no side rails are present, fasten drive in bay by fastening two screws in each side of the bay/drive.
  - c) Locate an unused power cable/connector coming from the power supply, and plug it into the power socket on the rear of the CD-ROM drive.
  - d) Attach one end of the supplied ribbon cable to the back of the CD-ROM unit, and the other end to the CD-ROM card or other SCSI adapter card. Check the manual to verify connector orientation, and gently insert the cable connector into the card connection and the other device.
- 4) External CD-ROM unit only:
- a) Unpack the CD-ROM unit and place it near the base unit.
  - b) Locate the data cable (usually with 25-pin connectors) and attach one end to the port connection on the back of the CD-ROM unit and plug the other end into the socket of the card just installed (on back of base unit).
  - c) Locate an electrical power cable/adaptor plug and insert the small plug into the power connector on the back of the CD-ROM unit. Plug the adapter into the surge protector or wall socket.
  - d) Turn the CD-ROM unit power switch on (usually a toggle switch located on the back panel) and watch the power indicator light come on.
- 5) Reinstall the cables and turn on the computer.
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in the power cable.
  - c) Turn on the computer and related peripherals one at a time.
- 6) Install drivers and test the new configuration:
- a) Install driver software for the card from the diskette that came with the card, following the installation or setup instructions in the card's manual. Usually, enter one of the following commands:  
A:INSTALL or A:SETUP  
  
The installation program will add a necessary driver line to CONFIG.SYS and a line to load the MS-DOS CD-ROM extensions to AUTOEXEC.BAT.
  - b) Do one or both of the following:
    - 1] Update or add device to Windows.
    - 2] Update or add device to OS/2.
  - c) Push the button on the front of the CD-ROM unit to open the disk drawer and insert a CD-ROM.
  - d) Follow instructions on CD-ROM to install the particular program so it can be used.
  - e) Test operation of the CD-ROM and drive by running one or more CD-ROM applications to Make sure proper configuration.
  - f) Replace base unit cover.



[Photo: Replacing cover](#)

**g)** Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUTOEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), and STARTUP.CMD



## How to install a primary hard disk drive.

### Solution:

BACKUP ALL FILES, remove the cover to the computer, disconnect drive cables, remove old drive. Set jumpers and drive selection switches on new hard drive, install drive in bay and reconnect cables. Turn on computer, run setup, low-level format MFM/ESDI disk, partition disk, format logical drives and test them.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Backup all desired application programs and data files using a network, tape backup unit or diskettes.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove old hard disk:
  - a) Remove the data ribbon cable from the drive by grasping the cable and connector, and pulling it out of the drive socket. Fold it back out of the way.



Photo: Remove hard disk ribbon cable

- b) Remove the power cable from the drive by pulling on the white plug (**WARNING: Do not pull on the 4 colored wires).** Fold it back out of the way.



Photo: Remove hard disk power cable

- c) Remove the drive bay by removing the two screws holding it to the front of the base unit and carefully lifting it out. *(NOTE: If hard disk is slotted in a drive bay with one or more other devices (e.g., floppy disk drive(s) or CD-ROM) disconnect the ribbon and power cables from them first. Then remove drive bay).*
  - d) Remove the two (or more) retaining screws from the left and right sides of the drive bay.



Photo: Side screws

- e) Remove the old hard disk drive from the drive bay and set it aside in a safe place.
- 4) Install the new hard disk:

- a) Set jumpers and drive selection switches.



Photo: Set hard disk drive select jumper

- 1] MFM and ESDI drives do not require termination, but the drive number must be set (e.g., 0 and 1 OR 1 and 2). Advanced drives may have other options that must be set for proper operation. Follow drive installation instructions.
- 2] IDE drives require moving Jumpers and/or changing DIP Switches as follows:
  - a] If there is only one IDE drive, set it to 'Master'.
  - b] If there are two IDE drives, set the one to be used as the boot disk to 'Master', and the other to 'Slave'. There may also be a jumper on the first drive to indicate that a second drive exists. See drive installation instructions for details.

*(NOTE: IDE drives from different manufacturers do not always work well together. Try to use drives from the same manufacturer)*
- 5) SCSI drives must be assigned a unique ID number (0-8). The SCSI device at the end of the chain is terminated. All devices connected between the SCSI controller card and the last device, must be assigned a unique ID and not be terminated. Refer to documentation for moving Jumpers and/or changing DIP Switches.
  - a) Usually, set the first SCSI hard disk to ID #0 and the second SCSI hard disk to ID #1.
  - b) Make sure the last SCSI device installed is terminated. (Common practice is to assign drive 0 to SCSI ID #0, terminate it and place it at the furthest end of the SCSI chain.) If this hard disk is the only SCSI device, its termination jumper should be set.
  - c) Keep a log (perhaps on sticker inside base unit) of SCSI device IDs, drivers and BIOS locations to prevent conflicts. Recommend installing one SCSI device at a time.
  - d) Check to see if the new drive fits the slot in the drive bay. Three options are available:
    - 1] New drive is the same size as the old one and it fits perfectly.
    - 2] Drive bay is for an older computer (e.g., AT) and drive rails are required.
    - 3] New drive is larger than the old drive (unlikely). If an adapter kit is installed, remove it. Otherwise locate another larger drive bay.
    - 4] New drive is smaller than the old drive. Install an adapter kit (e.g., to enable a 3.5 inch drive to fit in a 5.25 inch drive bay.
  - e) Turn the drive bay on its side and slide the hard disk into the drive bay. (Make sure the end of the drive with the connectors is oriented toward the rear of the base unit.) Line up the holes for the mounting screws and insert them. Turn the drive bay to its other side and secure it to the drive with mounting screws.



Photo: Side screws

- WARNING: DO NOT use longer screws or over-tighten them. This may cause the screw to enter the internal circuit board or the drive case and damage the drive.**
- f) Slide the drive bay back into place and resecure it to the base unit.

*NOTE: If installing in a standard drive bay, attach ribbon and power cables first (especially if in bottom bay).*



- g) Connect the power cable to the socket on the rear of the drive (it is molded or keyed to fit only one way).



Photo: Connect hard disk power cable

- h) Connect the ribbon data cable, coming from the controller card, to the large connector on the rear of the hard disk drive (red or blue side to Pin 1). (Cheap or old cables often cause lots of problems. If new cables are supplied, use them.)



Photo: Connect hard disk ribbon cable

- 1] MFM, RLL and ESDI drives/controllers use a 34-wire ribbon cable.
  - 2] ESDI drives/controllers use a 40-wire ribbon cable.
  - 3] SCSI drives/controllers use a 50-wire ribbon cable.
- i) Make sure other cable connections to drives and controller card are secure.
- 6) Reinstall external cables and power up computer.
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Insert boot diskette in Drive A.
  - d) Power up computer and display unit one at a time.
- 7) Run Setup to set the drive type in CMOS, as follows:
- NOTE: In most cases, the drive has not been formatted yet, so it cannot be read at this point.*
- CAUTION:** Setup usually refers to installed disks with the names Disk 0 for the first and Disk 1 for the second, etc. Make sure the proper one is selected.
- a) If the new drive is the exact same brand, model and size, no changes are required.
  - b) MFM drive: There should be a 'Drive Type' number associated with this model and size drive. Check the documentation that came with the system or drive.
  - c) ESDI drive: Most ESDI drive controllers work by setting the drive type to 1. This indicates a drive is present. Translation of specific characteristics is done automatically by the controller.
  - d) IDE drive: An IDE drive may or may not have a BIOS-supported type in the drive listing. Select the drive type that matches the characteristics (heads, cylinders, sectors, size) of the new drive, or choose 'User Defined' drive and enter the correct heads, cylinders, sectors, etc.
- CAUTION:** DO NOT set a user defined hard disk type so that the computer believes the hard disk is LARGER than it actually is (e.g., 515MB for a 420MB drive). This may damage the hard disk!
- e) SCSI drive: Choose the 'Not install' or 'No Drive Present' option. (The SCSI host adapter automatically handles translation.) *NOTE: To boot from this SCSI drive, the host adapter must be set to pretend to be a 'standard AT-style controller'.* If installing a drive larger than 1GB, or more than 2 drives, a special driver may be required. Check the controller manual to determine if Moving Jumpers is required, or if this is handled by chip firmware.
- 8) Low-level format drive (if applicable). (This prepares the drive to receive an operating system (high-level) format.
- a) MFM and ESDI drives require low-level formatting using a program provided with either the drive or controller. Remove the boot diskette from Drive A and insert the manufacturer's setup diskette.

Follow program instructions.

**CAUTION:** Make sure the correct drive is selected (the first drive is usually Drive 0 and the second Drive 1). Selecting the wrong drive will permanently destroy all data on the drive.

*NOTE: New hard disk drives are NOT perfect; they often contain a few defects in the surface. These bad sectors are excluded from use so that no data is stored there.*

- b) IDE drives do not require a low-level format. They are low-level formatted at the factory.

**WARNING:** DO NOT low-level format an IDE drive. It will make the drive useless.

- c) SCSI drives do not require a low-level format. They are low-level formatted at the factory.

- 9) Partition drive using FDISK. *(NOTE: Each hard disk consists of partitions that are either primary partitions, or logical drives within an extended partition.)*

- a) Decide what type of operating system configuration is desired, and how many partitions of each type to install on this hard disk. *NOTE: Considerations include number of operating systems, disk access speed (smaller multiple partitions increase disk access speed), ease of backups (afforded by separating programs from data) and space restrictions created by having multiple partitions. DOS 6.2 allows partitions up to 2GB.*

- 1] DOS only. Use the DOS FDISK and FORMAT command.

- 2] DOS and OS/2 Dual Boot. First use the DOS FDISK and FORMAT command and install DOS on the hard disk.

- 3] OS/2 only. Use the OS/2 FDISK command and format the hard disk as a part of the OS/2 installation procedure.

- b) Remove the manufacturer's drive setup diskette from Drive A and reinsert the boot diskette.

- c) Type FDISK at the DOS prompt, or FDISK at the OS/2 prompt. (The OS/2 version is identical to the DOS version except for the interface.) *NOTE: OS/2 also has a Presentation Manager FDISK that can be accessed by opening the 'Drives' object, and selecting 'Create Partition' after clicking on the upper left corner of the window with the mouse.*

*NOTE: If there are 2 or more hard disk drives installed, FDISK refers to them as Disk 1, Disk 2, etc. (not Disk 0 and Disk 1 as in CMOS Setup.)* Select '5. Change current fixed disk drive' to view a drive list and choose the appropriate drive by entering its digit.

- d) Create desired partitions:

- 1] DOS FDISK.

- a] Create a primary DOS partition:

- b] Choose '1. Create DOS partition or Logical DOS Drive' and press ENTER.

- c] Choose '1. Create Primary DOS Partition' and press ENTER.

- d] Do one of the following:

- 1} Type 'Y' for yes when prompted to '... use maximum available size of a Primary DOS Partition and make the partition active? (Y/N)' if that is the desire. FDISK will reboot the computer (make sure DOS boot disk remains in Drive A). Assuming no other hard disks are present, skip to high-level formatting this partition in Step 7 below.

- 2} Type 'N' for no and then enter the size of the desired Primary DOS Partition in MB or percent of the disk space (%). (Example: If total disk size is 150MB and a 30MB partition is desired, enter either 30 or 20%.)

- a} Press ESC to return to previous menu.

- b} Choose '2. Create Extended DOS Partition' to assign the remaining space to an Extended DOS partition and do one of the following:

- 1> Type 'Y' for yes when prompted to '... use maximum remaining size for an Extended DOS Partition and make the partition active? (Y/N)' if that is the desire. FDISK will reboot the computer (make sure DOS boot disk remains in Drive A). Assuming no other hard disks are present, skip to high-level formatting this partition in Step 7 below.
- 2> Type 'N' for no and then enter the desired size of the Extended DOS Partition in MB or percent of the disk space (%). (Example: If total disk size is 150MB with 100MB remaining a two 50MB partitions are desired, enter either 50 or 33%.) Repeat this process for the remaining space.
- c} (Optional) Choose '3. Create Logical Drive(s) in the Extended DOS Partition' to create additional logical drives in this partition.
- d} Press ESC twice to return to main menu.
- e} Choose 2. Set active partition' and designate one of the partitions in the list as active. (This will designate the boot partition.) Type the number of the partition to make active in the box (e.g., 1 or 2) and press ENTER.
- f} Press ESC to return to main menu.
- g} Press ESC to return to DOS.
- h} Press CTRL+ALT+DEL to reboot the computer (for changes to take effect).

## 2] OS/2 FDISK.

- a] Delete any existing partitions by using the arrow keys to highlight the partition and then select 'Delete partition' and press ENTER to delete it from the disk. Repeat this step for all existing partitions on the disk.
- b] Highlight the unused partition entry with the up/down arrow keys.
- c] Press ENTER to display the options menu again.
- d] Select 'Install Most'.
- e] Choose whether to position 'Boot Manager' at the beginning or end of the disk (Recommend the first 1MB). (This allocates the space for 'Boot Manager'; it will be installed later.)
- f] Select 'Create partition...' and press ENTER to create a primary disk partition for each operating system (OS/2 last). See [DOS-OS/2 Partitioning Example](#).
  - 1} Type the size of the partition in MB and specify whether it should be a primary partition or a logical drive within an extended partition. *(NOTE: DOS or OS/2 should be set up as the first primary partition.)*
  - 2} Use the options menu to change the parameters of that partition.
  - 3} Use the 'Startable' item to select the partition to be in control (usually 'Boot Manager' only).
  - 4} Use the 'Selectable' item to designate which choices will appear on the 'Boot Manager' startup menu.
- g] After checking table, press F3. FDISK asks to confirm selections before exiting.
- h] Proceed with installing OS/2. (If configuration is OS/2 only, the OS/2 installation procedure will high-level format the drive. Skip the next step.

## 10) High-level format drive using the operating system.

- a) Format the boot partition (usually Drive C) by entering the following command at the DOS or OS/2 prompt:  
 FORMAT C: /S /V

- (Using DOS, this will format Drive C, transfer the system files and COMMAND.COM, making Drive C bootable.)
- b) If the disk was partitioned into multiple partitions, format each remaining logical drive in sequence by entering the following command at the DOS or OS/2 prompt:  
FORMAT x:  
(Where x is the logical name of each remaining drive (e.g., D, E, F, etc.).)
  - c) After all logical drives are formatted, remove the boot diskette from Drive A and press CTRL+ALT+DEL to reboot the computer (it should boot fine from the hard disk).
- 11) Test operation of the hard disk drive and each of its partitions by running one or more commands that access it to Make sure proper configuration. Examples: Perform a directory, copy and read several files and then delete them. Also test functionality of each floppy disk drive to make sure their operation was not disturbed.
- 12) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Make sure controller card is fully seated.
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives. Make sure the cables are routed correctly and each connection is secure.
  - c) Reconnect the power, reboot and retest drive access.
- 13) If still unable to access one or more drives but computer seems to boot OK from boot diskette in Drive A, run Setup and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 14) If problems persist, try one or more of the following steps:
- a) Reread installation instructions and make sure data cables are routed properly and drives are connected in proper sequence.
  - b) Check jumper and DIP switch settings on all drives with those specified in the installation instructions (especially if there is more than one hard disk drive installed).
  - c) If 2 IDE drives do not work right, try switching the master/slave relationship. If they are from different manufacturers, consider exchanging one for a drive from the other manufacturer.
  - d) If this is a SCSI installation, recheck all SCSI ID assignments to make sure there are no conflicts. Also make sure the last device is terminated.
  - e) If the computer must be turned on several times before it works properly, the power supply may be too weak or going bad. This prevents the hard disk from coming up to speed in a timely manner.
- 15) Replace base unit cover.



Photo: Replacing cover

- 16) Install operating system (i.e., DOS or OS/2) on boot partition (i.e., Drive C). Follow instructions accompanying operating system software.
- 17) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:
- DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.
- OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD





## How to configure SCANDISK to monitor read/write/seek times.

### Solution:

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Use the /TIME switch.

*NOTE: SCANDISK is a DOS 6.2 and later utility for repairing disk, directory and file errors.*

Do one of the following:

- 1) Add the /TIME switch to the command line as follows:

SCANDISK x: /TIME

(Where x is the name of the disk drive to be scanned.)

- 2) Change the 'ScanTimeOut' option to 'On' from 'Off'.

- a) Locate the SCANDISK.INI file. (It may be located in C:\ or C:\WINDOWS\COMMAND.)

- b) Edit the SCANDISK.INI file by entering the following at the DOS prompt:

TYPE [PATH]\SCANDISK.INI

where [PATH] is the path to the SCANDISK.INI file.

- c) Locate the 'Environment' section.

- d) Locate the 'ScanTimeOut=off' command line and change it to read as follows:

SCANTIMEOUT=ON

- e) Save the file and exit.

- f) Enter [PATH]\SCANDISK at the DOS prompt.

Where [PATH] is the path to the SCANDISK.EXE file.



## Format a disk.

### Solution:

Enter the following command at the DOS prompt:

FORMAT x:

(Where x is the drive designation of the drive to be formatted.)

There are several reasons/situations to format a disk. Select one of the following situations and enter the command following it at the DOS prompt:

- 1) Format a new or used diskette of the same size as the floppy drive.

FORMAT A: or FORMAT B:

- 2) Format a new or used diskette of a different size than the floppy drive.

FORMAT A: /F:size or FORMAT B: /F:size

(Where size is the byte size of the diskette to be formatted.)

SIZES: 5 1/4 360K 1.2MB

3 1/2 760K 1.44MB 2.88MB

- a) Example. To format a 360K diskette in a 1.2MB B drive:

FORMAT B: /F:360K

- b) Example. To format a 360K diskette in 2.88MB A drive:

FORMAT A: /F:360K

- 3) Format a bootable DOS system diskette.

FORMAT A: /S or FORMAT B: /S

- 4) Format a hard disk drive (Called 'High-level' format).

FORMAT C: or FORMAT D:

**CAUTION:** Exercise care when selecting the logical hard drive to format. Data will be lost on the formatted disk!

- 5) Include a volume label with the formatting command (DOS 5x and later).

FORMAT A: /V:label

(Where 'label' is a volume label not to exceed 11 characters.)

- 6) Unformat a diskette (immediately after formatting it) to retrieve overlooked files (DOS 5.x and later).

UNFORMAT A: or UNFORMAT B:







## Multiple CD-ROM drives; Use the /D:MSCDxxxx parameter to distinguish drives.

### Solution:

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Adjust the CD-ROM driver in CONFIG.SYS and the MSCDEX command in AUTOEXEC.BAT using the /D:MSCDxxxx parameter to differentiate between drives.

Add/modify the CD-ROM lines in AUTOEXEC.BAT and CONFIG.SYS. Pay close attention to the MSCDxxxx portions of the commands. This example assigns the first device to Drive G and the second device to Drive H.

1) Edit CONFIG.SYS.

2) Add/modify the CD-ROM driver lines to match the following example.

```
DEVICE=C:\<pathname>\<filename> /D:MSCD000
```

```
DEVICE=C:\<pathname>\<filename> /D:MSCD001
```

(Where <pathname> is the path to the device driver and <filename> is the name of the device driver.)

3) Edit AUTOEXEC.BAT.

4) Add/modify the MSCDEX command to match the following example.

```
MSCDEX /D:MSCD001 /L:G /D:MSCD000 /L:H
```

(Assigns CD-ROM device 001 to Drive G and CD-ROM device 000 to Drive H.)



## How to change the size of a compressed disk.

### **Solution:**

Enter DBLSPACE to open DoubleSpace Management Utility. Select 'Change Size' from the 'Drive' menu and enter the new size.

- 1) Enter the following command at the DOS prompt:  
DBLSPACE  
(This opens the DoubleSpace Management Utility.)
- 2) Select the desired 'Drive' to be double-spaced.
- 3) Select 'Change Size'.
- 4) Enter a new size for the compressed drive.
- 5) Exit the DoubleSpace Management Utility.
- 6) Reboot the computer (so the change will take effect).



## How to configure expanded and extended memory (286).

### Solution:

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Configure memory card for both enhanced and extended memory. Add following commands to CONFIG.SYS:

DEVICE=C:\EMMBOARD.SYS

DEVICE=C:\DOS\HIMEM.SYS

DOS=HIGH,UMB

Reboot computer and enter MEM at DOS prompt to check expanded and extended memory status.

- 1) Configure the memory adapter card for both extended and expanded memory if possible. (Refer to the owner's manual for memory card).
- 2) Make a special recovery diskette to use in case the following steps do not work:
  - a) Insert a blank diskette into the floppy drive.
  - b) Enter the following command at the DOS prompt:  
FORMAT A: /S  
(This will format the diskette and copy the system files and COMMAND.COM to it.)
  - c) Enter the following command at the DOS prompt:  
COPY C:\CONFIG.SYS A:
- 3) Edit CONFIG.SYS.
  - a) Enter the expanded memory adapter card device driver first.  
DEVICE=C:\EMMBOARD.SYS
  - b) Next enter the HIMEM.SYS line.  
DEVICE=C:\DOS\HIMEM.SYS
  - c) To load DOS into the high memory area (HMA or the first 64K of extended memory) and make upper memory blocks available in the UMA, enter the following command line:  
DOS=HIGH,UMB
  - d) Save the CONFIG.SYS file and exit the editor.
- 4) Reboot the computer (to make the changes take effect).

- 5) Enter MEM /C at the DOS prompt to see if both expanded and extended memory are available.
- 6) If the computer fails to restart, the expanded memory manager is probably conflicting with HIMEM.SYS.
- 7) (Optional) To return to the original configuration:
  - a) Insert the recovery diskette into the floppy drive.
  - b) Reboot the computer.
  - c) Enter the following command at the DOS prompt:  
COPY A:CONFIG.SYS C:
  - d) Reboot the computer.



## How to configure both expanded and extended memory (MS-DOS 5.x).

### Solution:

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Configure memory card for extended memory only. Add following commands to CONFIG.SYS:

DEVICE=C:\DOS\HIMEM.SYS

DEVICE=C:\DOS\EMM386.EXE nnn RAM

DOS=HIGH,UMB

Reboot computer and enter MEM at DOS prompt to check expanded and extended memory status.

- 1) Configure the memory adapter card for both extended and expanded memory if possible. (Refer to the owner's manual for memory card).
- 2) Make a special recovery diskette to use in case the following steps do not work:
  - a) Insert a blank diskette into the floppy drive.
  - b) Enter the following command at the DOS prompt:  
FORMAT A: /S  
(This will format the diskette and copy the system files and COMMAND.COM to it.)
  - c) Enter the following command at the DOS prompt:  
COPY C:\CONFIG.SYS A:
- 3) Edit CONFIG.SYS.
  - a) Make sure the following device driver for HIMEM.SYS is listed first (to provide access to extended memory).  
DEVICE=C:\DOS\HIMEM.SYS
  - b) Add the following device driver for EMM386:  
DEVICE=C:\DOS\EMM386.EXE nnn RAM  
(Where nnn is the amount of extended memory to allocate to EMM386.EXE (e.g., 640)). The RAM switch instructs EMM386 to provide access to upper memory area (UMA) and expanded memory.
  - c) To load DOS into the high memory area(HMA, the first 64K of extended memory) and make upper memory blocks available, enter the following command line:  
DOS=HIGH,UMB

- d)** Save the CONFIG.SYS file and exit the editor.
- 4)** Reboot the computer (to make the changes take effect).
- 5)** Enter MEM /C at the DOS prompt to see if both expanded and extended memory are available.
- 6)** If the computer fails to restart, the expanded memory manager is probably conflicting with HIMEM.SYS.
- 7)** (Optional) To return to the original configuration:
  - a)** Insert the recovery diskette into the floppy drive.
  - b)** Reboot the computer.
  - c)** Enter the following command at the DOS prompt:  
COPY A:CONFIG.SYS C:
  - d)** Reboot the computer.



## How to configure both expanded and extended memory (MS-DOS 6.x).

**Solution:**

Run MemMaker, choosing 'Expanded Memory' =YES and accepting default recommendations at the rest of prompts.



## How to configure expanded memory in MS-DOS 5.0.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

To use an expanded memory adapter card in a 386 computer with EMM386.EXE under MS-DOS 5.0, load the device drivers into the upper memory area (UMA), and configure the memory on the card as EXTENDED memory.

- 1) Set the expanded memory board as extended.
- 2) Edit CONFIG.SYS.
- 3) Enter the expanded memory adapter card device driver first.
- 4) Next, enter the HIMEM.SYS line.
- 5) Next, enter the EMM386 line, excluding the address range of the memory card's page frame.

EXAMPLE CONFIG.SYS ENTRIES:

DEVICE=C:\EMMBOARD.SYS

DEVICE=C:\DOS\HIMEM.SYS

DEVICE=C:\DOS\EMM386.EXE RAM 1024 X=C000-C7FF

- 6) Save the file and exit editor.
- 7) Reboot the computer to make the changes take effect.





## How to configure extended memory in MS-DOS 5.0.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Reserve some extended memory to permit HIMEM.SYS or EMM386.EXE to load.

- 1) Run Setup.
- 2) Instead of allocating all available extended memory as Expanded Memory Specification (EMS) or expanded memory, setup some of it as extended memory.
- 3) Save the settings and reboot the computer.
- 4) Edit CONFIG.SYS and check HIMEM.SYS and EMM386.EXE command lines in the CONFIG.SYS file for proper syntax. EXAMPLES:  
DEVICE=C:\DOS\HIMEM.SYS  
DEVICE=C:\DOS\EMM386.EXE /RAM
- 5) (Optional) To load DOS high, Edit AUTOEXEC.BAT and make sure the following command is listed:  
DOS=HIGH,UMB
- 6) Reboot the computer and make the changes take effect.



## How to install cache memory chips.

### Solution:

To install Cache Memory Chips, verify memory information and remove the base unit cover. Identify the location on the mainboard, orient the chip properly and insert the chips and press straight down into the socket. Power up the computer, watch the memory test and update CMOS.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Remove base unit cover.
- 2) Read owner's manual and inspect mainboard to determine the type of cache memory chips or modules that is required. Determine/verify the following items:
  - a) Type of memory required (e.g., SRAM, SIMMs).
  - b) Amount of memory desired/required.

*NOTE: Sometimes cache memory must be added in certain increments to fill an entire bank at a time.*

EXAMPLE: Cache memory in a computer that has two banks (e.g., banks 0 and 1) of 32Kx8 SRAM chips, must be installed in increments of four 32Kx8 memory chips at a time. This means that the external CPU cache can contain 128KB or 256KB at a time.

- c) Speed of new memory matches that already installed.

*NOTE: If removing an old SRAM is not required, skip to Step 4 for installation steps.*

- 3) Removing old Cache Memory Chip(s):
  - a) Touch the metal sides of the base unit to discharge any static.
  - b) Remove old SRAM chip using chip puller. Grasp the edges firmly between the tips of the tweezers, and pull straight up (rocking gently back and forth if necessary).
  - c) Place the SRAM chip in an anti-static envelope (do not mix it with new SRAMs).
  - d) Repeat steps 3)a)-3)c) to remove additional SRAMs.
- 4) Install new Cache Memory Chip(s):
  - a) Locate the appropriate cache chip socket on the mainboard.
  - b) Touch metal sides of the base unit to discharge static electricity.
  - c) Install new SRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**(CAUTION: Be careful not to bend or damage delicate pins on SRAM chip, or damage chip socket on board.)**
  - d) Repeat steps 4)a)-4)c) to install additional SRAM chips.
  - e) Make sure all Cache Memory Chips are level and completely seated by again pressing down firmly on each chip.

- 5) Test computer to see if new cache memory is recognized and functioning properly:
  - a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer.
  - d) Carefully observe the MEMORY TEST portion of the POST. (It should report 1024KB of cache memory for each MB of cache memory installed.  
*NOTE: Also, an error message reporting inconsistent memory may appear because of inconsistencies between CMOS information and actual memory found. This is addressed in Step 6 below.)*
  - e) If all installed cache memory is not reported, or POST does not complete successfully:
    - 1] Power down computer.
    - 2] Unplug power cable.
    - 3] Touch the metal sides of the base unit to discharge any static electricity.
    - 4] Recheck all SRAMs to make sure they are properly seated. If necessary, remove and reinstall them using steps 3) and 4) above, or run a hardware diagnostic program to identify which chip(s) may be faulty.
    - 5] Repeat steps 5)a) to 5)e) to retry memory test.
- 6) Update the amount of cache memory in CMOS:
  - a) Run Setup.
  - b) Move to the cache memory section, and update the amount of cache memory in the system (refer to help or owner manual for assistance).
  - c) Save Setup and reboot the computer.
  - d) If problems reoccur, repeat Steps 4) and 5).
- 7) Replace base unit cover.
- 8) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.  
OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## How to install cache module (SIMM).

### Solution:

To install an SRAM Cache Module, verify the memory type, speed and quantity, and remove the base unit cover. Identify the installation location on the mainboard and insert SRAM SIPP at an angle and press back. Power up, watch the POST memory test, and update CMOS.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Remove base unit cover.
- 2) Read owner's manual and inspect mainboard to determine the type of memory modules that are required. Determine/verify the following items:

- a) Type of memory required (e.g., SRAM, SIMMs).
- b) Amount of memory desired/required.

*NOTE: Sometimes cache memory must be added in certain increments to fill an entire bank at a time.*

EXAMPLE: Cache memory in a computer that has two banks (e.g., banks 0 and 1) of 32Kx8 SRAM chips, must be installed in increments of four 32Kx8 memory chips at a time. This means that the external CPU cache can contain 128KB or 256KB at a time.

- c) Speed of new memory matches that already installed.

*NOTE: If removing an old SIMM is not required, skip to Step 4) for installation steps.*

- 3) Removing old SIMM(s):

- a) Touch the metal sides of the base unit to discharge any static.
- b) Unclip the clip at each end of the SIMM (this should cause the SIMM to spring forward slightly).

**CAUTION:** *Never force a SIMM out of the slot. Both the SIMM and its slot may be damaged.*

- c) Grasp the SIMM and carefully lift it out of the slot.
- d) Place the SIMM in a protective anti-static envelope (do not mix it with new SIMMs).
- e) Repeat steps 3)a)-3)d) to remove additional SIMMs.

- 4) Install new SIMM(s):

- a) Touch the metal sides of the base unit to discharge any static electricity.
- b) Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will fit only one way into the socket.*

- c) Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available (Refer to labels on mainboard or diagram in owner's manual.)

- d) Grasp SIMM with thumb and two fingers by top edge and insert it into SIMM slot at an angle.
- e) Press down, applying even pressure across the SIMM, and rock it back into place towards the back of the socket.

*(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation)*

**CAUTION:** Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.

- f) Repeat steps 4)a-4)e) to install additional SIMMs.
  - g) Make sure all SIMMs are at the same height and angle to the board.
  - h) Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
- 5) Test computer to see if new cache memory is recognized and functioning properly:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer.
  - d) Carefully observe the MEMORY TEST portion of the POST. (It should report 1024KB of memory for each 1MB of cache memory installed.
- (NOTE: Also, an error message reporting inconsistent memory may appear because of inconsistencies between CMOS information and actual memory found. This is addressed in Step 6), below.)*
- e) If all installed memory is not reported or POST does not complete successfully:
    - 1] Power down computer.
    - 2] Unplug power cable.
    - 3] Touch the metal sides of the base unit to discharge any static electricity.
    - 4] Recheck cache SIMMs to make sure they are properly seated. If necessary, remove and reinstall them using steps 2 and 3 above.
    - 5] Repeat steps 5)a) to 5)e) to retry memory test.
- 6) Update the amount of cache memory in CMOS:
- a) Run Setup.
  - b) Move to the cache memory section, and update the amount of cache memory in the system (refer to help or owner manual for assistance).
  - c) Save Setup and reboot the computer.
  - d) If problems reoccur, repeat Steps 4)and 5).
- 7) Replace base unitcover.
- 8) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:
- DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.
- OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD



## How to install SIPP memory.

### Solution:

To install SIPP(s), verify the memory type, speed and amount and remove the base unit cover. Identify the lowest bank and row, insert SIPP at an angle and press back until it snaps into place. Power up the system, observe the POST memory test, and update CMOS.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Remove base unit cover.
- 2) Read owner's manual and inspect mainboard to determine the type of memory chips or modules that is required. Determine/verify the following items:
  - a) Type of memory required (e.g., DRAM, SIMMs, SIPPs).
  - b) Amount of memory desired/required.

*NOTE: Sometimes memory must be added in specific increments to fill an entire memory bank at the same time (e.g., 2MB, 4MB or 8MB, depending on the memory type).*

EXAMPLE: RAM memory in a 486 computer that uses 1x9 or 4x9 SIMMs, must be installed in increments of four SIMMs of the same size and type at a time (e.g., 4MB, 16MB).

- c) Speed of new memory matches that already installed.

*NOTE: If removing an old SIPP is not required, skip to Step 4) for installation steps.*

- 3) Removing old SIPP(s):
  - a) Touch the metal sides of the base unit to discharge any static.
  - b) Grasp the SIPP, using a finger and thumb of each hand on either end of the SIPP, and gently lift straight up.

**CAUTION:** *Never force a SIPP out of the slot. Both the SIPP and its slot may be damaged.*

- c) Place the SIPP in an anti-static envelope (do not mix it with new SIPPs).
  - d) Repeat steps 3)a)-3)d) to remove additional SIPPs.

- 4) Install new SIPP(s):

- a) Touch the metal sides of the base unit to discharge any static electricity.
  - b) Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c) Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available (Refer to labels on mainboard or diagram in owner manual.)
  - d) Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
  - e) Grasp the SIPP, using a finger and thumb of each hand on either end of the SIPP, and gently press it

down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

- f) Repeat steps 3)a)-4)e) to install additional SIPPs.
- g) Make sure all SIPPs are at the same height and are perpendicular to the board.
- h) Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
- i) [Move Jumpers](#) and/or [Change DIP Switches](#), if necessary.



[Photo-Moving jumpers](#)



[Photo-DIP Switches](#)

- 5) Test computer to see if new memory is recognized and functioning properly:
  - a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video), and plug in power cable.
  - c) Power up computer.
  - d) Carefully observe the MEMORY TEST portion of the [POST](#). (It should report 1024KB of memory for each MB of memory installed. Some computers may be off by 384KB, depending on how they handle the 384KB in the first 1MB of memory.)  
*(NOTE: Also, an error message reporting inconsistent memory may appear because of inconsistencies between CMOS information and actual memory found. This is addressed in Step 6), below.)*
  - e) If all installed memory is not reported or POST does not complete successfully:
    - 1] Power down computer.
    - 2] Unplug power cable.
    - 3] Touch the metal sides of the base unit to discharge any static electricity.
    - 4] Recheck SIPPs to make sure they are properly seated. If necessary, remove and reinstall them using steps 2) and 3) above.
    - 5] Repeat steps 5a to 5e to retry memory test.
- 6) Update the amount of memory in CMOS:
  - a) [Run Setup](#).
  - b) Move to the memory section, and update the amount of memory in the system (refer to help or owner's manual for assistance).
  - c) Save Setup and reboot the computer.
  - d) If problems reoccur, repeat Steps 5) and 6).
- 7) [Replace base unit cover](#).
- 8) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## How to install DRAM memory.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the DRAM chip(s) by removing the base unit cover, locating and removing the old chip(s) and installing the new chip(s). Power up the system, watch POST memory test, and update CMOS.

- 1) Remove base unit cover.
- 2) Read owner's manual and inspect mainboard to determine the type of memory chips or modules that is required. Determine/verify the following items:
  - a) Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - b) Amount of memory desired/required. Sometimes memory must be added in specific increments to fill an entire memory bank at the same time (e.g., 2MB, 4MB or 8MB, depending on the memory type).

EXAMPLE: RAM memory in a 486 computer that uses 1x9 or 4x9 SIMMs, must be installed in increments of four SIMMs of the same size and type at a time (e.g., 4MB, 16MB).

- c) Speed of new memory matches that already installed.

*NOTE: If removing an old DRAM is not required, skip to Step 4 for installation steps.*

- 3) Removing old DRAM(s):
  - a) Touch the metal sides of the base unit to discharge any static.
  - b) Remove old DRAM chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).
  - c) Place the DRAM chip in an anti-static envelope (do not mix it with new DRAMs).
  - d) Repeat steps 3)a)-3)c) to remove additional DRAMs.
- 4) Install new DRAM(s):
  - a) Locate the proper chip socket on the mainboard.
  - b) Touch metal sides of the base unit to discharge static electricity.
  - c) Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**(CAUTION:** *Be careful not to bend or damage the delicate pins on DRAM, chip or damage chip socket on board.)*
  - d) Repeat steps 4)a)-4)c) to install additional DRAMs.
  - e) Make sure all DRAMs are level and completely seated by again pressing down firmly on each chip.
  - f) Check owner manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.

- g) Move Jumpers and/or Change DIP Switches, if necessary.



Photo-Moving jumpers



Photo-DIP Switches

- 5) Test computer to see if new memory is recognized and functioning properly:
- Make sure no parts or tools remain in metal sides of the base unit.
  - Replace necessary cables (power, keyboard, video) and plug in power cable.
  - Power up computer.
  - Carefully observe the MEMORY TEST portion of the POST. (It should report 1024KB of memory for each MB of memory installed. Some computers may be off by 384KB, depending on how they handle the 384KB in the first 1MB of memory.)  
*(NOTE: Additionally, an error message that reports inconsistent memory may appear because of inconsistencies between CMOS information and actual memory found. This is addressed in Step 6), below.)*
- e) If all installed memory is not reported, or POST does not complete successfully:
- Power down computer.
  - Unplug power cable.
  - Touch the metal sides of the base unit to discharge any static electricity.
  - Recheck all DRAMs to make sure they are properly seated. If necessary, remove and reinstall them using steps 2 and 3 above, or run a hardware diagnostic program to identify which chip(s) may be faulty.
  - Repeat steps 4a to 4e to retry memory test.
- 6) Update the amount of memory in CMOS:
- Run Setup.
  - Move to the memory section and update the amount of memory in the system (refer to help or owner manual for assistance).
  - Save Setup and reboot the computer.
  - If problems reoccur, repeat Steps 4 and 5.
- 7) Replace base unit cover.
- 8) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:
- DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.
- OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD





## How to assign a DMA channel at installation or setup.

### Solution:

Install the new component with the default DMA Channel setting.

Do one of the following:

- 1) Use a hardware utility program (e.g., WinSleuth) to identify assigned DMA channels and choose a different one.
- 2) Install the component with the default DMA channel setting. If conflicts arise, choose a different memory address until the conflict disappears.

*(NOTE: This usually works for simple systems with few additional devices/components.)*

- 3) Create a system inventory by opening the base unit and examining the DIP Switches and Jumper settings on each card/component. Consult the installation guide for each component to determine DMA channels used, based on the settings observed and written in the inventory. Select a DMA channel for the new component that is different from those already in use.



## How to assign a memory address to a new component.

### Solution:

Install the new component with the default memory address settings.

Do one of the following:

- 1) Use a hardware utility program (e.g., WinSleuth) to identify the assigned memory addresses and choose a different one.
- 2) Install the component with the default memory address setting. If conflicts arise, choose a different memory address until the conflict disappears.

*(NOTE: This usually works for simple systems with few additional devices/components.)*

- 3) Create a system inventory by opening the base unit and examining the DIP Switches and Jumper settings on each card/component. Consult the installation guide for each component to determine DMA channels used, based on the settings observed and written in the inventory. Select a memory address for the new component that is different from those already in use.



## How to free up conventional memory.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Use MemMaker to optimize memory use in computer. It will change AUTOEXEC.BAT and CONFIG.SYS to load TSRs and device drivers into the Upper Memory Area (UMA) (memory between 640K and 1 MB).

- 1) Exit all programs, including Windows and DOS Shell.
- 2) Enter the following command at the DOS prompt:  
MEMMAKER
- 3) Select 'Express Setup' (Unless very experienced with memory management).
- 4) When asked if any programs require expanded memory (EMS) answer Yes or No (usually No).
- 5) Answer several questions about Windows (e.g., where it is installed).
- 6) Wait for MemMaker to perform, as follows:
  - a) MemMaker will reboot the PC.
  - b) MemMaker analyzes the system to determine the optimum memory setup.
  - c) MemMaker rewrites the AUTOEXEC.BAT and CONFIG.SYS files.
  - d) MemMaker reboots the system again (Press 'Enter' key to proceed).
- 7) MemMaker asks if the system is working properly:
  - a) Choose Yes by pressing 'Enter', if no error messages were displayed and the system appears to be working properly.
  - b) Choose No by pressing 'Spacebar' if the system is not functioning properly. Follow the instructions on the screen to have MemMaker try some additional setup changes.

*NOTE: To discard MemMaker's changes and return the system to its previous state, enter the following command at the DOS prompt:*

MEMMAKER /UNDO





## How to see how much memory is installed.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Watch for the memory total at the end of the RAM check during bootup or run MEM /C at the DOS prompt.

Do one of the following:

- 1) Watch for memory total at end of RAM check during bootup.
- 2) Use a hardware utility (e.g., Microsoft Diagnostics (MSD)) to identify system memory.
  - a) Enter MSD at DOS prompt.
  - b) Choose 'Memory...' button (2nd on left side).



Choose MSD Memory Status Screen

- c) Add the numbers shown under 'Conventional', 'Extended' and 'Expanded' memory.



Memory Status Screen

- 3) Run the MEM command in DOS:
  - a) Enter the following command at the DOS prompt
  - b) Read the 'Total' memory column at the end of the report.

*NOTE 1: In some discussions, megabytes (MB) of memory are rounded off to 1000K. The correct number is 1024K. Also, if total memory appears to be 1MB or 384KB short, this is due to how conventional memory and the first 1MB of memory is counted (or missed). The first 1MB of memory consists of 640K of conventional memory, and the 384K upper memory area (or UMAPCDGS071.TXT) above it. One or both of these are often not reported in the total memory.*

*NOTE 2: If computer is not reporting all the memory known to be installed, either CMOS Setup is incorrect, one or more jumpers or DIP switches on mainboard are not set correctly to inform the computer of the additional installed memory, or a memory manager (e.g., HIMEM.SYS) is not loaded.*







## Install/replace bus mouse.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Use MSD to select a free COM port and interrupt. Turn the computer off. Set card jumpers. Install bus mouse card. Locate mouse/serial port and plug mouse cable into back of computer. Turn computer on, install mouse driver and update system file(s). Reboot computer, update Windows and OS/2.

- 1) Run a diagnostic utility (e.g., Microsoft Diagnostics (MSD) to identify both a free COM port and free interrupt. Type MSD at the DOS prompt.
- 2) Review and select COM port.
  - a) Choose 'COM Ports...' button.



[Choose MSD COM Ports Screen](#)

- b) Review list of COM ports to Make sure there are no conflicts and identify a free COM port.



[MSD Serial Port Configuration Example](#)

- c) See [Serial Port Configuration Standards](#) for information on selecting a COM port.
- d) Select an available COM port.
- 3) Review and select interrupt (IRQ).
  - a) Choose 'IRQ Status...' button.



[Choose MSD IRQ Status Screen](#)

**CAUTION:** *Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- b) Review list of interrupts to Make sure there are no conflicts and identify a free interrupt.



[Choose MSD IRQ Status Example](#)

- c) See [IRQ Conflicts](#) for information on avoiding IRQ conflicts.

- d) Select an available interrupt.

(HINT: If not using a 2nd printer port and base unit contains few expansion cards, interrupt (IRQ) 5 should be available.)

*NOTE: If removing an expansion board is not required, skip to Step 6 for bus mouse card installation steps.*

- 4) Remove base unit cover.

- 5) Remove old bus mouse card:

- a) Remove the screw from the top notch of the mounting bracket on the card.
- b) Touch the metal sides of the base unit to ground any static and, grasping the bus mouse card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
- c) Place the card in a static-resistant envelope.
- d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.

- 6) Install new bus mouse card:

- a) Remove the bus mouse card from its box and from the protective anti-static envelope.
- b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
- c) Considering the COM port and IRQ assignments determined in step 1, read the bus mouse card manual and identify which, if any, settings must be changed on the card for this particular computer.

*(NOTE: If installing Microsoft Bus Mouse (InPort Adapter), leave port selection switch set to 'Primary Inport'.)*

- d) Move Jumpers and/or Change DIP Switches, if necessary.

The CyberMedia logo is displayed in a large, bold, red, italicized font. The word "CyberMedia" is followed by a registered trademark symbol (®).

Photo-Moving jumpers

The CyberMedia logo is displayed in a large, bold, red, italicized font. The word "CyberMedia" is followed by a registered trademark symbol (®).

Photo-DIP switches

- e) Identify a free expansion slot of appropriate size and remove the rear metal slot cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the bus mouse card by its edges, insert bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.
  - h) Orient the serial plug on the end of the mouse cable to the bus mouse card serial socket on the rear of the computer, and connect it.
  - i) Make sure no parts or tools remain in metal sides of the base unit.
  - j) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - k) Turn on the computer and related peripherals one at a time.
- 7) Install mouse driver:

*NOTE: If replacing a mouse with an identical mouse, the following section is optional (however an updated mouse driver may be available).*

- a) Locate the mouse installation diskette and instructions and insert the diskette in floppy drive.
  - b) Type the following command at the DOS prompt:  
A:INSTALL or A:SETUP  
(Depending on instructions.)
  - c) Follow instructions in the installation program (responding with the port assignment determined in step 1).
  - d) Respond 'YES' when asked for permission to add information to AUTOEXEC.BAT and/or CONFIG.SYS. (This adds the correct driver statement to the file to enable the mouse to run when the computer is turned on.)
  - e) Press CTRL+ALT+DEL to reboot the computer. (This will load the driver added to AUTOEXEC.BAT or CONFIG.SYS into memory and enable mouse to function.)
- 8) If the mouse model differs from the old mouse, update mouse configuration in Windows and/or OS/2.  
[Update Windows/OS2 Mouse Configuration](#)
- 9) Test application software that uses the mouse (drivers and bus mouse card) to Make sure proper configuration.
- 10) [Replace base unit cover.](#)
- 11) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.  
OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Install/replace scanner.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Remove the base unit cover, install the scanner adapter card, prepare the scanner for operation, install cables, observe POST, resolve conflicts, install the driver and application, test scanner operation and replace base unit cover.

*NOTE: If removing an old scanner adapter card is not required, skip to Step 3 for installation steps.*

- 1) Remove base unit cover.
- 2) Remove the old scanner adapter card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the scanner adapter card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit cards crack easily).
  - c) Place the card in a static-resistant envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 3) Install new scanner adapter card:
  - a) Remove the scanner adapter card from its box and from the protective static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
  - c) Read the scanner adapter card manual and identify which, if any, settings need to be changed on the card for this particular computer.

*NOTE: If system is simple and has few adapter cards (e.g., tape drive, fax/modem, SCSI host adapter), the default settings on scanner adapter card should work. Verify no conflicts with installed devices. Otherwise identify an appropriate I/O address and, in some cases a free interrupt (IRQ) and DMA address.*

- d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo-Moving jumpers



#### Photo-DIP Switches

- e) Identify a free expansion slot of appropriate size and remove the rear metal slot cover.
- f) Touch the metal sides of the base unit to ground any static and, grasping the scanner adapter card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
- g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole, and tighten it securely.

#### 4) Setup scanner:

- a) Locate scanner within cable reach of computer.
- b) Remove shipping lock (usually a screw or tab).

***CAUTION:** Not removing the shipping lock before operation may damage the scanner or burn out the motor. Make sure it is removed before operating the scanner.*

- c) Check owner manual for additional setup tasks (e.g., install bulb).
- d) Connect data cable between scanner unit and scanner adapter card. Check the manual to verify connector orientation and gently insert the cable connector into the card connection and the scanner.
- e) Attach a power cord to the scanner and plug it into a power receptacle.
- f) Turn on the scanner. *(NOTE: Turn on scanner before turning on or rebooting the PC. Most scanners, especially SCSI scanners, must complete their own self-test before being recognized by the computer system.)*

#### 5) Power on computer system and resolve conflicts:

- a) Make sure no parts or tools remain in metal sides of the base unit.
- b) Replace necessary cables (power, keyboard, video) and plug in power cable.
- c) Turn on the computer and related peripherals one at a time (scanner first).
- d) Observe POST for any error messages signaling potential problems.
- e) If computer does not boot properly:
  - 1] First, recheck all hardware connections (seating of scanner card, secure connections for data and power cables, configuration of scanner unit).
  - 2] Second, resolve conflict(s) between scanner card and another component by changing the address of the scanner card OR the other component.

*NOTE: Change only ONE item at a time (to prevent introducing new errors). Also, keep a log of all original and changed settings (to enable back-tracking if necessary).*

- f) Repeat Step 5e until computer boots successfully.

#### 6) Install scanner driver and related application software and test new configuration:

- a) Install driver software for scanner from diskette accompanying card, following the installation/setup instructions in the card's manual.
- b) Install scanner application software. Follow instructions accompanying the software package.
- c) Do one or both of the following:
  - 1] Update or add device to Windows.
  - 2] Update or add device to OS/2.
- d) Test the scanner and application software by scanning several documents to Make sure proper

configuration.

- e) Replace base unit cover.
- f) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.  
OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Install/replace serial mouse, PS/2 mouse or trackball.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

**NOTE:** A trackball is a pointing device similar to a mouse (follow the instructions below for a mouse).

Turn off the computer. Locate the mouse/serial port and plug the mouse cable into the back of the computer. Turn on the computer, install the mouse driver and update system file(s). Reboot computer, update Windows.

1) Save all files and exit all programs, including Windows.

2) Turn off the power to the computer.

**NOTE:** If removing an old mouse is not required, skip to Step 4 for installation steps.

3) Remove the defective mouse:

- a) Trace the mouse cable to the back of the computer. Note the location of the mouse cable connection.
- b) If the mouse connects to a 9-pin or 24-pin serial port, unscrew any hold-down screws on this plug.
- c) Grasp the mouse plug and gently pull it straight out.

4) Install a new serial mouse:

- a) Match the connector styles of the mouse and the computer port to use (Make note of the port used (e.g., COM1, COM2):
  - 1] If both match the port where the old mouse was removed, use this port.
  - 2] If both are slender 6-pin PS/2-style connectors, use this port (often labeled 'Mouse').
  - 3] If both use 9-pin serial ports, use this port.
  - 4] If the mouse plug differs in size from the port on the back of the computer, obtain an adapter (e.g., 9-pin to 6-pin serial port adapter, or 9-pin to 25-pin serial adapter).
  - 5] If no serial port is available, a bus-mouse is required (See installing a bus-mouse.)
- b) Examine the shape and markings (e.g., notches or arrow) of the mouse plug and orient it to fit into the socket on the back of the PC.
- c) Carefully insert the plug into the socket and push it in gently until it fits tightly. (Secure any port screws or finger screws.)

**WARNING:** Do not use excessive force; it may damage the pins or connector. Instead, check plug orientation or type.

d) Turn on the power to the computer.

5) To Install Mouse Software:



*NOTE: If replacing a mouse with an identical mouse, the following section is optional (however an updated mouse driver may be available).*

- a) Locate the mouse installation CD and the instructions and insert the CD in the CD ROM.
  - b) Select the 'Start' button and select 'Run'.
  - c) Enter the following command in the 'Open' drop-down list box:  
D:INSTALL or D:SETUP  
(Depending on the instructions.)
  - c) Follow instructions in the installation program (responding to the port assignment determined in step 4).
  - d) Respond 'YES' when asked for permission to add information to AUTOEXEC.BAT and/or CONFIG.SYS. (This adds the correct driver statement to the file to enable the mouse to run when the computer is turned on.)
  - e) Press CTRL+ALT+DEL twice to reboot the computer. (This will load the driver added to the AUTOEXEC.BAT or CONFIG.SYS files into memory and enable the mouse to function.)
- 6) If the mouse model differs from the old mouse, update Windows as follows:
- a) Choose the Windows 95 'Start' button to open the 'Start' menu.
  - b) Select 'Settings' then select 'Control Panel'.
  - c) Double-click the 'Mouse' icon then choose the 'General' tab.
  - d) Choose the 'Change' button. (The 'Select Device' dialog box appears.)
  - e) Select the appropriate manufacturer and model for the new mouse.
  - f) Choose 'OK'.
  - g) Choose the 'Close' button.
  - h) Choose the 'Yes' button when asked to restart Windows. (This will reboot the computer and allow the new mouse driver to take effect).



## Run setup for Microsoft mouse 9.0.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Make sure mouse is properly plugged in. Enter A:\SETUP from DOS prompt to begin installation program, respond to prompts (usually choose defaults) and reboot computer when asked. Run Windows to test mouse operation.

- 1) Make sure a Microsoft Mouse is securely plugged into the mouse port on the back of the base unit.
- 2) Select the Windows 95 'Start' button to access the 'Start' menu and select 'Run'
- 3) Enter the following command in the 'Open' list box:

D:\SETUP

(This will start the Microsoft Mouse installation program. It will check the hardware and software configuration (e.g., number of drives, current mouse driver version, and whether Windows is installed.)

- 4) Enter the user name to register the product when prompted.
- 5) Specify the installation directory. (It is generally best to accept the default directory).
- 6) Choose the type of setup from the following list (depending on the configuration, use and desires):
  - a) Windows and DOS
  - b) Windows only
  - c) DOS only
  - d) Custom setup
- 7) Choose options to customize setup:
  - a) Add the mouse driver to the AUTOEXEC.BAT file (recommended).
  - b) Load the mouse driver when starting Windows.
  - c) Customize the cursor for LCD screens (on laptops).

*NOTE: Setup runs in order to install files in a specified directory, modify AUTOEXEC.BAT, CONFIG.SYS, WIN.INI AND SYSTEM.INI files, install Mouse Manager, display completion message and prompts to restart computer.*

- 8) Choose 'Restart' or press CTRL+ALT+DEL twice to reboot computer (This boots the computer with the new AUTOEXEC.BAT and CONFIG.SYS and loads the mouse driver.)
- 9) Open Windows (or another program that uses the mouse) to test for proper mouse operation. If the mouse does not work, recheck the cable connections, make sure the mouse driver is loaded in the

AUTOEXEC.BAT file and consult the installation guide for additional diagnosis.



## How to install SIMM memory.

### Solution:

To install SIMM(s), verify memory type, speed and quantity, and remove base unit cover. Identify lowest bank and row, insert SIMM at an angle and press back until it snaps into place. Power up system, watch POST memory test, and update CMOS.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Remove base unit cover.
- 2) Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
  - a) Type of memory required (e.g., DRAM, SIMMs, SIPPs).
  - b) Amount of memory desired/required.

*NOTE: Sometimes memory must be added in specific increments to fill an entire memory bank at the same time (e.g., 2MB, 4MB or 8MB, depending on the memory type).*

EXAMPLE: RAM memory in a 486 computer that uses 1x9 or 4x9 SIMMs, must be installed in increments of four SIMMs of the same size and type at a time (e.g., 4MB, 16MB).

- c) Speed of new memory matches that already installed.

*NOTE: If removing an old SIMM is not required, skip to Step 4 for installation steps.*

- 3) Removing old SIMM(s):
  - a) Touch the metal sides of the base unit to discharge any static.
  - b) Unclip the clip at each end of the SIMM (this should cause the SIMM to spring forward slightly).

**CAUTION:** *Never force a SIMM out of the slot. Both the SIMM and its slot may be damaged.*

- c) Grasp the SIMM and carefully lift it out of the slot.
  - d) Place the SIMM in a static-resistant envelope (do not mix it with new SIMMs).
  - e) Repeat steps 2)a)-2)d) to remove additional SIMMs.

- 4) Install new SIMM(s):

- a) Touch the metal sides of the base unit to discharge any static electricity.
  - b) Remove a SIMM module from the protective static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c) Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available (Refer to labels on mainboard or diagram in owner manual).
  - d) Grasp SIMM with thumb and two fingers by top edge and insert it in the SIMM slot at an angle.

- e) Press down, applying even pressure across the chip and rock it back into place towards the back of the socket.

*(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM and hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

- f) Repeat steps 3)a)-3)e) to install additional SIMMs.
- g) Make sure all SIMMs are at the same height and angle to the board.
- h) Check owner manual to determine if any jumpers or DIP switches on mainboard must be changed so the computer will recognize the added memory.
- i) [Move Jumpers](#) and/or [Change DIP Switches](#), if necessary.



[Photo-Moving jumpers](#)



[Photo-DIP Switches](#)

- 5) Test computer to see if new memory is recognized and functioning properly:
  - a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer.
  - d) Carefully observe the MEMORY TEST portion of the [POST](#). (It should report 1024KB of memory for each MB of memory installed. Some computers may be off by 384KB, depending on how they handle the last 384KB in the first MB of memory.)

*(NOTE: Also, an error message reporting inconsistent memory may appear because of inconsistencies between CMOS information and actual memory found. This is addressed in Step 6), below.)*
  - e) If all installed memory is not reported, or POST does not complete successfully:
    - 1] Power down computer.
    - 2] Unplug power cable.
    - 3] Touch the metal sides of the base unit to discharge any static electricity.
    - 4] Recheck SIMMs to make sure they are properly seated. If necessary, remove and reinstall them using steps 2 and 3 above.
    - 5] Repeat steps 4a to 4e to retry memory test.
- 6) Update the amount of memory in CMOS:
  - a) [Run Setup](#).
  - b) Move to the memory section and update the amount of memory in the system (refer to help or the owner manual for assistance).
  - c) Save Setup and reboot the computer.
  - d) If problems reoccur, repeat Steps 4) and 5).
- 7) [Replace base unit cover](#).

- 8)** Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## How to replace the BIOS chip (hardware).

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace BIOS by doing the following: remove base unit cover, locate and remove the old BIOS chip, install the new BIOS chip, run setup, and replace base unit cover.

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Locate BIOS chip on mainboard.
- 3) Touch metal sides of the base unit to discharge any static electricity, and remove old BIOS chip using chip puller. Grasp the edges firmly between the tips of the tweezers, and pull straight up (rocking gently back and forth if necessary).
- 4) Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.  
*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*
- 5) Run Setup and follow upgrade instructions to enter new values where appropriate.
- 6) Reboot the computer and use appropriate applications and peripherals to test new BIOS.
- 7) If problem is encountered, contact the hardware vendor that provided the BIOS chip for assistance.
- 8) Replace base unit cover.



Photo: Replacing cover

- 9) If problems persist, reinstall old BIOS, following steps 1-8.



## How to update the Flash BIOS (software).

### Solution:

Update [Flash BIOS](#) by following the accompanying instructions to capture old BIOS information on RESTORE diskette, and installing the Flash BIOS Upgrade. [Run Setup] and follow instructions to enter new values where appropriate.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Obtain the BIOS update software from hardware vendor via modem or diskette.
- 2) Read installation instructions accompanying the software upgrade (look for a paper copy or a README file accompanying upgrade files).
- 3) Format a diskette that will be used to hold the current BIOS information. (This RESTORE file will permit reverting to the old BIOS information if the update causes system problems.)
- 4) Run the upgrade installation program.
- 5) Run [Setup](#) and follow upgrade instructions to enter new values where appropriate.
- 6) Reboot the computer and use appropriate applications and peripherals to test required changes in BIOS information.
- 7) If problems are encountered, contact the hardware vendor that provided the Flash BIOS Upgrade for assistance.
- 8) If problems persist, use the RESTORE function provided with the upgrade, to restore the old information to the BIOS.





## How to move jumpers.

### Solution:

Move the Jumper by carefully grasping it with tweezers or needle-nose pliers, and slide it off gently. Carefully align it, and slide it down onto the new jumper setting pins.

- 1) Locate the jumpers on the board (refer to the diagram in the manual if necessary).



Photo: Moving jumpers

- 2) Look on the board at the base of the pins for labels identifying each of the pins (e.g., J1, J2, etc.).
- 3) Determine the current jumper pin setting on the board.
- 4) Refer to the table or diagram in the manual to determine the required jumper setting for the new situation. (If the manual is unavailable, contact the manufacturer for technical support or identify the correct setting through trial and error)

*(NOTE: 'Closed' and 'On' are synonymous, as are 'Off' and 'Open').*

- 5) To move a jumper, carefully grasp it with tweezers or needle-nose pliers, and slide it off gently. Carefully align it, and slide it down onto the new jumper setting pins.



Photo: Moving jumpers

*NOTE: If the manual says to remove the jumper, DO NOT remove it completely. Simply hang it on a single pin so it will be available for future use.*

- 6) If the mainboard jumper has wires attached, move it in the same fashion (The red wire always attaches to pin 1).



## How to change DIP switches.

### Solution:

To change [DIP Switches](#), record current setting, obtain new setting from table in manual, and use a pen or small screwdriver to flip/slide each switch to be changed.

- 1) Locate the DIP switch(s) on the board (refer to the diagram in the user manual if necessary).
- 2) Determine the current DIP switch setting and record it on paper (to return to later if necessary).
- 3) Refer to the table or diagram in the manual to determine the required setting for the new situation. Write down the new setting to more easily refer to it later.
- 4) Using a pen tip or small screwdriver, slide or flip the switch to be changed. Move it towards 'ON' to turn it on; away from 'ON' to turn it off.



[Photo: DIP Switches](#)

- 5) Repeat Step 4 for each additional switch that must be changed.



## How to replace the power supply.

### Solution:

Remove the base unit cover, disconnect the power cables to the internal components, remove the power supply from metal sides of the base unit. Test the new supply by plugging it in and listening for fan. Insert power supply, connect P8 and P9 to mainboard, connect components, power up and make sure POST completes successfully.

**CAUTION:** Do not attempt to disassemble or repair the power supply; simply replace it.

**NOTE:** If removing an old power supply is not required, skip to Step 8 for installation steps.

### REMOVING POWER SUPPLY

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Remove all power cables running in the trunk from the power supply to the peripherals.
- 3) Remove all power cables from the connectors on the mainboard.
- 4) Draw a diagram of the color coded wiring from the power supply to the power switch for future reference. (There are usually 5 wires: 1-ground, blue, black, brown and white.
- 5) Disconnect the wires to the power switch.
- 6) Locate and remove the screws on the back of the base unit that hold the power supply in place.
- 7) Carefully lift the power supply out of the base unit metal sides of the base unit (be careful not to snag any other cables or boards).

### INSTALLING POWER SUPPLY

- 8) Test the power supply before installation.
  - a) Make sure the power supply is not connected to anything and the switch is OFF.
  - b) Plug the power supply into an electrical outlet and turn on the power switch.
  - c) Listen for the fan operation.
  - d) Turn off the power supply and disconnect it from the electrical outlet.
  - e) If the power supply does not work, replace it before installation.
- 9) Insert the power supply into the metal sides of the base unit. Connect power connectors P8 and P9 to the mainboard. Connect the remaining power supply cables to the internal disk drives. If the power supply uses a remote switch, remount the switch. Make sure the power supply switch is OFF. Attach the external power cable to the back of the base unit and connect the other end to the power supply (preferably through a surge protector). Turn the power switch to the ON position. Make sure the fan is functioning and the computer passes the POST. Make sure each connected device (e.g., disk drives) operates properly. If a device does not function, turn off the power, disconnect the power cable and recheck the power cable

connections. Repeat steps 14)-16), as necessary. [Replace base unit cover.](#)

***CyberMedia***<sup>®</sup>

[Photo: Replacing cover](#)



## How to install an expansion card.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Remove base unit cover, set jumpers/DIP switches on card, insert card in empty slot, connect ribbon cables (if applicable), install driver, power up and test computer system and peripherals, replace cover and update rescue diskette.

*NOTE: If removing an old expansion card is not required, skip to Step 3 for installation steps.*

1) Remove base unit cover.



Photo: Removing cover

2) Remove the old expansion card:

- a) Remove the screw from the top notch of the mounting bracket on the card.
- b) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, remove the card by pulling straight out of the slot gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
- c) Place the card in a static-resistant envelope.
- d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.

3) Install new expansion card:

- a) Remove the expansion card from its box and the protective anti-static envelope.
- b) Locate the jumpers or DIP switches on the card and lay the card down on the anti-static envelope with the jumpers/DIP switches in view.
- c) Read the expansion card manual and identify which, if any, settings must be changed on the card for this particular computer.
- d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo-Moving jumpers



#### Photo-DIP Switches

- e) Identify a free expansion slot of proper size, and remove the rear metal slot cover.
- f) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily).
- g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
- h) If the expansion card attaches to another device, connect the two devices using the supplied ribbon cable. Check the manual to verify connector orientation, and gently insert the cable connector into the card connection and the other device.

#### 4) Install drivers and test new configuration:

- a) Make sure no parts or tools remain in metal sides of the base unit.
- b) Replace necessary cables (power, keyboard, video), and plug in power cable.
- c) Power up computer and related peripherals one at a time.
- d) Install driver software for card from diskette that came with the card, following the installation/setup instructions in the card's manual.
- e) Test application software that uses the drivers and expansion card to Make sure proper configuration.

#### f) Replace base unit cover.

- g) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Replace base unit cover.

### Solution:

Test the computer before reinstalling the cover. Slide on the cover, replace the screws, reconnect the data and power cables, and turn on the computer and retest it.

- 1) Test the computer for proper operation before reinstalling the cover.
  - a) Reconnect the keyboard, video and power cables.
  - b) Plug the surge protector back into the power receptacle and turn it on.
  - c) Power up the base unit and peripherals one at a time.
  - d) Make sure the computer is working properly.

***CAUTION:** DO NOT touch or probe with a tool anywhere inside the base unit with the computer turned on. An electrical shock could occur, or one or more components could sustain catastrophic damage.*
  - e) Turn off the computer and all components and disconnect the power cable from the electrical outlet.
  - f) Disconnect all cables.
- 2) Make any adjustments, and troubleshoot and repair any problems. Repeat steps 1 and 2 as necessary.
- 3) Make sure all adapter cards are secured with screws (cards work their way loose unless secured).
- 4) Make sure all empty slots are covered with slot covers (missing slot covers distort airflow patterns and can cause chip and component overheating).



Photo: Replacing cover

- 5) Make sure all cabling (especially ribbon cables) is tucked inside the metal sides of the base unit, and does not protrude or catch on the cover.
- 6) Retrieve the base unit cover and slowly slide it in place, making sure not to catch or pinch any protruding cables.
  - 7) Replace screws along the top and sides of the back of the base unit.
  - 8) Carefully orient and replace all cables into the connectors on the back of the computer. Secure with screws where appropriate.

***WARNING:** Do not force or bend connectors or pins.*
  - 9) Plug the surge protector back into power receptacle and turn it on. Reposition the base unit for use.
  - 11) Power up the base unit and peripherals one at a time.
  - 12) Retest to make sure the computer and all peripherals are working properly.







## How to remove and replace PC cover.

### Solution:

Turn off the power to the computer and all peripherals, disconnect the power and remove all cables. Remove the screws along the top and sides of the back, and slide off the cover.

- 1) Turn off the power to the computer and all peripherals.
- 2) Switch off the surge protector and unplug the power cable from the wall socket.  
SAFETY TIP: Make sure all components are turned off and the power cable is disconnected.
- 3) Carefully pull out the base unit slightly so that the rear panel is accessible.
- 4) Carefully remove all cables from the back of the base unit.



### Photo-Cable connections

- a) Check each cable for screw or finger-screw connections. Unscrew the connectors.
- b) Note the location and orientation of each connector during removal. (If necessary, draw a wiring diagram or tag the end of each cable to note its destination.)
- c) Carefully remove each cable. **WARNING: Do not force or bend the connectors to avoid costly damage to the connector or pins.**
- 5) Remove the screws from the top and sides of the back edge of the base unit. Store them together in a safe location.
- 6) Grasp the cover along the sides with two hands. SLOWLY and GENTLY slide the cover forward and off. Set it aside.



### Photo-Removing cover

**CAUTION:** Watch carefully to make sure parts of the cover DO NOT catch on power or ribbon cables inside the base unit.

- 7) Dissipate any static electricity by touching the metal sides of the base unit with a finger.





## **(.)(.) Has a bad attribute (or link or size); Use a file/disk recovery utility.**

### **Cause:**

The current directory or the parent directory is corrupted. **CAUTION:** *This error may be an early warning of future hard drive problems. The error should not generally occur.*

### **Solution:**

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Back up data and use a file/disk recovery utility to recover the directory and its files.



## **(.) (.) Does not exist; Use a file/disk recovery utility.**

### **Cause:**

The current directory or the parent directory is corrupted.

***CAUTION:** This may be an early warning of future hard drive problems. This error should not generally occur.*

### **Solution:**

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Back up data and use a file/disk recovery utility to recover the directory and its files.



## Lost cluster(s) found in y chains; Choose 'Y' & use file/disk recovery utility.

### Cause:

Check disk (CHKDSK) found lost chains or other errors while inspecting a disk. None of the files in the disk directory contain these chains of clusters. There are one or more chains in the FAT, but there is no indication of their location in a file.

*NOTE: Lost chains are NOT significant and often occur when files are deleted.*

### Solution:

Answer YES to CHKDSK.

Consider using a file/disk recovery utility to clean this disk.



## **VSAFE Warning; Change VSAFE & SmartDrive configurations".**

### **Cause:**

Error occurs when VSAFE is installed with write-protect option enabled and SmartDrive is installed with write-caching enabled.

This is a known conflict with VSAFE and SmartDrive. Microsoft Corporation has issued a bug report and will provide additional information after completing further research.

### **Solution:**

Do not use VSAFE configured for write-protection and SmartDrive configured for write-caching together.



## Bad command or filename (while using QEMM); Edit AUTOEXEC.BAT & CONFIG.SYS.

### Cause:

Using a plus sign (+) as a delimiter within a command line for QEMM (e.g., C:\QEMM\LOADHI /R:1 FILES+30).

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Remove the 'QEMM files+nn' command from AUTOEXEC.BAT and add the FILES command in CONFIG.SYS.

- 1) [Edit AUTOEXEC.BAT](#) and remove the 'QEMM files+nn' command from AUTOEXEC.BAT.
- 2) [Edit CONFIG.SYS](#) and add the following command:  
FILES=xx  
(Where xx is the maximum number of files to allow DOS to open at a time.)
- 3) [Run MemMaker](#) to setup an optimal memory configuration.



## **Unrecoverable error in directory; Press 'N' (No)! and check for a virus.**

### **Cause:**

Cause is generally unknown, although it could be a [Computer VIRUS](#).

### **Solution:**

Press 'N' (No)!

- 1) Press 'N' (No)!
- 2) [Check for Viruses](#).
- 3) Run a file/disk recovery utility on this disk to recover the directory, its subdirectories and files.





## your computer is now stoned.

### Cause:

**WARNING:** Computer VIRUS! This is the STONED Virus.

### Solution:

Save any open files, close all open applications (including Windows) and turn off the computer immediately!

Arrange for a qualified computer technician to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

**CAUTION:** *Computer viruses are extremely dangerous. Your data may be in danger of being corrupted or lost.*

- 1) Perform immediate shutdown:
  - a) Save any open files.
  - b) Close all open applications.
  - c) Close Windows.
  - d) Turn off the computer.
  - e) Identify and segregate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).
- 2) Detect and eradicate virus(es).
  - a) Insert a bootable, write-protected diskette in the appropriate drive and turn on the power to the computer.
  - b) After the system boots, insert a write-protected diskette containing a virus detection program in the drive.
  - c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette in the vicinity).
  - d) Delete all infected files through detection/disk clean virus program.
  - e) If a virus has infected the boot sector of the hard drive, the following command may be useful. Enter it at the DOS prompt:  
FDISK /MBR  
(The /MBR switch of the FDISK command rebuilds the Master Boot Record on the hard drive.)
  - f) Cold boot the computer (Turn off the computer, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.
  - g) Scan all memory and connected drives for viruses again using the most thorough scan pattern (some

detectors miss viruses on the first pass). Use another virus detector program if available (to be absolutely sure all remnants of the virus(es) are gone).

- 3) Check surrounding environment and notify anyone who has shared these disks or files:
  - a) Scan all nearby PCs and floppy diskettes for viruses (re-infection of the disinfected computer from other previously infected diskettes commonly occurs).
  - b) Notify anyone who has used the infected disks. Make sure the owner of the source diskette knows of the infection.
- 4) Call for expert help from virus software and/or 3rd party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## **Write protect error writing; Remove write-protection on diskette or use another.**

### **Cause:**

Attempting to write to a write-protected diskette or damaged floppy drive (component that detects write-protect tabs).

### **Solution:**

Either remove the write-protection or select another target diskette.

Do one of the following:

- 1) Remove the write-protection from the diskette.
- 2) Select another target diskette.
- 3) If an error reoccurs with all diskettes, replace the floppy drive.



## **Write fault error writing drive x; Close the floppy disk drive door securely.**

### **Cause:**

Drive door is not properly closed or drive door-closed sensor is broken, drive is bad or printer is turned off or offline.

### **Solution:**

***CAUTION:*** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

Close the disk drive door.

Do one of the following, in sequence, until the problem solved.

- 1) Close the disk drive door and try copying or saving file again.
- 2) Make sure the printer is turned on and online.
- 3) Replace the floppy drive.



**Write failure, disk unusable; Discard diskette and use a new one.**

**Cause:**

Diskette contains bad sectors.

**Solution:**

Discard diskette and use a new one.



## Unable to use a disk cache; Remove references to network & CD-ROM drives.

### Cause:

Attempted to use DOS 6.x SMARTDRV.EXE to cache a networked drive or a CD-ROM drive. SmartDrive cannot cache these type of devices.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit [AUTOEXEC.BAT](#) and remove references to network and CD-ROM drives.



## Unrecoverable read (or write) error; Remove diskette, & reinsert, try again.

### Cause:

Read/write errors have many possible causes: diskette not seated properly, bad spot on the disk, drive head alignment, incorrect/incomplete installation, or aging disk.

### Solution:

Remove the diskette from the drive, reinsert it and attempt to read the diskette again.

Do one of the following, in sequence, until the problem is solved:

- 1) Remove the diskette from the drive, reinsert it and attempt to read the diskette again.
- 2) If someone was just working inside the base unit, turn off the computer, make sure the drive is correctly installed and check all power and data cables going to the disk drive. Make sure they are properly and securely connected.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 3) If an error reoccurs, check the disk operation, because these error messages indicate this disk is starting to have some problems. Run a file/disk recovery utility on this disk to isolate the problem and attempt to repair it. These disk utilities can read the data from bad spots and move it to good locations on the disk.
- 4) If the disk is an old floppy diskette, consider discarding the diskette after data is recovered.
- 5) Run SpinRite or a similar program, or reformat the diskette and reload the data. This procedure rejuvenates the disk and extends its useful life.



## unrecoverable error during ..

### Cause:

*NOTE: This error occurs during MS-DOS Upgrade Setup versions 5.x and 6.x.*

Path is set with 'SET PATH=' command, the drive letter used is lower case (e.g., SET PATH=c:\) and SETUP is being run with the /E parameter. Or, there are no directories in the PATH statement that contain MS-DOS files, and there is a file in the root directory named 'DOS'.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Remove 'SET' from the front of the path statement and change Drive c to uppercase, or delete the DOS file.

Do one of the following:

- 1) If SET PATH= is used:
  - a) Edit AUTOEXEC.BAT.
  - b) Locate SET PATH= statement.
  - c) Remove the word 'SET'.
  - d) Change the drive letter 'c' to uppercase.  
COMPLETED EXAMPLE: PATH=C:
  - e) Save the file.
  - f) Reboot the computer.
  - g) Rerun MS-DOS Upgrade Setup.
- 2) If 'DOS' file exists:
  - a) Enter the following command at the DOS prompt to delete the file:  
DEL C:\DOS.\*
  - b) Rerun MS-DOS Upgrade Setup.







## Unrecognized command; Review each line of CONFIG.SYS for mistakes, restart.

### Cause:

CONFIG.SYS contains a command or line that the computer does not understand. Something is probably mistyped.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit CONFIG.SYS and review each line for mistakes and reboot computer.

- 1) Edit CONFIG.SYS.
- 2) Review each statement for mistakes.
- 3) If unable to find/correct mistake(s), temporarily remove any suspect lines or commands.
- 4) Save the file.
- 5) Reboot the computer.
- 6) If a line was temporarily removed, research the correct command syntax and try it again.



## **unlock system unit keylock.**

**Cause:**

The keylock is locked. This grounds out the keyboard to the base unit so that it cannot be used.

**Solution:**

Use the key to unlock the keylock, and reboot the computer.



## **Error: unexpected sw interrupt xxh at xxxx.xxxx. type (r)eboot, other.**

### **Cause:**

Any hardware-related problem can cause this message (Phoenix BIOS). Message means an interrupt is being sent on an interrupt line that is not properly initiated (e.g., from an adapter card). Most likely cause is driver software that accompanies adapter cards and devices that is not installed or is installed incorrectly (despite the reference to hardware problems).

### **Solution:**

Check the drivers and software for each adapter card and device installed/attached to the computer. Reinstall drivers as necessary.



## unexpected interrupt in ..

### Cause:

Bad adapter card or mainboard is sending interrupts during bootup over the NMI line.

### Solution:

Isolate and remove the bad card.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Turn off the computer and unplug the power cable.
- 2) Remove the base unit cover.
- 3) Remove all adapter cards except the video card.
- 4) Reinstall one adapter card.
- 5) Plug in power cable and turn on computer.
- 6) Watch for the same error message.
- 7) Repeat Steps 1,4-6 with each adapter card until discovering the one causing the error message. Replace this card.
- 8) If the error message continues with all cards, the video card may be bad. Try another video card. If the error message stops, replace the video card.
- 9) Replace the mainboard as a last resort.



## unexpected hw interrupt ..

### **Cause:**

Any hardware-related problem can cause this message (Phoenix BIOS). Message means an interrupt is being sent on an interrupt line that is not properly initiated (e.g., from an adapter card). Most likely cause is driver software that accompanies adapter cards and devices that is not installed or is installed incorrectly (despite the reference to hardware problems).

### **Solution:**

Check the drivers and software for each adapter card and device installed/attached to the computer. Reinstall the drivers as necessary.



## **Unable to write BOOT; Discard the diskette and use another one.**

### **Cause:**

*NOTE: This message occurs while FORMATing a diskette. There is a bad sector in the boot area of the diskette.*

### **Solution:**

Discard the diskette and use another one.



## **Track 0 bad-diskette unusable; Verify that the diskette and drive size match.**

### **Cause:**

Error occurs when attempting to format a 1.2MB diskette in a 360KB drive (and vice versa), or when track 0 is actually bad on diskette or hard drive.

### **Solution:**

Verify that the diskette and drive size match, and retry format.

Do one of the following:

- 1) If the disk is a diskette:
  - a) Verify that the diskette and drive size match.
  - b) Retry formatting the diskette.
  - c) If track 0 is still bad, discard the diskette.
- 2) If the disk is a hard drive (disk):
  - a) Retry formatting.
  - b) If the format fails, use a file/disk recovery utility to diagnose and possibly repair the problem.
  - c) If the file/disk recovery utility is unable to bypass the error message, replace the hard drive.





## too many block devices.

**Cause:**

CONFIG.SYS contains too many device statements.

**Solution:**

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Edit CONFIG.SYS and remove unneeded device drivers.



## timer or interrupt controller.

### Cause:

Timer and/or interrupt controller chips are bad.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the mainboard (since timer and interrupt controller chips are permanently attached).

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover.](#)



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.

- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.

- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.

- c) Locate the jumpers or DIP switches on the mainboard.

- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:

- 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.

- 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.

- e) (Optional) Install BIOS chip.

- 1] Locate BIOS chip on mainboard.

- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.

- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).  
6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.  
7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.

- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).  
6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP's).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).
  - 3] Speed of new memory matches that already installed.

i) (Optional) Install any additional cache or RAM memory. Do one of the following:

1] Install new SIMM(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c] Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.
- e] Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

- f] Repeat steps 3)a)-3)e) to install additional SIMMs.
- g] Make sure all SIMMs are at the same height and angle to the board.

2] Install new SIPP(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c] Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
- e] Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

- f] Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.
- g] Make sure all SIPPs are at the same height and perpendicular to the board.

3] Install new DRAM(s):

- a] Locate the appropriate chip socket on the mainboard.
- b] Touch metal sides of the base unit to discharge static electricity.
- c] Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

- d] Repeat steps 4a-4c to install additional DRAMs.
- e] Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.
- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
- g] Locate and position mounting screws and support spacers:

- h) Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.

*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*

- i) Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
- j) Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.

*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*

- k) Secure mainboard in place by placing screws in the mounting posts and tightening them.

7) Reconnect all wires and cables to mainboard: **(CAUTION: Remember to discharge static first!)**

- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
- b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
- c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

**WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.

- d) Reconnect any other cables to be connected to mainboard.

8) Reinstall all expansion cards.

- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
- b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
- c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.

9) Test new configuration:

- a) Make sure no parts or tools remain in metal sides of the base unit.
- b) Replace necessary cables (power, keyboard, video) and plug in power cable.
- c) Power up computer and related peripherals one at a time.
- d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*
- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.

10) If unable to access drive(s), turn computer off and disconnect power cables.

- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## Timer chip counter 2 failed.

### Cause:

Timer chip failed.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the mainboard (since the timer chip is permanently attached).

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover.](#)



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.

- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.

- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.

- c) Locate the jumpers or DIP switches on the mainboard.

- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:

- 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.

- 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.

- e) (Optional) Install BIOS chip.

- 1] Locate BIOS chip on mainboard.

- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.

- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).  
6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.  
7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.

- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).  
6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP's).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).
  - 3] Speed of new memory matches that already installed.

i) (Optional) Install any additional cache or RAM memory. Do one of the following:

1] Install new SIMM(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c] Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.
- e] Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

- f] Repeat steps 3)a)-3)e) to install additional SIMMs.
- g] Make sure all SIMMs are at the same height and angle to the board.

2] Install new SIPP(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c] Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
- e] Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

- f] Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.
- g] Make sure all SIPPs are at the same height and perpendicular to the board.

3] Install new DRAM(s):

- a] Locate the appropriate chip socket on the mainboard.
- b] Touch metal sides of the base unit to discharge static electricity.
- c] Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

- d] Repeat steps 4a-4c to install additional DRAMs.
- e] Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.
- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
- g] Locate and position mounting screws and support spacers:

- h) Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.

*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*

- i) Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j) Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k) Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: **(CAUTION: Remember to discharge static first!)**
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

**WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.

- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*
  - e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.

- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## **The MS-DOS Setup wasn't completed; Change Setup to search drive A then drive C.**

### **Cause:**

*NOTE: This error arises when MS-DOS 6.x Upgrade is not successfully installed.*

Some computers are setup to search Drive C first, and not Drive A. MS-DOS 5.x and later INSTALL programs require the computer to check Drive A first.

### **Solution:**

Run Setup and change CMOS setting to check for boot disk in Drive A before attempting to boot from Drive C.





## **Target disk bad or incompatible; Try copying again.**

### **Cause:**

This error message occurs while copying files. It means that the target disk sustained some damage that prevents it from receiving particular files, or that the diskette format does not match the drive type.

### **Solution:**

Retry the copy operation.

Try one of the following, in sequence, until problem is solved:

- 1) Retry the copy operation.
- 2) Remove the diskette. Verify the diskette and drive type/size.
- 3) Reinsert the diskette and try copying again.
- 4) Reformat the target diskette and try copying again.
- 5) If the target is a diskette, discard it and use another diskette.
- 6) If target disk is a hard drive, attempt to correct the problem by using a file/disk recovery utility.



## **Disk write-protected; remove write-protection on this diskette or use another.**

### **Cause:**

Attempting to DISKCOPY a write-protected diskette or damaged floppy drive (component that detects write-protect tabs).

### **Solution:**

Either remove the write-protection or select another target diskette.

Do one of the following:

- 1) Remove the write-protection from the diskette.
- 2) Select another target diskette.
- 3) If an error reoccurs with all diskettes, replace the floppy drive.



## sys1733 the country info .

### Cause:

*NOTE: This is an OS/2 installation error.*

Hardware configuration problem such as incorrectly configured CMOS for floppy drives, computer missing 1 of 2 floppy drives but CMOS has both, or incorrect SCSI configurations.

### Solution:

Run setup and make sure CMOS information matches actual hardware configuration.

Do one or more of the following:

- 1) Run Setup and make sure CMOS information matches actual hardware configuration.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) If SCSI adapter card is present, check the card's settings against the proper settings provided in the installation manual.
- 3) Try to reinstall OS/2.



## **Stuck key scancode-xxx; Unstick the stuck key or remove anything resting on key.**

### **Cause:**

A key is stuck on the keyboard.

### **Solution:**

Unstick the stuck key.

Do one of the following, in sequence, until the problem is solved:

- 1) Remove any objects that may be resting on the top of the keyboard.
- 2) Locate and unstick the stuck key.
- 3) Try pressing each key on the keyboard. (The stuck key will feel different than the rest when pressed.)



**strike the f1 key to continue.**

**Cause:**

An error occurred during the POST. Computer should display a specific error message describing problem.

**Solution:**

Attempt to correct the problem indicated in the displayed error message (e.g., remove the non-bootable diskette from Drive A) and press F1 to boot system.



## specified com port number ..

**Cause:**

Requested COM port exists but is not supported by the BIOS ROM.

**Solution:**

Use a different COM port or replace the BIOS ROM with an updated version.

***CAUTION:*** BIOS ROM replacement should be done by a qualified computer technician.



## **Source disk bad or incompatible; Try copying again.**

### **Cause:**

This error message occurs while copying files. It means that the source disk sustained some damage that prevents it from copying particular files, or that the diskette format does not match the drive type.

### **Solution:**

Retry the copy operation.

Try one of the following, in sequence, until problem is solved:

- 1) Retry the copy operation.
- 2) Remove the diskette. Verify the diskette and drive type/size.
- 3) Reinsert the diskette and try copying again.
- 4) Reformat the target diskette and try copying again.
- 5) If the target is a diskette, discard it and use another diskette.
- 6) If target disk is a hard drive, attempt to correct the problem by using a file/disk recovery utility.



## shutdown failure.

### Cause:

*NOTE: This error applies only to AT computers.*

A keyboard switch in wrong position, bad keyboard or bad keyboard controller chip on mainboard.

### Solution:

Make sure the keyboard switch on the back of the keyboard is set to the AT position.

Do one of the following, in sequence, until the problem solved:

- 1) Make sure the keyboard switch on the back of the keyboard is set to the AT position.
- 2) Make sure the keyboard cable is securely plugged into the keyboard connection on the back of the base unit.
- 3) Try another keyboard from a similar (AT) computer.
- 4) Replace the mainboard (because the keyboard controller chip is permanently attached).





## **Sharing violation; Release control or enable file-sharing.**

### **Cause:**

File on drive x is in use by another application or process. The SHARE command is used with task-switching programs (e.g., Windows, DesqView, DOS Shell Task Swapper).

### **Solution:**

Check other active applications/processes to determine which one(s) is using the file(s) in violation. Release control or enable file-sharing.



## Seek error reading/writing; Try again to access the file on the disk.

### Cause:

Seek errors have many possible causes: bad spot on the disk, drive head alignment, incorrect or incomplete installation, or aging disk.

### Solution:

Attempt to reaccess the file on the disk.

Do one of the following, in sequence, until the problem is solved:

- 1) Attempt to reaccess the file on the disk.
- 2) If someone was just working inside the base unit, turn off the computer, make sure the drive is correctly installed and check all power and data cables going to the disk drive. Make sure they are properly and securely connected.

***CAUTION:*** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

- 3) If an error reoccurs, check the disk operation, because these error messages indicate this disk is starting to have some problems. Run a file/disk recovery utility on this disk to isolate the problem and attempt to repair it. These disk utilities can read the data from bad spots and move it to good locations on the disk.
- 4) If the disk is an old floppy diskette, consider discarding the diskette after data is recovered.
- 5) Run SpinRite or a similar program, or reformat the diskette and reload the data. This procedure rejuvenates the disk and extends its useful life.



## **Sector size too large; Install/copy new version of the device driver to hard disk.**

### **Cause:**

The device driver specified in <filename> is bad.

### **Solution:**

Install or copy a new version of the device driver to the hard drive from the installation diskette.

Do one or more of the following:

- 1) Install or copy a new version of the device driver to the hard drive from the installation CD or diskette.
- 2) Contact the driver publisher for additional instructions.



## Sector not found; Try to read disk again.

### Cause:

Sector read errors have many possible causes: bad spot on the disk, drive head alignment, incorrect or incomplete installation, or aging disk.

### Solution:

Attempt to read the disk again.

Do one of the following, in sequence, until problem is solved:

- 1) Attempt to read the disk again.
- 2) If someone was just working inside the base unit, turn off the computer, make sure the drive is correctly installed and check all power and data cables going to the disk drive. Make sure they are properly and securely connected.

***CAUTION:*** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 3) If an error reoccurs, check the disk operation, because these error messages indicate this disk is starting to have some problems. Run a file/disk recovery utility on this disk to isolate the problem and attempt to repair it. These disk utilities can read the data from bad spots and move it to good locations on the disk.
- 4) If the disk is an old floppy diskette, consider discarding the diskette after data is recovered.
- 5) Run SpinRite or a similar program, or reformat the diskette and reload the data. This procedure rejuvenates the disk and extends its useful life.



## second disk bad or ..

### Cause:

This error message appears while running disk compare (DISKCOMP), (used to compare the tracks of two diskettes of the same size). In most cases this error means that the logical size (density) of the two diskettes is different. If two

diskettes are not formatted to the same size, or were not created with DISKCOPY, they cannot be compared using DISKCOMP. Also, a diskette may not be readable.

### Solution:

Use file compare (FC) to compare sets of similar files on each of these diskettes.

Do one of the following:

- 1) Use file compare (FC) to compare on these diskettes:
  - a) Enter the following command at the DOS prompt:  
FC <drive1>:first.fil <drive2>:second.fil  
(Where <drive1>:first.fil is the diskette drive containing the first file and <drive2>:second.fil is the second diskette drive containing the second file.)
  - b) Repeat step a) for remaining file sets to be compared.
- 2) Do a directory of the source diskette to see if there is a problem reading it.
  - a) Enter the following command at the DOS prompt:  
DIR x:  
(Where x: is the floppy drive containing the source diskette)
  - b) If the disk is unreadable, use a file/disk recovery utility to attempt to recover files from it.



## Time-of-day not set up; Run Setup, enter current time & date, save setup.

### Cause:

CMOS Setup information was lost, CMOS battery is failing or the power supply is going bad.

### Solution:

Rerun Setup, verify answers to each question and enter the current date and time. Save setup and reboot computer.

- 1) Rerun Setup, verify answers to each question and enter the current date and time. Save setup and reboot the computer.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) If that solves the problem, but error reoccurs after turning the computer off and on again, replace the CMOS battery.
- 3) If an error continues after a new CMOS battery is installed, replace the power supply.



## Time-of-day clock stopped; Run Setup, enter current date & time, save setup.

### Cause:

CMOS Setup information was lost, CMOS battery is failing or the power supply is going bad.

### Solution:

Rerun Setup, verify answers to each question and enter the current date and time. Save setup and reboot the computer.

- 1) Rerun Setup, verify answers to each question and enter the current date and time. Save setup and reboot the computer.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) If that solves the problem, but the error reoccurs after turning the computer off and on again, replace the CMOS battery.
- 3) If error continues after a new CMOS battery is installed, replace the power supply.



**resume=f1 key.**

**Cause:**

An unknown error occurred.

**Solution:**

Press F1 to continue processing.





## Real time clock failure; Run setup, enter current date & time, save setup.

### Cause:

CMOS Setup information was lost, CMOS battery is failing or the power supply is going bad.

### Solution:

Rerun Setup, verify answers to each question and enter the current date and time. Save setup and reboot the computer.

- 1) Rerun Setup, verify answers to each question and enter the current date and time. Save setup and reboot the computer.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) If that solves the problem, but the error reoccurs after turning the computer off and on again, replace the CMOS battery.
- 3) If error continues after a new CMOS battery is installed, replace the power supply.



## Read fault error; Press 'R' to retry reading the disk.

### Cause:

Read fault errors have many possible causes: bad spot on the disk, drive head alignment, incorrect or incomplete installation, or aging disk.

### Solution:

Press 'R' to retry reading disk.

Do one of the following, in sequence, until problem is solved:

- 1) Press 'R' to retry reading the disk.
- 2) If someone was just working inside the base unit, turn off the computer, make sure the drive is correctly installed and check all power and data cables going to the disk drive. Make sure they are properly and securely connected.

***CAUTION:*** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 3) If an error reoccurs, check the disk operation, because these error messages indicate this disk is starting to have some problems. Run a file/disk recovery utility on this disk to isolate the problem and attempt to repair it. These disk utilities can read the data from bad spots and move it to good locations on the disk.
- 4) If the disk is an old floppy diskette, consider discarding the diskette after data is recovered.
- 5) Run SpinRite or a similar program, or reformat the diskette and reload the data. This procedure rejuvenates the disk and extends its useful life.



## RAM bad; Press on memory chips to ensure they're seated/replace motherboard.

### Cause:

RAM failed the POST. One or more random access memory (RAM) chips is bad or, in rare instances, the mainboard circuitry is bad.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Press down on all memory chips, making sure they are fully seated.

Try one of the following, in sequence, until the problem solved:

- 1) Press down on all memory chips, making sure they are fully seated and retest.
- 2) Remove and test each socketed memory chip. Replace any chips that fail the test. Retest the system.
- 3) Replace the mainboard. Retest the system.



## **Program too big to fit in memory; Close programs & remove TSRs from memory.**

### **Cause:**

Program attempting to run is too large to fit into current memory. Perhaps the program is simply too big, other applications may be occupying needed memory, or an older program requires an earlier version of DOS.

### **Solution:**

Close other open applications, remove any TSRs from memory and retry the application.

Try one or more of the following:

- 1) Close other open applications.
- 2) Remove TSRs from memory.
- 3) [Run MemMaker](#) to gain additional lower memory by optimizing use of the upper memory.
- 4) If the application is old, run [SETVER](#) to set the DOS version to an earlier version of DOS. EXAMPLE:

SETVER <program name> 3.31

(Where <program name> is the name of the executable file that runs the program and 3.31 is the version of DOS the program expects.)

- 5) Add more RAM memory to the computer.



**processing cannot continue.**

**Cause:**

This error occurs when running CHKDSK due to lack of memory.

**Solution:**

Add more RAM memory to the computer.



## **Probable non-DOS disk; Use a file/disk recovery utility to repair.**

### **Cause:**

Boot track on disk is bad, and DOS cannot recognize the disk. This error usually occurs only on computers being used during electrical storms. High voltage changes write garbage to hard drives.

### **Solution:**

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Use a file/disk recovery utility to repair the disk.



## **printer error.**

### **Cause:**

Printer is offline or turned off.

### **Solution:**

Turn on the printer and make sure it is online.



## **Pointer device failure; Secure pointer device (mouse) cable or replace device.**

### **Cause:**

The pointing device (e.g., mouse) is not plugged in or is faulty.

### **Solution:**

Make sure the pointing device cable is securely plugged into the mouse port on the back of the computer.

Try one of the following, in sequence, until the problem is solved:

- 1) Make sure the pointing device cable is securely plugged into the mouse port on the back of the computer.
- 2) Run the test program provided with the pointing device.
- 3) Try testing the pointing device on another similar computer.
- 4) Replace the pointing device.





## path too long.

### Cause:

The path statement in AUTOEXEC.BAT exceeds the DOS limit of 127 characters.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Shorten the PATH statement in AUTOEXEC.BAT by eliminating duplicate and unused path components.

- 1) Edit AUTOEXEC.BAT.
- 2) Locate the PATH statement.
- 3) Inspect and eliminate duplicate and unused path components.
- 4) Save the file.
- 5) Reboot the computer.



## **parse error.**

**Cause:**

DOS detected an error but cannot locate COMMAND.COM to provide appropriate error message.

**Solution:**

Insert the system diskette in Drive A and try operation again.



## **Parity error; Ensure memory chips are seated securely, replace bad chips.**

### **Cause:**

Loose or bad memory chip(s).

### **Solution:**

Press down on all memory chips, making sure they are fully seated.

***CAUTION:*** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until the problem is solved:

- 1) Press down on all memory chips, making sure they are fully seated and retest.
- 2) Remove and test each socketed memory chip. Replace any chips that fail the test. Retest the system.
- 3) Replace the mainboard. Retest the system.



## Parity check 1; Identify and replace the adapter card with the faulty memory.

### Cause:

Parity error within memory on an adapter card.

### Solution:

Isolate and replace the adapter card with the faulty memory as follows.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Turn off the computer and unplug the power cable.
- 2) Remove the base unit cover.
- 3) Remove all adapter cards except the video card.
- 4) Reinstall one adapter card.
- 5) Plug in the power cable and turn on the computer.
- 6) Watch for the same error message.
- 7) Repeat steps 1,4-6 with each adapter card until discovering the one causing the error message. Replace this card.
- 8) If the error message continues with all cards, the video card may be bad. Try another video card. If the error message stops, replace the video card.
- 9) Replace the mainboard as a last resort.



## **Parameters not compatible; Check 'HELP' about this command & correct parameters.**

### **Cause:**

Entering command with invalid parameters.

### **Solution:**

Enter HELP x at the DOS prompt to check HELP for the command and verify the correct parameters. (Where x is the name of the command.)



## not enough memory.

**Cause:**

The computer does not have enough lower memory available to run the program/application just attempted.

**Solution:**

Close other applications and TSRs.

- 1) Close other applications and TSRs.
- 2) Reboot computer and run [MemMaker](#) to attempt to free up additional lower memory.
- 3) Rerun the application.



## **Non-system disk or disk error; Insert a system/recovery diskette into Drive A.**

### **Cause:**

Computer is attempting to boot, but cannot find a system disk. Perhaps there is not a system diskette in drive A, or the system files on the hard drive are missing or damaged.

### **Solution:**

Insert the system/recovery diskette in Drive A and press ENTER.

Try one of the following, in sequence, until the problem solved:

- 1) Remove the non-system diskette from Drive A and press ENTER (if intention is to boot from the hard drive).
- 2) Insert the system/recovery diskette in Drive A and press ENTER (if intention is to boot from the floppy drive).
- 3) If system again fails to boot from the hard drive and generates the same error:
  - a) Insert a system/recovery diskette in Drive A and close the door (if necessary).
  - b) Enter the following command from the DOS prompt in Drive C:  
A:SYS C:  
  
(This will copy the 2 DOS hidden system files and a matching COPY of COMMAND.COM to the root directory of Drive C.)
- 4) Run a file/disk recovery utility to analyze any problems with the hard drive.



## out of memory.

**Cause:**

Too many files or programs are open and not enough conventional memory is available to run the last program.

**Solution:**

Close several programs and retry this program again.

Do one or more of the following, in sequence, until problem solved:

- 1) Close several programs and retry this program again.
- 2) Close any TSRs.
- 3) Run MemMaker to optimize the use of upper memory and free additional conventional memory.





## out of environment space.

### Cause:

The problem could be caused by a loaded TSR that blocks DOS from further expanding its environment space, attempting to use the SET command to expand a full environment space, or using an application that requires a large environment space.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Remove TSR from memory or increase the environment space with the SHELL command.

Do one of the following, in sequence, until the problem is solved:

- 1) Remove any TSRs from memory and retest.
- 2) Increase the environment space using SHELL:
  - a) Edit CONFIG.SYS.
  - b) Add the following command to CONFIG.SYS:  
SHELL=COMMAND.COM /E:1024 /P  
*(NOTE: The /E' switch in the SHELL command sets the DOS environment space in bytes)*
  - c) Save the file and reboot the computer.



## **Not ready reading drive; Insert diskette completely & close drive door securely.**

### **Cause:**

Most likely the drive door is open or not closed securely. Other possibilities include a bad drive or bad drive door-closed sensor.

### **Solution:**

Remove the diskette, reinsert it fully and make sure the door is engaged/closed completely.

Try one of the following, in sequence, until the problem is solved:

- 1) Remove the diskette and reinsert it fully. Make sure the door is engaged/closed completely.
- 2) Try another diskette. If the drive reads the other diskette, the problem is with the diskette.
- 3) If the problem is with the diskette or hard drive, run a file/disk recovery utility to clean up the disk.
- 4) If the problem is with the drive, replace the drive.

*NOTE: The 'writing' version of this error may appear if attached printer is offline or turned off.*



## Not a boot disk; Insert a system diskette in Drive A and press F1.

### Cause:

Diskette in Drive A is not a system/boot diskette or failing floppy drive or controller card.

### Solution:

Insert a boot diskette in Drive A and press F1.

Try one of the following, in sequence, until the problem is solved:

- 1) Insert a boot diskette in Drive A and press F1.
- 2) Test the boot diskette in another computer with the same size floppy drive (e.g., 1.2MB in another 1.2MB).
- 3) Retry step 1 with a boot diskette that successfully boots another computer.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 4) Make sure the data and power cables to the drives are securely connected.
- 5) Attempt to localize the problem to the data cable:
  - a) Switch the floppy drive data cable with a working floppy drive data cable (from spare parts or from another computer).
  - b) Replace the original floppy drive data cable if the second floppy drive data cable solves the problem.
- 6) Attempt to localize the problem to the floppy drive:
  - a) Switch the floppy drive with a working floppy drive of the same size from another computer.
  - b) Replace the original floppy drive if the second floppy drive works properly after it is installed.
- 7) Attempt to localize the problem to the controller card:
  - a) Switch the controller card with a working controller card for the same floppy drive type from another computer (use the original floppy drive).

**NOTE:** *This will not be possible if the controller card is an integral part of the mainboard or the floppy drive.*

- b) Replace the original controller card if the floppy drive works correctly after the second controller card is installed.





## Non-DOS disk error; Repair disk with a diagnostic/repair program.

### Cause:

Boot track on Disk x is bad and DOS cannot recognize the disk.

### Solution:

Use a hard drive diagnostic/repair program (e.g., Spinrite) to attempt disk repair.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following, in sequence, until the problem is solved:

- 1) Use a hard drive diagnostic/repair program (e.g., Spinrite) to attempt disk repair.
- 2) Back up data on the disk using MS Backup or a similar program.
- 3) Reformat the disk.



## no timer tick interrupt.

### Cause:

The interrupt controller chip is not sending interrupt 0 (timer interrupt) to the timer chip.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover.](#)



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.

- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.

- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.

- c) Locate the jumpers or DIP switches on the mainboard.

- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:

- 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.

- 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.

- e) (Optional) Install BIOS chip.

- 1] Locate BIOS chip on mainboard.

- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.



- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).  
6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.  
7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.

- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).  
6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP's).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).
  - 3] Speed of new memory matches that already installed.

i) (Optional) Install any additional cache or RAM memory. Do one of the following:

1] Install new SIMM(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c] Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.
- e] Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

- f] Repeat steps 3)a)-3)e) to install additional SIMMs.
- g] Make sure all SIMMs are at the same height and angle to the board.

2] Install new SIPP(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c] Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
- e] Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

- f] Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.
- g] Make sure all SIPPs are at the same height and perpendicular to the board.

3] Install new DRAM(s):

- a] Locate the appropriate chip socket on the mainboard.
- b] Touch metal sides of the base unit to discharge static electricity.
- c] Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

- d] Repeat steps 4a-4c to install additional DRAMs.
- e] Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.
- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
- g] Locate and position mounting screws and support spacers:

- h) Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.

*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*

- i) Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j) Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k) Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: **(CAUTION: Remember to discharge static first!)**
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

**WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.

- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*
  - e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.

- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## No software port NMI.

### Cause:

Main board is probably bad.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Run a hardware diagnostics program test on the mainboard. If it fails, replace the mainboard.

If mainboard is bad, do the following:

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover.](#)



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.



- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to



fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## No free file handles cannot..

### Cause:

Attempted to start second copy of COMMAND.COM, but not enough memory exists.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Increase the number of FILES in the CONFIG.SYS file.

- 1) Edit CONFIG.SYS.
- 2) Locate the FILES command line.
- 3) Increase the number of files by 10 (or so).

EXAMPLE: FILES=30

*NOTE: Valid range for files is 8-255; default is 8. Each file handle adds about 60 bytes to the size of DOS in low memory.*

- 4) Save the file.
- 5) Reboot the computer.



## **no fail safe timer NMI.**

### **Cause:**

Fail-safe timer on EISA board has failed.

### **Solution:**

Run a hardware diagnostics utility to check the mainboard. If the fail-safe timer is bad, replace the mainboard.



## No boot device available; Remove non-system diskette from drive and restart.

### Cause:

No boot device available has many possible causes: non-bootable diskette in Drive A, problem reading boot segment, drive head alignment, lost CMOS Setup data, loose or missing cable, bad hard drive or bad controller card.

### Solution:

Make sure the diskette in Drive A (the bootable floppy drive) is not a non-bootable disk. Press F1 to reboot computer.

Do one of the following, in sequence, until the problem is solved:

- 1) Remove the non-bootable diskette from Drive A.
- 2) Press F1 to reboot the computer.
- 3) If someone was just working inside the base unit, turn off the computer and check all power and data cables going to the hard drive. Make sure they are properly and securely connected.  
***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*
- 4) If the computer boots properly, check the hard drive operation anyway because this error message the first time indicates something is definitely wrong. Run a file/disk recovery utility on this hard drive to isolate the problem and attempt to repair it.
- 5) If the computer doesn't boot after pressing F1, boot from a floppy and look at the hard drive.
  - a) Insert a system diskette in Drive A and press CTRL+ALT+DEL.
  - b) Enter 'C:' (to look at hard drive).
  - c) If 'Invalid Drive' error message appears, the computer cannot read Drive C. Run Setup and make sure the hard drive is correctly configured. Reboot the computer.
- 6) If you are able to get to Drive C, attempt to copy or backup critical files immediately onto another media (diskette, tape drive or another hard drive).
- 7) Run SpinRite or a similar program, or reformat the hard drive and reload the data. Reboot the computer.
- 8) Replace the hard drive.
- 9) Replace the controller card.





## **nnnk standard memory.**

**Cause:**

This is NOT an error message. Computer is reporting how much expanded memory is found for user's information (e.g., 384K Standard memory).

**Solution:**

No action is required.





## **nnnk extra memory.**

**Cause:**

This is NOT an error message. Computer is reporting how much expanded memory is found for user's information (e.g., 384K Extra memory).

**Solution:**

No action is required.



## **nnnk extended memory.**

**Cause:**

This is NOT an error message. Computer is reporting how much extended memory is found for user's information (e.g., 384K Extended memory).

**Solution:**

No action is required.



## **nnnk expanded memory.**

**Cause:**

This is NOT an error message. Computer is reporting how much expanded memory is found for user's information (e.g., 384K Expanded memory).

**Solution:**

No action is required.



## **nnnk base memory.**

**Cause:**

This is NOT an error message. Computer is reporting how much base memory is found for user's information (e.g., Base memory=640K).

**Solution:**

No action is required.



## Error writing bad file number; Use an active port, use MODE to set baud rate.

### Cause:

*NOTE: This error message appears when attempting to print a report from Microsoft Diagnostics (MSD). It occurs when attempting to write to an inactive port or a port with the wrong baud rate.*

### Solution:

Print to an active port or use MODE to set the correct baud rate for this port.

- 1) Try printing to an active port.
- 2) Use MODE to set the correct baud rate for this port. EXAMPLE: Enter the following command at the DOS prompt: MODE COM1:9600, N,8,1,P  
(Sets the serial port parameters for COM1 to 9600 baud, no parity, 8 bits, 1 stop bit, and retry until the printer accepts the characters.)



## A write error occurred on drive x; Use special parameter for 'MS Backup' program.

### Cause:

*NOTE: This error message appears only when running Microsoft Backup for Windows.*

Using EMM386.EXE or Microsoft Backup with MS-DOS 6.0 and 6.2 is causing a hardware conflict.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Use a special parameter or do not load EMM386.EXE.

Do one of the following:

- 1) If using a Packard Bell 386 or 486, add X=C600-C7FF to the EMM386.EXE command line in CONFIG.SYS.
  - a) Edit CONFIG.SYS.
  - b) Locate the EMM386.EXE command line.
  - c) Add the above parameter so that the line looks like this:  
EMM386.EXE X=C600-C7FF
  - d) Save the file.
  - e) Reboot the computer, and try again.
- 2) Reboot the computer and do not load EMM386.EXE:
  - a) Press CTRL+ALT+DEL.
  - b) Press F8 (Interactive Startup function key) when text 'Starting MS-DOS ...' appears on the screen.
  - c) Press 'N' (No) when prompted to load EMM386.EXE.
- 3) Rerun the MS Backup 'Compatibility Test'.
- 4) If the Compatibility Test passes, run MemMaker to remove any conflicts in upper memory management.
- 5) If the Compatibility Test fails, there is a hardware problem that should be diagnosed by a qualified computer technician.





## Memory write/read failure; Replace the bad chip or bank of bad memory chips.

### Cause:

There is a slow or bad memory chip located at the first hex location.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the particular chip or bank of memory chips.

Do one of the following:

- 1) Replace the memory chip:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip.
- 2) If unable to identify memory chip, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.







## **Memory tests terminated by keystroke; This is not a problem, nothing to be done.**

### **Cause:**

*NOTE: This is a notification rather than an error message. User pressed designated key to terminate the memory test portion of the POSTPCDGS001.TXT.*

### **Solution:**

No action is required.

*NOTE: In the future, if one desires to complete the memory tests, do not press a key during this portion of the POST.*



## Memory parity NMI at xxxx.xxx.

### Cause:

Bad memory chip or an occasional drop in power to the chip caused by another power-intensive operation. This drop in power causes the chip to lose some of its information leading to a parity error.

### Solution:

To continue working, press 'S' to shut off the NMI and save the file.

*(NOTE: This action will remove error message, but does not solve the problem). When time permits, isolate the bad memory chip and replace it.*

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Turn off the computer and unplug the power cable.
- 2) Remove the base unit cover.
- 3) Remove and test all memory chips (the bad one is probably NOT located at the address in the error message).
- 4) If no memory chips are bad, the problem may be a temporary drop in power to one or more chips that is caused by an under-rated power supply during some power-intensive operation. This drop in power does not permit the chip(s) to maintain information and leads to a parity error. Diagnosis to pinpoint the problem is difficult. There is no solution for this problem in this knowledge-base.
- 5) Remove all adapter cards except the video card.
- 6) Reinstall one adapter card.
- 7) Plug in power cable and turn on the computer.
- 8) Watch for the same error message.
- 9) Repeat steps 1,4-6 with each adapter card until discovering the one causing the error message. Replace this card. If an error message continues with all cards, the video card may be bad. Try another video card. If the error message stops, replace the video card. Replace the mainboard as a last resort.



## Memory parity interrupt; Press 'S' to shut off NMI and save files.

### Cause:

Bad memory chip or an occasional drop in power to the chip caused by another power-intensive operation. This drop in power causes the chip to lose some of its information: leading to a parity error.

### Solution:

To continue working, press 'S' to shut off the NMI and save the file.

*(NOTE: This action will remove error message, but does not solve the problem). When time permits, isolate the bad memory chip and replace it.*

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Turn off the computer and unplug the power cable.
- 2) Remove the base unit cover.
- 3) Remove and test all memory chips (the bad one is probably NOT located at the address in the error message).
- 4) If no memory chips are bad, the problem may be a temporary drop in power to one or more chips that is caused by an under-rated power supply during some power-intensive operation. This drop in power does not permit the chip(s) to maintain information and leads to a parity error. Diagnosis to pinpoint the problem is difficult. There is no solution for this problem in this knowledge-base.
- 5) Remove all adapter cards except the video card.
- 6) Reinstall one adapter card.
- 7) Plug in power cable and turn on the computer.
- 8) Watch for the same error message.
- 9) Repeat steps 1,4-6 with each adapter card until discovering the one causing the error message. Replace this card. If an error message continues with all cards, the video card may be bad. Try another video card. If the error message stops, replace the video card. Replace the mainboard as a last resort.





## Memory parity failure; Replace the bad chip or bank of bad memory chips.

### Cause:

Bad data or parity memory chip.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the bad memory chip or bank of chips.

Do one of the following:

- 1) Replace the memory chip:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip.
- 2) If unable to identify memory chip, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Memory parity error; Replace the bad chip or bank of bad memory chips.

### Cause:

Bad data or parity memory chip.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the bad chip or bank of chips.

Do one of the following:

- 1) Replace the memory chip:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip.
- 2) If unable to identify memory chip, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.







## Memory odd/even logic failure.

### Cause:

Mainboard is bad.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover.](#)



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.

- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.

- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.

- c) Locate the jumpers or DIP switches on the mainboard.

- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:

- 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.

- 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.

- e) (Optional) Install BIOS chip.

- 1] Locate BIOS chip on mainboard.

- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.

- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).  
6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.  
7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.

- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).  
6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP's).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).
  - 3] Speed of new memory matches that already installed.

i) (Optional) Install any additional cache or RAM memory. Do one of the following:

1] Install new SIMM(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c] Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.
- e] Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

- f] Repeat steps 3)a)-3)e) to install additional SIMMs.
- g] Make sure all SIMMs are at the same height and angle to the board.

2] Install new SIPP(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c] Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
- e] Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

- f] Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.
- g] Make sure all SIPPs are at the same height and perpendicular to the board.

3] Install new DRAM(s):

- a] Locate the appropriate chip socket on the mainboard.
- b] Touch metal sides of the base unit to discharge static electricity.
- c] Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

- d] Repeat steps 4a-4c to install additional DRAMs.
- e] Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.
- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
- g] Locate and position mounting screws and support spacers:

- h) Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.

*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*

- i) Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j) Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k) Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: **(CAUTION: Remember to discharge static first!)**
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

**WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.

- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*
  - e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.

- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## Memory high address line failure; Replace motherboard inside computer.

### Cause:

Mainboard is bad causing memory high address line failure or memory odd/even logic failure.

### Solution:

**CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

Replace the mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

the mainboard jumper.

- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.

- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.

- c) Locate the jumpers or DIP switches on the mainboard.

- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:

- 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
- 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.

- e) (Optional) Install BIOS chip.

- 1] Locate BIOS chip on mainboard.
- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## Memory failure at xxxx.xxxx; Replace the bad chip or bank of bad memory chips.

### Cause:

There is a slow or bad memory chip at the first hex location shown in message.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the bad chip or the whole bank of chips.

Do one of the following:

- 1) Replace the memory chip:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip.
- 2) If unable to identify memory chip, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.







## Memory double word logic failure; Replace the bad chip or bank of bad chips.

### Cause:

There is a slow or bad memory chip located at the first hex location.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the particular chip or bank of memory chips.

Do one of the following:

- 1) Replace the memory chip:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip.
- 2) If unable to identify memory chip, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Memory data line failure; Replace the bad chip or bank of bad memory chips.

### Cause:

There is a slow or bad memory chip located at the first hex location.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the particular chip or bank of memory chips.

Do one of the following:

- 1) Replace the memory chip:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip.
- 2) If unable to identify memory chip, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## **Memory allocation error; Restart the computer & retry using software program.**

### **Cause:**

A software program corrupted the memory area where DOS is loaded.

### **Solution:**

Restart the computer.

- 1) Press CTRL+ALT+DEL twice to restart the computer and retry using the software program.
- 2) If an error reoccurs, report the software bug to the software program manufacturer's technical support hotline.



## Memory address line failure; Replace the motherboard inside computer.

### Cause:

Memory problem on mainboard.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover](#).



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)

- b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.
- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
- c) Locate the jumpers or DIP switches on the mainboard.
- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
  - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
  - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.



- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).
  - 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.  
*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*
- f) (Optional) Install CPU chip.
- 1] Identify the type of CPU socket used on mainboard.
    - a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
    - b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:
  - a] Standard straight-push socket.
    - 1} Touch the metal sides of the base unit to ground any static.
    - 2} Remove the CPU chip from its protective anti-static envelope.
    - 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
    - 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.
  - 1} Touch the metal sides of the base unit to ground any static.
  - 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

- a]** Touch the metal sides of the base unit to discharge any static electricity.
- b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.
- e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.

- f]** Repeat steps 3)a)-3)e) to install additional SIMMs.
- g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

- a]** Touch the metal sides of the base unit to discharge any static electricity.
- b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
- e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.

- f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.
- g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

- a]** Locate the appropriate chip socket on the mainboard.
- b]** Touch metal sides of the base unit to discharge static electricity.
- c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.

- d]** Repeat steps 4a-4c to install additional DRAMs.
- e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## **Last boot incomplete.**

### **Cause:**

Error caused by malfunctioning chip in Intel 82335 chip set found in some AT clone mainboards. Chips have features required to be set in the extended CMOS Setup.

### **Solution:**

Run Intel 82335 setup program. Pay close attention to EMS configuration parameters and memory interweaving.



## **Keyboard stuck key failure; Check for a stuck key and the AT switch position.**

### **Cause:**

Keyboard is not sending proper signals back to keyboard controller chip during POST. Keyboard switch may be wrong, keyboard bad, keyboard cable bad, or a key may be stuck.

### **Solution:**

Check the keyboard for the stuck key and AT switch position.

Try one of the following, in sequence, until the problem is solved:

- 1) Inspect the keyboard for one or more stuck keys and unstick them.
- 2) Check to see if the keyboard is the correct keyboard for this computer. Also check the back of the keyboard to see if it has an AT switch and make sure it is in the correct position.
- 3) Make sure the keyboard cable is securely connected to the keyboard connector on the back of the base unit.
- 4) Replace the keyboard and cable.



## **Keyboard not found; Check for a stuck key and secure the keyboard cable.**

### **Cause:**

Keyboard cable may not be securely connected to the base unit, keyboard switch may be in the wrong position or something may be on the keyboard pressing the keys.

### **Solution:**

Check the keyboard for the stuck key and make sure the cable is securely connected.

Try one of the following, in sequence, until the problem is solved:

- 1) Inspect the keyboard for one or more stuck keys and unstick them.
- 2) Check to see if the keyboard is the correct keyboard for this computer. Also check the back of the keyboard to see if it has an AT switch, make sure it is in the correct position.
- 3) Make sure the keyboard cable is securely connected to the keyboard connector on the back of the base unit.
- 4) Replace the keyboard and cable.





## Keyboard error; Set keyboard to 'Not installed' in Setup.

### Cause:

Keyboard has a timing problem. If the computer has American Megatrends, Inc. AMIBIOS, the keyboard may be incompatible with BIOS ROM.

### Solution:

To work around this problem, set the keyboard to 'Not installed' in the CMOS Setup.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) To work around this problem, set the keyboard to 'Not installed' in the CMOS Setup (this will cause the computer to bypass the keyboard POST routines).
- 2) Make sure a Keyboard Controller AMIBIOS is installed.



## **Keyboard data line failure; Check for a stuck key and the AT switch position.**

### **Cause:**

Keyboard is not sending the proper signals back to the keyboard controller chip during POST. Keyboard switch may be wrong, keyboard may be bad, keyboard cable may be bad, or a key may be stuck.

### **Solution:**

Check the keyboard for a stuck key and the AT switch position.

Try one of the following, in sequence, until the problem is solved:

- 1) Inspect the keyboard for one or more stuck keys and unstick them.
- 2) Check to see if the keyboard is the correct keyboard for this computer. Also, check the back of the keyboard to see if it has an AT switch and make sure it is in the correct position.
- 3) Make sure the keyboard cable is securely connected to the keyboard connector on the back of the base unit.
- 4) Replace the keyboard and cable.



## **Keyboard controller failure; Check for a stuck key and the AT switch position.**

### **Cause:**

Keyboard is not sending the proper signals back to the keyboard controller chip during POST. Keyboard switch may be wrong, keyboard may be bad, keyboard cable may be bad, or a key may be stuck.

### **Solution:**

Check the keyboard for a stuck key and the AT switch position.

Try one of the following, in sequence, until the problem is solved:

- 1) Inspect the keyboard for one or more stuck keys and unstick them.
- 2) Check to see if keyboard is the correct keyboard for this computer. Also, check the back of the keyboard to see if it has an AT switch and make sure it is in the correct position.
- 3) Make sure the keyboard cable is securely connected to the keyboard connector on the back of the base unit.
- 4) Replace the keyboard and cable.



## **Keyboard clock line failure; Check for a stuck key and the AT switch position.**

### **Cause:**

Keyboard is not sending the proper signals back to keyboard controller chip during POST. Keyboard switch may be wrong, keyboard may be bad, keyboard cable may be bad, or a key may be stuck.

### **Solution:**

Check the keyboard for a stuck key and the AT switch position (if switch exists).

Try one of the following, in sequence, until the problem is solved:

- 1) Inspect the keyboard for one or more stuck keys and unstick them.
- 2) Check to see if the keyboard is the correct keyboard for this computer. Also, check the back of the keyboard to see if it has an AT switch and make sure it is in the correct position.
- 3) Make sure the keyboard cable is securely connected to the keyboard connector on the back of the base unit.
- 4) Replace the keyboard and cable.



## Keyboard bad.

**Cause:**

Keyboard failed POST.

**Solution:**

Turn off the computer, reseal the keyboard connector, and turn computer back to reboot.

- 1) Turn the computer off.
- 2) Make sure the keyboard connector is securely seated in the connection.
- 3) Turn computer on and watch reboot process.
- 4) If the error persists, replace the bad keyboard.



## Invalid switch parameter.

### Cause:

*NOTE: This error message applies to the VDISK.SYS command appearing in DOS versions 3.3 and earlier.*

In the VDISK command in CONFIG.SYS, a switch other than /E (for extended memory) was included.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit CONFIG.SYS and change the switch to /E, then reboot the computer.

- 1) Edit CONFIG.SYS.
- 2) Locate the line using VDISK.
- 3) Remove any other switches and the add /E switch.
- 4) Save CONFIG.SYS.
- 5) Press CTRL+ALT+DEL to reboot the computer.



## Invalid stack parameter.

### Cause:

The STACK command line in CONFIG.SYS contains an incorrect parameter entry.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit CONFIG.SYS and correct the parameter in STACKS command line.

- 1) Edit CONFIG.SYS.
- 2) Change the STACKS command line to look similar to this example:

STACKS=9,256

*NOTE: Syntax is STACKS=n,s (Where n sets number of stacks (Valid entries 0,8-64), and s sets the size of each stack (Valid entries 0,32-512)).*

- 3) Save CONFIG.SYS.
- 4) Press CTRL+ALT+DEL to reboot the computer.



## Invalid path.

### Cause:

A directory entry in the PATH statement is incorrect, or the whole PATH statement is more than 127 characters long.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit AUTOEXEC.BAT and fix or shorten the PATH statement.

- 1) Type PATH at the DOS prompt.
- 2) Check if any directory statement appears incorrect, or if some of the path statement is truncated.
- 3) Confirm the correct directory/path for those in question by checking them in DOS.
- 4) Edit AUTOEXEC.BAT.
- 5) Locate the PATH statement and verify or correct each component.
- 6) Save AUTOEXEC.BAT.
- 7) Press CTRL+ALT+DEL to reboot the computer.





## Invalid partition table.

**Cause:**

DOS detects invalid information in the partition table on the disk.

**Solution:**

Use a file/disk recovery utility program to analyze and repair the problem.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Use a file/disk recovery utility program to analyze and repair the problem.
- 2) If running DOS 5 and using the MIRROR command on this disk, and the PARTNSAV.FIL is available, try to restore the partition table with UNFORMAT as follows:

UNFORMAT /PARTN



## **Invalid media or track 0 bad; Reformat diskette, if can't reformat use a new one.**

### **Cause:**

An error occurs while attempting to format a disk. Track 0 (the most important track) appears bad, meaning that the disk is not usable.

### **Solution:**

Try reformatting the disk.

- 1) Try reformatting the disk.
  - a) Insert the diskette in Drive A.
  - b) Type FORMAT A: at the DOS prompt.
- 2) If the disk does not format the second time, throw it away.

***CAUTION:*** Putting valuable data on a questionable disk is not worth the risk.



## Invalid environment size ..

### Cause:

Specified an incorrect argument for the /E switch on the SHELL command in CONFIG.SYS.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit CONFIG.SYS and fix the /E parameter on the SHELL command.

- 1) Edit CONFIG.SYS.
- 2) Locate the SHELL command line and change the /E switch to a number  $\geq 160$  and  $\leq 32768$ . Example follows:

SHELL=COMMAND.COM /E:1024 /P

*(NOTE: Do not include commas in this number.)*



## **Error: invalid EISA configuration storage due to actual/setup differences..**

### **Cause:**

*NOTE: This applies only to EISA computers.*

Card and slot information in setup is different from where boards are actually located.

### **Solution:**

Rerun the EISA Configuration Utility and reboot the computer.

- 1) Verify the adapter card information and slots used.
- 2) Rerun the EISA Configuration Utility, correct faulty entries and reboot the computer.
- 3) If that doesn't work, replace CMOS battery. Rerun [Setup](#) and the EISA Configuration Utility.



## **Invalid drive media; Format the diskette.**

**Cause:**

Attempted to read/write to a diskette that is not formatted.

**Solution:**

Format the diskette.

- 1) Insert the unformatted diskette in Drive A and close drive door.
- 2) Type the following command at the DOS prompt:  
FORMAT A:
- 3) (Optional) Type a volume label for diskette ( $\geq 11$  characters) when prompted.
- 4) Retry the task.



## Invalid drive in search path; Remove the bad drive reference in PATH statement.

### Cause:

The PATH command (usually in AUTOEXEC.BAT) contains a reference to an invalid disk drive.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit AUTOEXEC.BAT and remove the bad drive reference in PATH statement.



## **Invalid disk change; Put the first diskette back in the floppy drive and retry.**

### **Cause:**

The diskette in the drive was switched or exchanged before DOS was finished with the first diskette.

### **Solution:**

Put the first diskette back in the drive and press 'R' to Retry.



## Invalid device parameters..

**Cause:**

Bad DEVICE command line in CONFIG.SYS.

**Solution:**

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Repair the bad DEVICE command line in CONFIG.SYS and reboot the computer.

- 1) Edit CONFIG.SYS.
- 2) Identify and correct the DEVICE line (consult the user manual for details).
- 3) Save the file.
- 4) Press CTRL+ALT+DEL to reboot the computer.





## Invalid date and time; Replace CMOS battery, run Setup, enter date & time.

### Cause:

This error message may intermittently appear during bootup before the 'C:\>' prompt appears, because the CMOS battery is failing. Incorrect dates and times may appear on newly created files.

### Solution:

Type the following for a quick work around:

DATE (Type the current date in the format requested.)

TIME (Type the current time in the format requested.)

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Replace the CMOS battery.
- 2) Reboot the computer.
- 3) Run Setup.
- 4) Type the current date and time.
- 5) Reboot the computer.



## Invalid configuration info ..

### Cause:

Inconsistent information is being entered into Setup, the CMOS battery is bad or the power supply is going bad.

### Solution:

*NOTE: If other error messages appear along with this one, work to eliminate the others first.*

Rerun Setup and verify answers to each question. Reboot the computer.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Rerun Setup and verify answers to each question. Reboot the computer.
- 2) If that solves the problem, but the error reoccurs after turning the computer off and on again, replace the CMOS battery.
- 3) If the error continues after a new CMOS battery is inserted, replace the power supply.



## Invalid configuration info ..

**Cause:**

*NOTE: This applies only to EISA computers.*

Card and slot information in setup is different from where the board is actually located.

**Solution:**

Rerun the EISA Configuration Utility and reboot the computer.

- 1) Verify the adapter card information and the slot used.
- 2) Rerun the EISA Configuration Utility, correct the faulty entries and reboot the computer.
- 3) If that doesn't work, replace the CMOS battery and rerun Setup and the EISA Configuration Utility.



## **Invalid COMMAND.COM; Place COMMAND.COM in root or DOS directory.**

### **Cause:**

DOS cannot locate its primary file, COMMAND.COM. This file should be located in the root directory or DOS directory of Drive C. Perhaps it was deleted or the path statement lost.

### **Solution:**

Reboot the computer.

- 1) Press CTRL+ALT+DEL to reboot the computer (to reset the proper path statement).
- 2) Type the following commands at the DOS prompt:  
C: (Press ENTER)  
CDDIR /S COMMAND.COM (this will locate all copies of COMMAND.COM on drive).
- 3) If COMMAND.COM is not located either in the root directory (C:\) or the DOS directory (C:\DOS), insert the System diskette or Recovery diskette into Drive A and enter the following command at the DOS prompt:  
A:SYS C:  
(This will copy COMMAND.COM and the matching hidden system files to Drive C.)
- 4) Press CTRL+ALT+DEL to reboot the computer.



## Invalid COMMAND.COM in drive; Remove diskette from drive A and restart.

### Cause:

DOS just attempted to access a version of COMMAND.COM different from the one currently in use. This is caused by having additional (different version) copies of COMMAND.COM on one or more hard disks or floppy diskettes.

### Solution:

Remove the diskette from Drive A and reboot the computer.

- 1) Remove the diskette from Drive A.
- 2) Press CTRL+ALT+DEL to reboot the computer.
- 3) Locate all the copies of COMMAND.COM. [Locate files.](#)

*NOTE: There should be, AT MOST 3 copies of the SAME VERSION of COMMAND.COM with the same size and date: (1) Root directory (C:\), (2) DOS directory (C:\DOS), and (3) System, Boot or Recovery Diskette.*

- 4) Delete all other copies of COMMAND.COM.



## Error: intr2 error due to failed interrupt controller logic on mainboard

### Cause:

Interrupt controller logic on the mainboard has failed.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.



- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Intr1 error.

### Cause:

Interrupt controller logic on the mainboard has failed.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover.](#)



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.

- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.

- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.

- c) Locate the jumpers or DIP switches on the mainboard.

- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:

- 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.

- 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.

- e) (Optional) Install BIOS chip.

- 1] Locate BIOS chip on mainboard.

- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.



- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).  
6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.  
7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.

- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).  
6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP's).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).
  - 3] Speed of new memory matches that already installed.



i) (Optional) Install any additional cache or RAM memory. Do one of the following:

1] Install new SIMM(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c] Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.
- e] Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

- f] Repeat steps 3)a)-3)e) to install additional SIMMs.
- g] Make sure all SIMMs are at the same height and angle to the board.

2] Install new SIPP(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c] Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
- e] Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

- f] Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.
- g] Make sure all SIPPs are at the same height and perpendicular to the board.

3] Install new DRAM(s):

- a] Locate the appropriate chip socket on the mainboard.
- b] Touch metal sides of the base unit to discharge static electricity.
- c] Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

- d] Repeat steps 4a-4c to install additional DRAMs.
- e] Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.
- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
- g] Locate and position mounting screws and support spacers:

- h) Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.

*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*

- i) Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j) Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k) Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: **(CAUTION: Remember to discharge static first!)**
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

**WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.

- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*
  - e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.

- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Internal stack overflow ..

### Cause:

DOS and other programs are using all available system memory reserved for temporary use. Stacks are used by hardware interrupt handlers. In this case, too many interrupts were initiated in quick succession and used all available memory. This error is usually rare, but if it occurs often, there is an easy solution.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Reboot the computer.

- 1) Press CTRL+ALT+DEL to reboot the computer (this usually solves the problem).
- 2) If error reoccurs often, add the STACKS command to CONFIG.SYS or increase its value as follows:

- a) Edit CONFIG.SYS.

- b) Do one of the following:

- 1] If there is no STACKS command, add the following command at bottom of CONFIG.SYS:

STACKS=9,256

- 2] If CONFIG.SYS already contains a STACKS command line, increase its value as follows:

STACKS=10,128

*NOTE 1: Syntax is STACKS=n,s (Where n sets number of stacks (Valid entries 0,8-64), and s sets the size of each stack (Valid entries 0,32-512)).*

*NOTE 2: MemMaker will often add the STACKS line to CONFIG.SYS (e.g., STACKS=9,256).*

*NOTE 3: Zenith computers using the GRAPHICS command require the following STACKS command: STACKS=9,256*



## Internal error code 02ch ..

### Cause:

**WARNING:** Computer VIRUS! Although this error message appears to reflect a real hardware error, it is the 1381 Virus!

### Solution:

Save any open files, close all open applications and turn the computer off immediately!

Arrange for local qualified computer technician to diagnose and remove virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

**CAUTION:** *Computer viruses are extremely dangerous. Your data may be in danger of being corrupted or lost.*

#### 1) Perform immediate shutdown:

- a) Save any open files.
- b) Close all open applications.
- c) Turn the computer off.
- d) Identify and isolate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).

**CAUTION:** *Viruses should be diagnosed and repaired by qualified computer technicians using updated virus detection and cleanup software as follows:*

#### 2) Detect and remove virus(es).

- a) Insert a bootable, write-protected diskette in Drive A and turn on the computer.
- b) After boot, insert a write-protected diskette containing a virus detection program in Drive A.
- c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all network drives, all backups and every floppy diskette in the vicinity).
- d) Delete all infected files with the virus detection/disk clean program.
- e) If virus has infected the boot sector of hard disk, the following command may be useful. Type it at the DOS prompt:  
FDISK /MBR  
(The /MBR switch rebuilds the Master Boot Record on the disk.)
- f) Cold boot the computer (Turn the computer off, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.
- g) Scan all memory and connected drives for viruses again using most thorough scan pattern (some

detectors miss viruses on first pass). Use another virus detector program if available (to be absolutely sure all remnants are gone).

- 3) Check the surrounding area and notify the appropriate parties:
  - a) Scan all nearby PCs and floppy diskettes for viruses (reinfection of a disinfected computer from other previously infected diskettes is a common occurrence).
  - b) Notify diskette or transmission providers and receivers. Make sure the owner of the source diskette knows of the infection.
  - c) Report details of virus (which virus, number of computers affected, suspected damage sustained, and results of cleanup operations) to designated company authority.
- 4) Call for expert help from virus software and/or third party providers if required.

*NOTE: Regardless of whether or not your computer has a virus, it's a good idea to install an anti-virus program. Anti-virus programs reside in memory at all times to detect and report potential viruses as soon as they occur.*



## Internal cache test failed ..

**Cause:**

Internal cache on CPU chip is bad, meaning the CPU chip is bad.

**Solution:**

Reboot the computer.

Do one of the following, in sequence, until problem solved:

- 1) Press CTRL+ALT+DEL to reboot the computer.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) Run a hardware diagnostic utility to test the mainboard.
- 3) Replace the CPU chip.



## **Insufficient/not enough/out of memory; Close some programs or files, retry.**

### **Cause:**

There is not enough free memory (RAM) to execute the command or program.

### **Solution:**

Close some programs and retry the command or program.

Try one of the following, in sequence, until the problem is solved:

- 1) Close some programs and windows and retry.
- 2) Remove unnecessary terminate and stay resident (TSR) programs from memory.
- 3) Run MemMaker to free as much conventional RAM as possible; then retry.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 4) Add additional memory to the computer, run Setup and retry.





## Insufficient disk space.

**Cause:**

There is not enough room on the disk to complete the last task.

**Solution:**

Identify and delete some files or programs that are no longer needed (e.g., .TMP, .BAK files). Try the task again.



## **Infinite retry on parallel.**

**Cause:**

Printer is either turned off or is offline.

**Solution:**

Turn the printer on or press the online button and try printing again.



## **Incorrect DOS version.**

### **Cause:**

Used a command or utility from a different version of DOS than the version of DOS running (i.e., command interpreter). This is often caused by copying some of the DOS files from another computer into the DOS directory. These newer (or older) DOS files may require a different version of the command interpreter (kept in the root directory) than the version now running (or vice versa).

### **Solution:**

Reinstall DOS from a single complete set of DOS system diskettes.

- 1) Insert the DOS system diskette in Drive A and close the door.
- 2) Type the following command at the DOS prompt:  
A:INSTALL
- 3) Follow the instructions given by the installation program.



## Illegal device name.

### Cause:

DOS does not recognize the device name used in the MODE COM command, either the COM device is spelled incorrectly or doesn't exist.

### Solution:

Check the spelling of COM1, COM2, COM3 or COM4. Choose a valid COM port.

- 1) In each case that the MODE COMx port command was just used, check its spelling.
- 2) Make sure the specified COM port is valid.
  - a) Run a hardware utility (e.g., Microsoft Diagnostics (MSD) to identify valid COM ports.
  - b) Type the following command at the DOS prompt:  
C:\DOS\MSD
  - c) Choose the 'COM Ports' button.



[Choose MSD COM Ports](#)

- d) Identify which COM ports are valid and in use. See [Serial & Parallel Port Configuration Standards](#) for additional information.



[MSD Serial Port Configuration](#)



## Id information mismatch for..

### Cause:

*NOTE: This error message applies only to EISA computers.*

The computer suspects the adapter cards have been moved from the configuration stored in the CMOS Setup. This could be because the cards were actually moved, or the CMOS Setup information may be lost due to a failing or bad battery.

### Solution:

Run EISA Configuration Utility (ECU) and fill in where all the adapter cards are located.

- 1) Run EISA Configuration Utility (ECU) and fill in where all adapter cards are located.
- 2) Save the setup and reboot the computer.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 3) Replace the backup battery and repeat Steps 1-2.



## Error: I/O card parity interrupt at xxxx.xxxx. type (s)hut off NMI.

### Cause:

A bad adapter card is installed in the computer base unit.

### Solution:

To continue working, press 'S' to shut off the NMI and save the file.

*(NOTE: This action will remove the error message, but does not solve the problem) When time permits, isolate the bad card as follows.*

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Turn off the computer and unplug the power cable.
- 2) Remove the base unit cover.
- 3) Remove all the adapter cards except the video card.
- 4) Reinstall one adapter card.
- 5) Plug the power cable in and turn on the computer.
- 6) Watch for the same error message.
- 7) Repeat steps 1,4-6 with each adapter card until discovering the one causing the error message. Replace this card.
- 8) If error message continues with all cards, the video card may be bad. Try another video card. If error message stops, replace the video card.
- 9) Replace the mainboard as a last resort.



## I/O card parity error at xxxx.

### Cause:

A bad adapter card is installed in the computer base unit.

### Solution:

To continue working, press 'S' to shut off the NMI and save the file.

*(NOTE: This action will remove the error message, but does not solve the problem) When time permits, isolate the bad card as follows.*

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Turn off the computer and unplug the power cable.
- 2) Remove the base unit cover.
- 3) Remove all the adapter cards except the video card.
- 4) Reinstall one adapter card.
- 5) Plug the power cable in and turn on the computer.
- 6) Watch for same error message.
- 7) Repeat steps 1,4-6 with each adapter card until discovering the one causing the error message. Replace this card.
- 8) If error message continues with all cards, the video card may be bad. Try another video card. If error message stops, replace the video card.
- 9) Replace the mainboard as a last resort.



## I/O card NMI at xxxx.xxxx. ..

### Cause:

A bad adapter card is installed in the computer base unit.

### Solution:

To continue working, press 'S' to shut off the NMI and save the file.

*(NOTE: This action will remove the error message, but does not solve the problem) When time permits, isolate the bad card as follows.*

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Turn off the computer and unplug the power cable.
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- 5) Plug the power cable in and turn on the computer.
- 6) Watch for same error message.
- 7) Repeat Steps 1,4-6 with each adapter card until discovering the one causing the error message. Replace this card.
- 8) If error message continues with all cards, the video card may be bad. Try another video card. If error message stops, replace the video card.
- 9) Replace the mainboard as a last resort.





## General failure reading (or writing) drive; Run a file/disk recovery utility.

### Cause:

If Drive x is a floppy, the diskette could be bad. If it is a SCSI hard disk, there may have been a simple timing error between the hard disk and controller card. Otherwise, this error is likely due to a hardware problem: loose or bad data or power cables, a bad controller, or a bad hard/floppy drive.

### Solution:

Press 'I' to Ignore and try reading the disk again. If it works, run a file/disk recovery diagnostic utility on disk.

Try one of the following, in sequence, until the problem is solved:

- 1) Press 'I' to Ignore and try reading the disk again  
*(NOTE: This may simply be a transient error that may never occur again.)*
- 2) Press 'A' to Abort.
- 3) If Drive x is a floppy drive, try reading another diskette in this drive. (Alternatively, try reading the first diskette in another drive of the same type.) If an error message reoccurs, the problem is probably with the diskette and not the hardware.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 4) Turn the computer off and disconnect the external electrical power.
- 5) Check the power cable leading to Drive x. Make sure it is securely connected to drive.
- 6) Check the data ribbon cable leading to Drive x. Make sure it is securely connected to both drive and controller card.
- 7) Make sure the controller card is firmly seated in the mainboard expansion slot.
- 8) Try swapping the controller card (drive x) to isolate problem to controller card. Replace the original controller card if the second controller card solves the problem.

*NOTE: Swapping the controller card separately will not be possible with most IDE drives.*

- 9) Switch hard disks (drive x) to isolate problem to hard disk. Replace the original hard disk if the second hard disk works properly after it is installed.





## Keyboard defective; (AT Clone only) Change AT switch setting/try new keyboard.

### Cause:

Error message applies to an AT clone only.

A bad keyboard or mainboard is causing the 8042 keyboard controller chip to continually send signals to the processor using address line 20. Processor needs line 20 but the 8042 chip will not quit. Finally, BIOS sends error message.

### Solution:

Check the keyboard switch to make sure it is set properly.

Try one of the following, in sequence, until problem solved:

- 1) Check the keyboard switch to make sure it is set properly.
- 2) Try another keyboard.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 3) Replace the mainboard (8042 chip is permanently attached).



## **Has invalid cluster, truncated file; STOP running CHKDSK, use recovery utility.**

### **Cause:**

Check disk (CHKDSK) found a reference to non-existent cluster and truncated the rest of the file.

*NOTE: Truncating files is NOT a good thing for CHKDSK to be doing.*

### **Solution:**

STOP running CHKDSK!

Use a file/disk recovery utility to clean up the disk. Unfortunately, the truncated portion of the file may be gone.



## Hard/Fixed disk read failure; Secure cables and restart by pressing F1.

### Cause:

Hard disk read failure has many possible causes: a problem reading the boot segment, drive head alignment, lost CMOS Setup data, loose or missing cable, a bad hard disk or a bad controller card.

### Solution:

Press F1 to reboot the computer.

Do one of the following, in sequence, until the problem is solved:

- 1) Press F1 to reboot the computer.
- 2) If someone was just working inside the base unit, turn the computer off and check all the power and data cables going to the hard disk. Make sure they are properly and securely connected.  
***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*
- 3) If the computer boots properly, check the hard disk operation anyway because this error message the first time indicates something is definitely wrong. Run a file/disk recovery utility on this hard disk to isolate the problem and attempt to repair it.
- 4) If the computer doesn't boot after pressing F1, boot from a floppy and look at the hard drive.
  - a) Insert a system diskette in Drive A and press CTRL+ALT+DEL to reboot the computer.
  - b) Type 'C:' (to look at hard drive).
  - c) If 'Invalid Drive' error message appears, the computer cannot read Drive C. Run Setup and make sure the hard disk is correctly configured. Reboot the computer.
- 5) If able to get to Drive C, attempt to copy or backup critical files immediately onto another media (diskette or another hard disk).
- 6) Run SpinRite or a similar program, or reformat the hard disk and reload the data. Reboot the computer.
- 7) Replace the hard disk.
- 8) Replace the controller card.





## **Hard/fixed disk configuration error; Use old CMOS Setup diskette/update BIOS chip.**

### **Cause:**

The CMOS contains an illegal code definition for the hard disk; usually due to using a CMOS setup program that is newer than the BIOS chip in the computer. It also may be due to using a CMOS program from another hardware manufacturer.

### **Solution:**

Use original the CMOS Setup diskette/program or obtain an updated BIOS chip.

Do one of the following:

- 1) Use the original CMOS Setup diskette to run [Setup](#).
- 2) Obtain an updated BIOS ROM chip that will contain new drive type definitions for the computer.



## Format not supported on drive x; Fix device driver parameters in CONFIG.SYS.

### Cause:

Attempted to use the FORMAT command on a device loaded from CONFIG.SYS with parameters that conflict with FORMAT command.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Check all the device driver command lines in CONFIG.SYS to make sure the correct parameters are used.

- 1) Edit CONFIG.SYS.
- 2) Make sure each device driver command line with additional parameters uses those parameters correctly (see the user documentation accompanying each device).





## How to install an external modem.

### Solution:

Select a serial (COM) port, connect the modem cable to the COM port and modem, connect the power and telephone lines to the modem, turn the computer on, run the install program in the communications package.

- 1) Turn the computer off.
- 2) Choose a serial (COM) port.
  - a) Look at back of base unit for empty 9-pin or 25-pin connector slots.



Photo: Cable connections

- b) Serial port 1 is usually a 9-pin male connection directly above/beside a 25-pin parallel port female connector, often used for a printer.
- c) Serial port 2 (if installed) is usually a 25-pin male connector in the slot next to the serial/parallel card slot.
- d) Choose one of the serial ports to use based on (1) which port is free, and (2) the connector size of the cable that came with the modem. (Option b) requires a 9-pin female plug on one end with a 25-pin male plug on the other end. Option c) requires a 25-pin female plug on one end and a 25-pin male plug on the other end.)
  - e) If no empty serial ports are available, install an input/output (I/O) card with a serial port, or choose an internal modem instead.
- 3) Hold the cable connector so the pin-shape matches the connector shape and connect the modem cable to the back of the modem. Repeat to connect the cable to the selected serial port on the back of the computer.  
*(CAUTION: Do not force connection! Pin damage may result.)*
- 4) Plug a standard single-line telephone cable into the phone jack labeled 'line' or 'line in' on the back of the modem, and plug the other end into a telephone wall jack.  
(If jacks are not labeled, consult modem user manual.)
- 5) (Optional) If the modem has 2 jacks and a desk phone on same line is also desired, plug the telephone cable connected to the telephone into the second jack on the modem card labeled 'phone' or 'line out'.  
(This allows normal telephone use when the modem is not being used.)
- 6) Plug the modem's AC adapter in.
  - a) Connect the plug into the power jack on the back of the modem.
  - b) Plug the AC adapter into an electrical outlet.
- 7) Locate and turn on the power switch on the modem (this is usually a toggle switch on the back of the modem).
- 8) If the power light on the front panel of the modem is not lit, recheck the work in step 5 and make sure the power source is good.

- 9) Turn the computer on. Insert the diskette containing communications program into Drive A and enter the following:

A: (Press enter)

INSTALL or SETUP (Refer to the program instructions) Follow the installation/setup instructions, responding with the correct serial (COM) port used for installation (See step 1). Test the application software installation and modem by entering a local working dial-up telephone number and the corresponding communications configuration settings. If the modem software generates an error message about interrupt (IRQ) conflicts during use:

- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at the DOS prompt and press 'ENTER':

C:\DOS\MSD

- b) Choose 'Com Ports...' from the MSD main screen.



[MSD Choose Com Ports screen](#)

- c) Identify the port assignments.



[MSD COM Ports example](#)

- d) Identify the interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

**CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.

- e) See [IRQ Conflicts](#) for advice on resolving conflicts.
- f) Turn the modem off, disconnect the power and telephone cables, and change the port and/or IRQ settings. Reinstall all the cables and test again.

**CAUTION:** Resolving interrupt (IRQ) conflicts should be done by a qualified computer technician.



## Color display has no color due to bad video card.

### Cause:

Video card is bad.

### Solution:

Video card needs to be replaced.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Turn the computer off.
- 2) Unplug the power cables.
- 3) Remove the video cable from the back of the base unit (removing both connector screws).
- 4) Remove the cover from the base unit.
- 5) Touch a grounded metal object outside of the base unit first.
- 6) Locate the video card and remove the screw holding the video card in place.
- 7) Remove the old video card by gently rocking the card lengthwise out of the bus slot.
- 8) Touch a grounded metal object again. Remove the new video card from the package carefully, handling the card only by the edges.
- 9) Holding the card by its edges, insert the card into the same slot carefully and press down firmly but slowly until the card is seated into the bus slot. (**CAUTION: Do not force the card! Do not allow the card to touch any other card.**) Replace the slot screw and tighten the screw and the card down to the metal sides of the base unit (to make sure proper grounding). If installing a different video card, check the manual to see if any switches or jumpers on the mainboard require changing and change them. Plug in the video cable to the video card on the back of the base unit. Reconnect the power cables. Turn the computer on. Observe the display to determine if the video card is working properly in conjunction with the display unit. Run Setup, if necessary, to make any changes to the CMOS video settings and reboot the computer.



## Video adapter card bad; Replace video adapter card.

### Cause:

Bad video card.

### Solution:

Replace the video card.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Turn the computer off.
- 2) Unplug the power cables.
- 3) Remove the video cable from the back of the base unit (removing both connector screws).
- 4) Remove the cover from the base unit.
- 5) Touch a grounded metal object outside of the base unit first.
- 6) Locate the video card and remove the screw holding the video card in place.
- 7) Remove the old video card by gently rocking the card lengthwise out of the bus slot.
- 8) Touch a grounded metal object again. Remove the new video card from the package carefully, handling the card only by the edges.
- 9) Holding the card by its edges, insert the card into the same slot carefully and press down firmly but slowly until the card is seated into the bus slot. (**CAUTION: Do not force the card! Do not allow the card to touch any other card.**) Replace the slot screw and tighten the screw and the card down to the metal sides of the base unit (to make sure proper grounding). If installing a different video card, check the manual to see if any switches or jumpers on the mainboard require changing and change them. Plug in the video cable to the video card on the back of the base unit. Reconnect the power cables. Turn the computer on. Observe the display to determine if the video card is working properly in conjunction with the display unit. Run [Setup](#), if necessary, to make any changes to the CMOS video settings and reboot the computer.



## **Defective display power supply; Replace the display unit (monitor).**

### **Cause:**

Monitor is bad (or, if the cable is permanently attached, the cable may be bad).

### **Solution:**

Have qualified technician examine both the cable and the display or replace the monitor.

*NOTE 1: The monitor may be covered under warranty.*

*NOTE 2: Refer to the internal procedure for sending the monitor for repair/replacement.*



## Video cable bad; Replace video cable, if detachable.

### Cause:

Video cable is bad.

### Solution:

Replace the video cable.

*NOTE: Only applies when the display unit has a detachable video cable.*

- 1) Turn the computer off.
- 2) Replace the video cable.
  - a) Trace the video cable from the back of the display unit to the back of the base unit.
  - b) Unscrew the connector screws completely until the video cable connector can be gently pulled from the connector on the video card.
  - c) Remove the video cable from the connector on the back of the display unit.
  - d) Insert the video cable into the connector on the back of the display unit.
  - e) Inspect the shape of the connectors on the video cable and the video card, holding the cable connector so that it matches the shape of the connector on the card.
  - f) Gently insert the cable connector into the video receptacle on the video card on the back of the base unit (**CAUTION: Do not force connection; fragile pin damage will occur.**)
  - g) Secure the video cable to the back of the display unit.
- 3) Turn the computer on.



## **Video cable loose causes no color; Secure video cable connections.**

### **Cause:**

Video cable connections are loose.

### **Solution:**

Secure the video cable firmly into the video port on the back of the base unit (and the display unit, if applicable).

- 1) Turn the computer off.
- 2) Check the video cable connections.
  - a) Secure the connection of the video cable to the video port on the back of the base unit.
  - b) If the video cable has a connector plug on the display unit end, securely connect it.
- 3) Turn the computer on.



## **Individual software program setup; Set up program to display colors.**

### **Cause:**

Software program is not set up properly to display colors or is not capable of using color mode.

### **Solution:**

Check the software program setup options and consult the software program's user manual for color capability and change settings to color.





## **Monochrome switch on; Move the monochrome switch to color position.**

### **Cause:**

Monochrome switch on the display unit is in a position other than color mode.

### **Solution:**

Move the monochrome switch to the color position.

- 1) Locate the monochrome switch on the display unit.
  - a) Look for a button, switch or small lever.
  - b) Check along the lower front and side of the display unit. It could be located along the lower side (check both sides) or rear of the display unit.
- 2) Move the button, switch or lever to the color mode position.



## **Horizontal bars moving slowly up display due to bad display power supply.**

**Cause:**

Power supply in the display unit is going bad.

**Solution:**

Replace the display unit (replacing the display unit power supply is not cost effective).

Do one of the following:

- 1) Contact the vendor immediately for a replacement if the display unit is still under warranty.
- 2) Continue to use the display unit while making arrangements to purchase a replacement.



## **Horizontal bars moving slowly up display due to power interference.**

### **Cause:**

Electrical power interference from nearby electrical appliances that aren't well shielded (e.g., laser printers, fluorescent lights, major conduits, etc.) is interfering with computer display.

### **Solution:**

Move the display unit (and the computer) to a location with less electrical interference.

*NOTE: The same interference causing problems with the display unit may begin to effect the hard drive also. Avoid work areas with high power interference problems.*



## **First or second disk bad or incompatible; Use 'file compare' to compare files.**

### **Cause:**

This error message appears while running disk compare (DISKCOMP), (used to compare the tracks of two diskettes of the same size). In most cases this error means that the logical size (density) of the two diskettes is different. If two diskettes are not formatted to the same size, or were not created with DISKCOPY, they cannot be compared using DISKCOMP. Also, a diskette may not be readable.

### **Solution:**

Use file compare (FC) to compare sets of similar files on each of these diskettes.

Do one of the following:

- 1)** Use file compare (FC) to compare files on these diskettes:
  - a)** Type the following command at the DOS prompt:  
FC <drive1>:first.fil <drive2>:second.fil  
(Where <drive1>:first.fil is the diskette drive containing the first file and <drive2>:second.fil is the second diskette drive containing the second file)
  - b)** Repeat step a) for remaining file sets to be compared.
- 2)** Attempt to read the directory of the source disk to see if there is a problem reading the diskette.
  - a)** Type the following command at the DOS prompt:  
DIR x:  
(Where x: is the floppy drive containing the source diskette)
  - b)** If disk is unreadable, use a file/disk recovery utility to attempt to recover files from it.



## <Filename> device driver..

### Cause:

An incorrect device driver filename, or the path for that driver, is listed in a command in CONFIG.SYS.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Check the spelling of the command line and path in CONFIG.SYS.

- 1) Locate the file for (<filename> device driver) and check the spelling and pathname.
- 2) Edit CONFIG.SYS.
- 3) Check and correct the spelling of the device driver (specified as <filename> in the error message).
- 4) Check and correct the path in the device driver line.
- 5) Save CONFIG.SYS.
- 6) Press CTRL+ALT+DEL to reboot the computer.



## FCB unavailable error.

### Cause:

SHARE.EXE is loaded and a program attempted to open more file control blocks (FCBs) than specified in the FCBS command.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Abort the operation, increase the FCBS setting in CONFIG.SYS by 4 and reboot the computer.

- 1) Stop the program operation.
- 2) Edit CONFIG.SYS.
- 3) Locate the 'FCBS=' line and increase the value by 4.
- 4) Save CONFIG.SYS.
- 5) Press CTRL+ALT+DEL to reboot the computer.
- 6) Reattempt the operation.



## Error: fixed disk read failure due to alignment, CMOS, or other problems.

### Cause:

Fixed disk read failure has many possible causes: problem reading the boot segment, drive head alignment, lost CMOS Setup data, a loose or missing cable, a bad hard disk or bad controller card.

### Solution:

Press F1 to reboot the computer.

Do one of the following, in sequence, until the problem is solved:

- 1) Press F1 to reboot the computer.
- 2) If someone was just working inside the base unit, turn the computer off and check all the power and data cables going to the hard disk. Make sure they are properly and securely connected.  
***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*
- 3) If the computer boots properly, check the hard disk operation anyway because this error message indicates something is definitely wrong. Run a file/disk recovery utility on the hard disk to isolate the problem and attempt to repair it.
- 4) If the computer doesn't boot after pressing F1, boot from a floppy disk and look at the hard drive.
  - a) Insert a system diskette in Drive A and press CTRL+ALT+DEL to reboot the computer.
  - b) Type 'C:' (to look at the hard drive).
  - c) If an 'Invalid Drive' error message appears, the computer cannot read Drive C. Run [Setup](#) and make sure the hard disk is correctly configured. Reboot the computer.
- 5) If able to get to Drive C, attempt to copy or backup critical files immediately onto another media (diskette or another hard disk).
- 6) Run SpinRite or a similar program, or reformat the hard disk and reload the data. Reboot the computer.
- 7) Replace the hard disk.
- 8) Replace the controller card.



## Error: fixed disk failure due to hard disk, controller or cabling problems..

### Cause:

Fixed disk controller did not receive the expected response from the hard disk within the time limit when attempting to move the head to the last cylinder (operational test), and issues a 'Hard Disk Failure' message. Possible causes include: the power cable is not connected to the hard disk, the data cable is bad or incorrectly installed, the wrong drive select jumper on the hard disk, a bad hard disk, or a bad controller card.

### Solution:

Check the cable connections and jumper settings, and make sure the controller card is properly seated. Reboot the computer.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until the problem solved.

- 1) Make sure the power cable is securely connected to the hard disk.
- 2) Make sure the data cable between the hard disk and the controller card is correctly and securely installed.
- 3) Check the drive select jumper setting on the hard disk (See the owner's manual that came with the hard disk/computer).
- 4) Reseat the hard disk controller card (reinspect the cables to make sure they are securely fastened).
- 5) Reboot the computer and watch for an error message.
- 6) If Steps 1-5 do not solve the problem, double-check each step, referring to the owner's manual.
- 7) Swap the hard disk drive for one that works. Repeat Steps 1-5.
- 8) If the problem does not appear to be the hard disk, swap the controller card. Repeat steps 1-5.

*NOTE: It may not be possible to swap the controller card separately if the hard disk and controller are combined (as in IDE drives). If so, step 7 is the last step to follow in this solution.*





## Fixed disk controller; Check cables, jumper setting, re-insert controller card.

### Cause:

Hard disk controller did not receive expected response from the hard disk within the time limit when attempting to move the head to the last cylinder (operational test), and issues a 'Hard Disk Failure' message. Possible causes include: the power cable is not connected to the hard disk, the data cable is bad or incorrectly installed, the wrong drive select jumper on the hard disk, a bad hard disk, or a bad controller card.

### Solution:

Check the cable connections and jumper settings, and make sure the controller card is properly seated. Reboot the computer.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until the problem is solved.

- 1) Make sure the power cable is securely connected to the hard disk.
- 2) Make sure the data cable between the hard disk and the controller card is correctly and securely installed.
- 3) Check the drive select jumper setting on the hard disk (See the owner's manual that came with the hard disk/computer).
- 4) Reseat the hard disk controller card (reinspect the cables to make sure they are securely fastened).
- 5) Reboot the computer and watch for an error message.
- 6) If Steps 1-5 do not solve the problem, double-check each step, referring to the owner's manual.
- 7) Swap the hard disk drive for one that works. Repeat Steps 1-5.
- 8) If the problem does not appear to be the hard disk, swap the controller card. Repeat Steps 1-5.



## Fixed disk configuration ..

### Cause:

The CMOS contains an illegal code definition for the hard disk; usually due to using a CMOS setup program that is newer than the BIOS chip in the computer. It also may be due to using a CMOS program from another hardware manufacturer.

### Solution:

Use the original CMOS Setup diskette/program or obtain an updated BIOS chip.

Do one of the following:

- 1) Use the original CMOS Setup diskette to run [Setup](#).
- 2) Obtain an updated BIOS ROM chip that will contain the new drive type definitions for the computer.



## **First cluster number is invalid; Stop using CHKDSK, use recovery utility.**

### **Cause:**

CHKDSK is truncating file(s) because file(s) shows zero clusters.

### **Solution:**

STOP using CHKDSK!

***CAUTION:*** *Truncating files can cause data loss.*

*NOTE: This particular file may be completely gone.*

- 1) STOP using CHKDSK (it is truncating files).
- 2) Use a file/disk recovery utility to attempt recovery of other truncated entries (prevents losing additional truncated files).



## **Error: FDD b is not installed due to loose card or bad/incorrectly installed cables..**

### **Cause:**

Computer cannot find the controller for the floppy disk drive (FDD) B. Controller card may not be seated properly, or the cables may be missing or incorrectly installed. There is a remote chance that the controller card is bad.

### **Solution:**

Reseat the controller card and check the cables.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Turn off the computer and disconnect the power cables.
- 2) Open the base unit and reseat the controller card.
- 3) Inspect the cable installation and make sure the cables are securely and correctly connected.
- 4) Make sure the ribbon cables are properly positioned (the cable side with the red or blue stripe connects to pin 1).
- 5) Turn on the computer and test it.
- 6) If the error message continues, replace the controller card.



## **FDD a is not installed.**

### **Cause:**

Computer cannot find the controller for the floppy disk drive (FDD) A. Controller card may not be seated properly, or the cables may be missing or incorrectly installed. There is a remote chance that the controller card is bad.

### **Solution:**

***CAUTION:*** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

Reseat the controller card and check the cables.

- 1) Turn the computer off and unplug the power cables.
- 2) Open the base unit and reseat the controller card.
- 3) Inspect the cable installation and make sure the cables are securely and correctly connected.
- 4) Make sure the ribbon cables are properly positioned (the cable side with the red or blue stripe should connect to pin 1).
- 5) Turn the computer on and test it.
- 6) If the error message continues, replace the controller card.



## FDD controller failure.

### Cause:

Often means the floppy drive and/or the controller is bad. However, it could simply be a loose controller card, cable or an incorrectly installed cable.

### Solution:

Reseat the controller card and check all the cables.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Turn the computer off and unplug the power cable.

Try one of the following, in sequence until the problem is solved:

- 2) Reseat the controller card.
- 3) Inspect the cables and connections to make sure they are not damaged and they are securely connected.
- 4) Make sure the ribbon cables are properly positioned (the cable side with the red or blue stripe should connect to pin 1).
- 5) Try swapping the controller card to isolate the problem to the controller card. Replace the original controller card if the second controller card solves the problem.

*NOTE: Swapping the controller card separately will not be possible with most IDE drives.*

- 6) Switch the hard disks to isolate the problem to the hard disk. Replace the original hard disk if the second hard disk works properly after it is installed.



## Fail-safe timer NMI inop.

### Cause:

Fail-safe timer on the EISA mainboard is bad.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the mainboard (fail-safe timer permanently attached).

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover.](#)



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip



with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Fail-safe timer NMI.

### Cause:

*NOTE: This message applies only to EISA computers. A device is taking over the bus. This error may be just a random event, or be caused by an adapter card problem.*

### Solution:

Reboot the computer.

Do one of the following, in sequence, until the problem is solved:

- 1) Press CTRL+ALT+DEL to reboot the computer.  
***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*
- 2) Isolate and remove the offending adapter card:
  - a) Turn the computer off.
  - b) Remove the most sophisticated adapter card from the system (or the one just installed).
  - c) Turn the computer on and test it.
- 3) Repeat Step 2 for each additional installed card. When the card causing the problem is found, replace the card and contact the card vendor.
- 4) Substitute the controller card and video card if necessary.



## **Expanded/extended memory size=nnnnnnnK; Not a problem, only reporting size.**

### **Cause:**

*NOTE: This is not an error message.*

The computer is reporting the size of extended memory.

### **Solution:**

None required.



## Extended memory size=nnnnnnk.

**Cause:**

*NOTE: This is not an error message.*

The computer is reporting the size of extended memory.

**Solution:**

None required.





## **Extended error.**

**Cause:**

An error occurred, but COMMAND.COM cannot locate the error message because the COMMAND.COM file is missing.

**Solution:**

Insert a diskette containing COMMAND.COM into drive A and retry operation.



## Expansion board not ready..

### Cause:

Ran EISA configuration utility and entered information for a board. Computer cannot find the board at the specified slot.

### Solution:

***CAUTION:*** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

Make sure the board is securely seated in the specified slot and reboot the computer.



## Expansion board disabled at..

**Cause:**

*NOTE: This is an information message.*

Board in slot x is disabled.

**Solution:**

Use EISA configuration utility to reenable the board at slot x.



## **Expansion board NMI at slot x.**

**Cause:**

Adapter card in slot x generated a nonmaskable interrupt to indicate it has a problem.

**Solution:**

Contact a qualified computer technician, who may contact the board vendor for technical assistance.



## Errors on list device..

**Cause:**

Printer is off-line or printer data cable is not secure.

**Solution:**

Make sure the printer is online and the printer data cable is securely connected at both ends.



## Errors found, incorrect configuration; Validate memory size entry in Setup.

### Cause:

The amount of memory found during the POST does not match the amount of memory set in the CMOS chip. The memory amount may be incorrectly setup in CMOS, or there may be loose memory chip(s) or SIMM(s) not counted during the POST.

### Solution:

Validate the memory size entry in the CMOS Setup.

Try one of the following, in sequence, until the problem is solved.

- 1) Validate the memory size entry in the CMOS Setup. Reboot the computer if a change is made.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) Replace the battery and reboot the computer.
- 3) Inspect and reseat any loose memory chips or SIMMs.
- 4) Count the amount of memory actually installed (while the computer case is off) and compare to the memory entry in the CMOS setup. Run the CMOS Setup and change the memory entry if incorrect.
- 5) Reboot the computer with memory chips/SIMMs seated and correct memory amount in CMOS.
- 6) Replace the mainboard (this is seldom necessary).



## **Errors found, F parameter not specified; Enter CHKDSK/F at the C: prompt.**

### **Cause:**

CHKDSK found one or more lost file chains or problems reading the boot directory or a subdirectory. Lost chains are a common occurrence and usually not serious.

### **Solution:**

Run check disk again using the /F parameter, as follows:

CHKDSK/F

*NOTE: Use a more advanced file/disk recovery utility (e.g., ScanDisk or Norton Disk Doctor). Most file/disk utilities will save more data than CHKDSK.*



## Errors found; disk x: failed initialization; Run Setup, choose the correct drive.

### Cause:

Hard disk does not report back after initialization. Causes range from the CMOS Setup problem to the hardware problems involving power or data cable installation, incorrect drive select jumper selected, a bad hard disk or a bad hard disk controller card.

### Solution:

Run Setup. Make sure the correct drive type is selected.

Try one of the following, in sequence, until the problem is solved:

- 1) Check the hard disk configuration.
  - a) Run Setup. Make sure the correct drive type is selected.
  - b) Reboot the computer.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) Make sure the power cable is securely connected to the hard disk.
- 3) Make sure the data cable is routed and connected properly between the hard disk and the controller card.
- 4) Check the drive select jumper on the hard disk against the suggested setting in the owner's manual.
- 5) Try swapping the controller card to isolate the problem to the controller card. Replace the original controller card if the second controller card solves the problem.

*NOTE: Swapping the controller card separately will not be possible with most IDE drives.*

- 6) Switch the hard disks to isolate the problem to the hard disk. Replace the original hard disk if the second hard disk works properly after it is installed.





## HIMEM.SYS has detected unreliable; Disable external cache in Setup.

### Cause:

*NOTE: Error applies to MS-DOS 6.2 and 6.21. Faulty external cache controller, bad or mismatched memory chips on external cache, mainboard, A20 handler problems, or bad or mismatched memory chips in main memory.*

### Solution:

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Disable external (secondary) cache in CMOS Setup.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until the problem is solved:

- 1) Disable the external (secondary) cache in CMOS Setup.
  - a) Run Setup and turn off the external (or secondary) cache.
  - b) Reboot the computer.
  - c) If this corrects problem, replace SRAM memory chips on cache (***CAUTION:** Be sure to use the proper memory chip type and speed.*)
  - d) If replacing the SRAM chips does not correct problem, cache controller may be bad. Contact the hardware manufacturer.
- 2) Disable Turbo in CMOS Setup.
  - a) Run Setup and turn off Turbo mode.
  - b) Reboot the computer.
- 3) Disable Fast Gate A20 and Fast A20 Display in CMOS Setup.
  - a) Run Setup and turn off the Fast Gate A20 and Fast A20 Display.
  - b) Reboot the computer.
- 4) Add the /MACHINE switch to the HIMEM.SYS command in CONFIG.SYS.
  - a) Edit CONFIG.SYS.
  - b) Locate the HIMEM.SYS command line near the top of file.

- c)** Add the /MACHINE switch to the HIMEM.SYS command (See [Machine Codes for HIMEM.SYS](#)).
  - d)** Save the file and exit the editor.
  - e)** Reboot the computer.
- 5)** Replace the bad or mismatched memory chips in the main memory.



## Error: unable to control A20.

### Cause:

A20 line is a hardware component of x86 processors that permits programs to access the first 64K of extended memory. Different computers use different techniques for controlling the A20 line. HIMEM.SYS is having difficulty choosing the correct technique for controlling the A20 line on this computer.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Add the /MACHINE switch to the HIMEM.SYS command line in CONFIG.SYS.

- 1) [Edit CONFIG.SYS.](#)
- 2) Locate the HIMEM.SYS command line near the top of the file.
- 3) Add the /MACHINE switch to the HIMEM.SYS command (See [Machine Codes for HIMEM.SYS](#)).
- 4) Save the file and exit the editor.
- 5) Press CTRL+ALT+DEL to reboot the computer.



## Error after uninstalling.

### Cause:

*NOTE: This error message applies to DOS 6.2 only.*

DoubleSpace Uninstall does not readjust the drive letters setup to be cached by the SmartDrive command (in AUTOEXEC.BAT), after uncompressing DoubleSpace drives.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit AUTOEXEC.BAT and specify the correct drive(s) on the SmartDrive command line.

- 1) Edit AUTOEXEC.BAT.
- 2) Locate the SmartDrive command line.  
(EXAMPLE: C:\DOS\SMARTDRV /X H: 512 512)
- 3) Change the drive to be cached to the actual drive name (i.e., in the above example, change 'H:' to 'C:').
- 4) Save the file and exit the editor.
- 5) Reboot the computer.



## **Error reading/writing the partition table; Run FDISK & 'high-level format' drive.**

### **Cause:**

*NOTE: Error occurs only when attempting to format hard disk.*

FDISK was run improperly.

### **Solution:**

Rerun FDISK and attempt to high-level format the drive again.

Try one of the following, in sequence, until the problem is solved:

- 1) Rerun FDISK and attempt to high-level format the drive again.
- 2) Low-level format drive again. Rerun FDISK and attempt to high-level format the drive again.
- 3) Replace the hard disk (only after absolutely sure there are no software or human errors).



## EISA CMOS inoperational.

### Cause:

EISA CMOS inoperational occurs when CMOS data is corrupt or a read/write error occurs. Most likely the cause is a low/bad battery.

### Solution

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the CMOS battery and run [Setup](#).



## EISA CMOS checksum failure.

### Cause:

EISA CMOS checksum failure occurs when CMOS data is corrupt or a read/write error occurs. Most likely the cause is a low/bad battery.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the CMOS battery and run [Setup](#).



## Driver not installed, MS Mouse not found; Fix port assignment or IRQ conflicts.

### Cause:

Incorrect serial port configuration, interrupt conflicts or a defective mouse.

### Solution:

Use the diagnostics program to identify any serial port assignment conflicts and IRQ conflicts. Try the mouse on another computer.

Try one of the following, in sequence, until the problem is solved:

- 1) Run a diagnostic program (e.g., MSD Microsoft Diagnostics) to check serial port assignments and interrupt assignments.
  - a) Type 'MSD' at the DOS prompt.
  - b) Choose 'Serial Ports' (third item on the right side)
  - c) Determine if the mouse and another device are in conflict (i.e., using identical serial ports and/or conflicting interrupts (IRQs)). (See [Serial Port Configuration Standards](#) and



[MSD Serial Port Configuration](#) for reference)

**CAUTION:** *Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- 2) If serial port conflict exists (i.e., 2 devices using same port) change one device to an independent port with the device's application software setup.

EXAMPLE: If the mouse and the modem share COM1, change the modem to COM3 within the communications package.

*NOTE: A Microsoft Mouse must be installed on COM1 or COM2 (COM3 and COM4 are not supported).*

- 3) If interrupt (IRQ) conflict exists (i.e., 2 devices using same interrupt (IRQ), contact a qualified computer technician to change the interrupts.

EXAMPLE: If the mouse is using COM1, IRQ4 and the modem is using COM3, IRQ4, the interrupts are in conflict.
- 4) Remove the adapter card of the device to be changed and set the jumpers/switches to a different interrupt (IRQ) setting (consult device or system owner's manual for guidance).



**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 5) Test whether the mouse is operational by trying it on another computer that uses the same mouse type.
  - a) Turn the other computer off.
  - b) Unplug the other computer's mouse and plug in the one being tested.
  - c) Turn the computer on.
  - d) Try using the mouse to test it).
  - e) Replace the mouse if it still does not work.



## **Fastopen program detected; Press CTRL+ALT+DEL to restart.**

### **Cause:**

*NOTE: This error may appear when running DoubleSpace if it detects that FASTOPEN is also running while it is compressing a drive from the full-screen program, and the computer may not be restarted.*

### **Solution:**

Press CTRL+ALT+DEL to restart the computer while the error message is displayed.

*NOTE: This will read the configuration files and remove Fastopen from memory. Then DoubleSpace will continue.*



## To set up doublespace you..

### **Cause:**

*NOTE: This error may occur when attempting to recover an unmounted compressed volume file (CVF) by booting with an MS-DOS 6.0 boot diskette in Drive A. The problem is that DBLSPACE.INI cannot be found.*

### **Solution:**

Use MS-DOS Editor to create a DBLSPACE.INI file with appropriate settings. Save the file to the root directory of the hard disk and reboot the computer.



## DoubleSpace found crosslink; Enter CHKDSK/F (or DBLSPACE /CHKDSK/F) at C: prompt.

### Cause:

Drive is too full (> 90%) or EMM386 command line in CONFIG.SYS uses the HIGHSCAN parameter. The HIGHSCAN parameter makes EMM386.EXE search through upper memory for available UMBs. If used, this may cause a memory conflict with TSRs like DoubleSpace.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Run CHKDSK/F (or DBLSPACE /CHKDSK/F) from the DOS prompt.

Do one of the following:

- 1) Run CHKDSK/F (or DBLSPACE /CHKDSK/F) from the DOS prompt.
- 2) Remove some files or applications from the drive.
- 3) (MS-DOS 6.x and later only) Edit CONFIG.SYS.

a) Locate the line containing EMM386.EXE.

b) Remove the HIGHSCAN parameter.

c) Add NOHIGHSCAN parameter. Example:

```
DEVICE=C:\DOS\EMM386.EXE NOEMS X=A000-CFFF I=D000-EFFF X=F000-FEFF  
NOHIGHSCAN
```

d) Save the file and press CTRL+ALT+DEL to reboot the computer.



## **DOS memory-arena error; Press CTRL+ALT+DEL to restart computer.**

### **Cause:**

DOS editor generated a serious memory error.

### **Solution:**

Press CTRL+ALT+DEL to restart the computer.



## Device not ready; Insert diskette again (label up) & close drive door.

### Cause:

If floppy drive, problem may be a diskette missing, installed upside down or backwards, drive door not securely closed, drive door sensor broken, bad cable, bad drive, or bad diskette. If hard drive, there may be timing incompatibilities.

### Solution:

Make sure the diskette is correctly installed and the drive door is completely closed.

Do one of the following:

1) If the drive is floppy drive:

- a) Make sure the diskette is correctly installed.
- b) Make sure the drive door is completely closed.
- c) Press 'R' to retry access.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- d) Try accessing the floppy diskette in another drive or on another computer.
- e) Use a file/disk recovery utility to inspect and repair the floppy diskette.
- f) Inspect the floppy drive cable for damage and secure connections. Replace if necessary.
- g) Replace the floppy drive.

2) If drive is hard disk:

- a) Press 'R' to retry access (Usually the problem disappears on second attempt).
- b) Use a file/disk recovery utility to inspect and repair the hard disk.



## DMA 2 failed.

### Cause:

DMA chip on mainboard is bad.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the mainboard (DMA chip is permanently attached).

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.

- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.

- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.

- c) Locate the jumpers or DIP switches on the mainboard.

- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:

- 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.

- 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.

- e) (Optional) Install BIOS chip.

- 1] Locate BIOS chip on mainboard.

- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).



- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.

- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).  
6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.  
7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.

- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).  
6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP's).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).
  - 3] Speed of new memory matches that already installed.

i) (Optional) Install any additional cache or RAM memory. Do one of the following:

1] Install new SIMM(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c] Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.
- e] Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

- f] Repeat steps 3)a)-3)e) to install additional SIMMs.
- g] Make sure all SIMMs are at the same height and angle to the board.

2] Install new SIPP(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c] Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
- e] Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

- f] Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.
- g] Make sure all SIPPs are at the same height and perpendicular to the board.

3] Install new DRAM(s):

- a] Locate the appropriate chip socket on the mainboard.
- b] Touch metal sides of the base unit to discharge static electricity.
- c] Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

- d] Repeat steps 4a-4c to install additional DRAMs.
- e] Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.
- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
- g] Locate and position mounting screws and support spacers:

- h) Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.

*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*

- i) Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j) Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k) Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: **(CAUTION: Remember to discharge static first!)**
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

**WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.

- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*
  - e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.

- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## DMA 1 error.

### Cause:

DMA chip on mainboard is bad.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the mainboard (DMA chip is permanently attached).

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.

- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.

- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.

- c) Locate the jumpers or DIP switches on the mainboard.

- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:

- 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.

- 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.

- e) (Optional) Install BIOS chip.

- 1] Locate BIOS chip on mainboard.

- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).



- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.



- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).  
6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.  
7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.

- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).  
6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP's).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).
  - 3] Speed of new memory matches that already installed.

i) (Optional) Install any additional cache or RAM memory. Do one of the following:

1] Install new SIMM(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c] Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.
- e] Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

- f] Repeat steps 3)a)-3)e) to install additional SIMMs.
- g] Make sure all SIMMs are at the same height and angle to the board.

2] Install new SIPP(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c] Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
- e] Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

- f] Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.
- g] Make sure all SIPPs are at the same height and perpendicular to the board.

3] Install new DRAM(s):

- a] Locate the appropriate chip socket on the mainboard.
- b] Touch metal sides of the base unit to discharge static electricity.
- c] Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

- d] Repeat steps 4a-4c to install additional DRAMs.
- e] Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.
- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
- g] Locate and position mounting screws and support spacers:

- h) Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.

*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*

- i) Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j) Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k) Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: **(CAUTION: Remember to discharge static first!)**
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

**WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.

- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*
  - e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.

- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## DMA error| DMA 1 error| DMA 2 error; Replace motherboard (DMA chip non-removable).

### Cause:

DMA chip on mainboard is bad.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the mainboard (DMA chip is permanently attached).

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

the mainboard jumper.

- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.

- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.

- c) Locate the jumpers or DIP switches on the mainboard.

- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:

- 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
- 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.

- e) (Optional) Install BIOS chip.

- 1] Locate BIOS chip on mainboard.
- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.



- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
  - 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to



fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## **DMA bus time-out; Restart, if it reoccurs, find & replace bad adapter card.**

### **Cause:**

A device (adapter card) is continuously using the bus for more than 7.8 microseconds. Could be a random failure of little concern or an offending adapter card.

### **Solution:**

Reboot the computer and ignore the error message, unless the error occurs repeatedly.

Try one of the following, in sequence, until the problem is solved:

**1)** Press CTRL+ALT+DEL to reboot the computer.

The following tasks should be done by a qualified computer technician.

**2)** Attempt to isolate the offending card.

**a)** Remove the most sophisticated card from the computer and reboot.

**b)** If the error persists, continue to remove a single card at a time and reboot the computer (Substitute a good hard disk controller card and video card if necessary).

**c)** When the card causing the error is pinpointed, contact the manufacturer of that card for assistance.

**3)** Replace the mainboard if error message persists.



## **Divide overflow.**

**Cause:**

Application error.

**Solution:**

Press CTRL+ALT+DEL to reboot the computer and try again. Contact a qualified computer technician or manufacturer if error message appears again.



## **Display switch not set properly; Look in manual and set jumper switch properly.**

### **Cause:**

The monochrome/color jumper on the mainboard is set incorrectly.

### **Solution:**

***CAUTION:*** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

Check the owner's manual for the location and the proper setting of this jumper.



## **Display adapter failed; Look in manual and set jumper switch properly.**

### **Cause:**

The monochrome/color jumper on the mainboard is set incorrectly.

### **Solution:**

***CAUTION:*** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

Check the owner's manual for the location and proper setting of this jumper.



## Diskette read failure.

### Cause:

Many items can cause this error: a bad boot diskette, a loose or incorrectly installed cable, a bad floppy drive, or a bad controller card.

### Solution:

Try another boot diskette.

Try one of the following, in sequence, until the problem is solved:

- 1) Try another boot diskette.
- 2) Make sure the boot diskette is good by booting another computer that has the same size floppy drive.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 3) Make sure the power and data connections to the floppy drive are secure.
- 4) Recheck the data cable installation to make sure it is properly installed.
- 5) Replace the floppy disk drive.
- 6) Replace the controller card.





## **Disk drive reset failed; Replace floppy disk controller card.**

### **Cause:**

Floppy disk controller card is unable to reset and must be replaced.

### **Solution:**

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the floppy disk controller card.



## Disk read failure; Try another system diskette.

### Cause:

Many items can cause this error: a bad boot diskette, a loose or incorrectly installed cable, a bad floppy drive, or a bad controller card.

### Solution:

Try another boot diskette.

Try one of the following, in sequence, until the problem is solved:

- 1) Try another boot diskette.
- 2) Make sure the boot diskette is good by booting another computer that has the same size floppy drive.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 3) Make sure the power and data connections to the floppy drive are secure.
- 4) Recheck the data cable installation to make sure it is properly installed.
- 5) Replace the floppy disk drive.
- 6) Replace the controller card.



## Disk boot failure; Try another system diskette.

### Cause:

Many items can cause this error: a bad boot diskette, a loose or incorrectly installed cable, a bad floppy drive, or a bad controller card.

### Solution:

Try another boot diskette.

Try one of the following, in sequence, until the problem is solved:

- 1) Try another boot diskette.
- 2) Make sure the boot diskette is good by trying to boot another computer with the same size floppy drive.  
***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*
- 3) Make sure the power and data connections to the floppy drive are secure.
- 4) Recheck the data cable installation to make sure it is properly installed.
- 5) Replace the floppy disk drive.
- 6) Replace the controller card.



## **Disk boot error; Insert system diskette in Drive A and restart.**

### **Cause:**

Computer cannot find a system disk to boot. System diskette is not in Drive A, or one or more system files are damaged or missing from the hard disk.

### **Solution:**

Insert the system boot diskette in Drive A and restart the computer.

- 1) Insert the system boot diskette in Drive A and press CTRL+ALT+DEL to reboot the computer.
- 2) If the computer does not boot, make sure it is a good system diskette by trying it in another computer.
- 3) After booting the computer, enter the following command at DOS A> prompt:

SYS C:

(This will transfer the system files and COMMAND.COM to the hard disk.

- 4) Remove the system diskette from the floppy drive.
- 5) Press CTRL+ALT+DEL to reboot the computer.
- 6) If the error reoccurs, the system files may reside in a bad sector. Troubleshoot as follows:

***CAUTION:*** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

- 7) Use a file/disk diagnostic/recovery utility to inspect and repair the hard disk for surface problems and check the integrity of the system files.



## Disk bad.

### Cause:

A component of the hard disk system is loose or bad. A data cable or power cable is loose or bad, the disk may be bad, or the controller card may be defective.

### Solution:

Inspect the hard disk cables (data and power) and connections.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until the problem is solved:

- 1) Inspect the hard disk data and power cables, make sure connections are secure.
- 2) Check to see if the hard disk is spinning:
  - a) Listen carefully and feel for vibration.
  - b) If unable to distinguish hard disk noises, unplug (wait 15 seconds) and plug in power cable. Listen for the hard disk hum as it spins down and up.
  - c) If there is no difference, try another power cable/connector.
- 3) If the hard disk is spinning, try replacing only the controller card.

*NOTE: It may not be possible to swap the controller card separately if the hard disk and controller are combined (as in IDE drives).*

- 4) If the hard disk is not spinning, replace the hard disk (disk is bad).

*NOTE: Consider replacing both the hard disk and the controller card together. Depending on the type of hard drive, this may be necessary.*



## Disk drive 1 seek failure; Check cables, run Setup to delete entry for disk.

### Cause:

Disk drive B cable is loose or computer is looking for non-existent disk drive (disk was removed without updating CMOS Setup).

### Solution:

Run Setup to delete entry for removed disk.

Try one of the following, in sequence, until the problem is solved:

- 1) Run Setup to delete entry for removed disk.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) Check for loose disk drive cables and secure them.



## Disk drive 0 seek failure; Run Setup, delete entry for removed disk/check cables.

### Cause:

Disk drive A cable is loose or the computer is looking for non-existent disk drive (disk was removed without updating CMOS Setup).

### Solution:

Run Setup to delete the entry for the removed disk.

Try one of the following, in sequence, until the problem is solved:

- 1) Run Setup to delete the entry for the removed disk.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) Check for loose disk drive cables and secure them.



## Diskette drive x failure.

### Cause:

Diskette drive cable is loose or the computer is looking for non-existent diskette drive (disk drive was removed without updating CMOS Setup).

### Solution:

Run Setup to delete the entry for the removed disk.

Try one of the following, in sequence, until the problem is solved:

- 1) Run Setup to delete the entry for the removed disk.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) Check for loose disk drive cables and secure them.





## **Disk error reading (or writing) drive; Use a recovery utility to recover file.**

### **Cause:**

DOS found a bad sector on a disk while attempting to read or write a file or program. Disks age and deteriorate over time and drive heads shift out of alignment.

### **Solution:**

Run file/disk recovery utility program to recover the file, move it to a good sector and mark the old sector as bad. Run Spinrite to scrub and refresh the disk surface to extend the disk life.



## **Disk unsuitable for system disk; Try FORMAT/S again or use new diskette.**

### **Cause:**

Attempting to format a bootable diskette using FORMAT/S. Diskette has bad sectors where system files are stored.

### **Solution:**

Try FORMAT/S again. If format fails, discard the diskette and use a new one.



## **Disk full. Edits lost/Insufficient disk space; Delete any unnneeded files.**

### **Cause:**

Hard disk is full; there is no room to save additional files.

### **Solution:**

Delete some unnneeded files to create space and try again, or save the file(s) to a diskette.



## **Diskette drive failure; Run Setup to delete entry for removed disk/check cables.**

### **Cause:**

Disk drive cable is loose or the computer is looking for a non-existent disk drive (disk was removed without updating CMOS Setup).

### **Solution:**

Run Setup to delete the entry for the removed disk.

Try one of the following, in sequence, until the problem is solved:

- 1) Run Setup to delete the entry for the removed disk.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) Check for loose disk drive cables and secure them.



## **Disk error reading (or writing) FAT; Use a file/disk recovery utility.**

### **Cause:**

Disk sector containing FAT is bad. Fortunately, DOS keeps 2 copies of FAT. This error message is an early warning that the backup copy is now in use.

### **Solution:**

Run file/disk recovery utility on the disk to cleanup bad sector(s) and recover FAT.

*NOTE: If this is a diskette, save the data to a new diskette and throw the bad one away.*



## **D: drive failure; Check connections, jumper settings, re-insert controller card.**

### **Cause:**

Hard disk controller did not receive the expected response from the hard disk (Drive D) within the time limit when attempting to move the head to last cylinder (operational test), and issues 'Hard Disk Failure' message. Possible causes include: power cable not connected to hard disk, data cable bad or incorrectly installed, wrong drive select jumper on hard disk, bad hard disk, or bad controller card.

### **Solution:**

Check the cable connections and jumper settings, and make sure the controller card is properly seated. Reboot the computer.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until the problem is solved.

- 1) Make sure the power cable is securely connected to the hard disk.
- 2) Make sure the data cable between the hard disk and the controller card is correctly and securely installed.
- 3) Check the drive select jumper setting on the hard disk (See the owner's manual that came with the hard disk/computer).
- 4) Reseat the hard disk controller card (reinspect the cables to make sure they are securely fastened).
- 5) Reboot the computer and watch for an error message.
- 6) If Steps 1-5 do not solve the problem, double-check each step, referring to the owner's manual.
- 7) Swap the hard disk drive for one that works. Repeat steps 1-5.
- 8) If the problem does not appear to be the hard disk, swap the controller card. Repeat Steps 1-5.



## **Disk configuration error; Use Setup disk for old BIOS or upgrade BIOS chip.**

### **Cause:**

Configuration errors arise when using a new CMOS Setup program with an old BIOS ROM (e.g., installing a new 1.44MB disk drive in an old 286 with a BIOS manufactured before 1.44MB drives existed).

### **Solution:**

Use the original Setup diskette that matches the old BIOS or upgrade the BIOS chip.



## Device ddd not prepared.

### Cause:

A device was specified that does not have a prepared Code Page (foreign character set).

### Solution:

Type the following command at the DOS prompt to prepare the code pages for use by a peripheral:

```
MODE device CODEPAGE PREPARE=((code page list) drive:\path\filename)
```





## **Decreasing available memory; Refer to accompanying error message for problem.**

### **Cause:**

This is not exactly an error message. This message is only displayed at the same time as a memory or CMOS configuration error.

### **Solution:**

Refer to the accompanying error message to determine the problem.



## **Disk bad; Use a file/disk recovery utility.**

### **Cause:**

A portion of the file resides in a bad spot on the disk or aging drive heads are slightly out of alignment; perhaps both.

### **Solution:**

Use a file/disk recovery utility to recover the file, mark the bad sector and write the file to a good sector.



## **D: drive error; Refer to owner's manual to set up and select proper drive type.**

### **Cause:**

Second hard disk (e.g., Drive D) is not properly setup in CMOS.

### **Solution:**

Setup and select the proper drive type. Refer to the owner's manual for help in selecting the correct drive type.



## **Bad format call error.**

**Cause:**

A bug in the application program's device driver caused DOS to receive a bad format call.

**Solution:**

Contact a qualified computer technician or the software publisher technical support for assistance.



## **ATTENTION: A serious disk error; Stop operation, save file to diskette.**

### **Cause:**

SmartDrive detected a hard disk error while attempting to write to the hard disk from memory. Data is probably lost.

### **Solution:**

STOP the Operation!

If the application file is still open and available, save the file to a diskette. Use a file/disk utility to troubleshoot the hard disk problems.

- 1) If the application file is still open and available, save the file to a diskette.
- 2) Exit the application(s).
- 3) Insert the system diskette in Drive A.
- 4) Reboot the computer.
- 5) Use a file/disk recovery utility to troubleshoot the hard disk problems.



## File allocation table bad, drive x Abort, Retry, Fail?; STOP immediately!.

### Cause:

DOS cannot read the file allocation table on the disk because it is located in a bad sector on a defective disk. This is a serious problem. Causes include a virus, physical damage to the hard disk, or a deteriorating disk surface caused by contaminants or wear and tear.

### Solution:

STOP immediately! If the information on this disk is important, there is a chance it can be recovered using the correct technique if the computer is not touched.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until the problem is solved:

- 1) Run a virus scan on the disk with a virus detection program.
- 2) Run a disk/file recovery utility to attempt to recover the FAT.
- 3) Run Spinrite, or a similar program that will (nondestructively) attempt to repair the bad sector holding the FAT or move the FAT to a good sector.
- 4) If the sector is repaired but FAT is still corrupt, try the following:
  - a) Use the FORMAT command to do a high-level format of the disk.
  - b) Run the UNFORMAT option in a file/disk recovery utility program.

EXPLANATION: The high-level format simply wipes out the FAT and creates a new empty FAT (the information in files is still physically on the disk; its location is unknown). The UNFORMAT command in the file/disk utility physically reads the disk, picking up the location of each file segment, and using this data to rebuild the FAT.

***CAUTION:** If the data on the malfunctioning hard disk is critical data, consider sending the hard drive to a company that specializes in data recovery before continuing to step 5. Commercial services exist that will use other methods not available to the typical PC user to rescue data from a bad hard drive.*

- 5) If Step 4 fails, do a low-level format of the disk (**CAUTION: All files and data on the disk will be lost**).
- 6) If Step 5 fails, replace the hard disk.





## **Cannot create a zero size partition; Select a partition size of 1MB or larger.**

### **Cause:**

Attempted to create a hard disk partition of zero percent while using FDISK. The minimum size partition allowed is 1 percent (or 1MB).

### **Solution:**

Select a partition size of 1MB or larger.





## **Cannot create logical drive; Create extended DOS partition, then a logical drive.**

### **Cause:**

Logical drives cannot be created without an existing partition.

### **Solution:**

First create the Extended DOS Partition, then create the logical drives.

- 1) Type FDISK at the DOS prompt.
- 2) Choose '1. Create DOS Partition or Logical DOS Drive'.
- 3) Choose '2. Create Extended DOS Partition'.
- 4) Choose '3. Create Logical DOS Drive(s) in the Extended Partition.
- 5) Press ESC to return to the DOS prompt.
- 6) Press CTRL+ALT+DEL to reboot the computer for changes to take effect.



## **Cannot DISKCOPY to or from a networked drive; Use the XCOPY or COPY command.**

**Cause:**

DOS does not support using the DISKCOPY command when copying files to or from a network drive.

**Solution:**

Use the XCOPY or COPY command.



## Cannot loadhigh batch file.

### Cause:

DOS does not permit loading a batch file into high memory. Only programs or device drivers can be loaded into high memory.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit **AUTOEXEC.BAT** and remove the LOADHIGH command from this item so the batch file will run in conventional memory. If the batch file contains an executable file or device driver, consider loading it high using a separate command in AUTOEXEC.BAT.



## Cannot find system files; Copy the system files to the hard disk.

### Cause:

DOS hidden system files (IO.SYS & MSDOS.SYS) were either deleted from the hard disk or the user is issuing DOS commands from a non-system diskette without access to the system files on the hard disk.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Transfer the system files to the hard disk or enter DOS commands from a system diskette.

Do one of the following:

- 1) To transfer the system files to a hard disk:
  - a) Insert the DOS system diskette into Drive A.
  - b) Type the following command from the DOS prompt:  
A:SYS C:  
(System should copy the system files and COMMAND.COM and respond with 'System transferred' when done.)
  - c) Remove the system diskette from Drive A.
  - d) Reboot the computer (this makes sure the computer is operating with consistent versions of system files and COMMAND.COM).
- 2) To enter commands from a system diskette:
  - a) Insert a DOS system diskette into Drive A.
  - b) Type A: to go to Drive A.
  - c) Type the desired command(s).



## **Cannot format ASSIGNED or SUBSTed drive; Run FORMAT against logical drive.**

### **Cause:**

DOS does not permit running disk-oriented commands like FORMAT against a virtual drive created using substitute or assign.

### **Solution:**

Run FORMAT against the logical drive name of the physical disk that contains the substituted or assigned drive.



## **Cannot delete extended DOS partition; Delete the logical drive(s) first.**

### **Cause:**

Logical drives contained in an Extended DOS Partition must be deleted first, before deleting the Extended DOS Partition.

### **Solution:**

Delete the logical drive(s) first, then delete the Extended DOS Partition.

- 1) Type FDISK at the DOS prompt.
- 2) Choose '3. Delete Partition or Logical DOS Drive'.
- 3) Choose '3. Delete Logical DOS Drive(s) in the Extended DOS Partition'.
- 4) When completed, choose '4. Delete Extended DOS Partition'.
- 5) Press ESC to return to the DOS prompt.
- 6) Press CTRL+ALT+DEL to reboot the computer for changes to take effect.



## **Cannot DISKCOMP for ASSIGNED/SUBSTed drive; Use DISKCOMP, DIR, or FC commands.**

### **Cause:**

DOS does not permit running disk-oriented commands like DISKCOMP against a virtual drive created using substitute or assign.

### **Solution:**

Run DISKCOMP against the logical name of the physical drive that contains the assigned or substituted drive.  
OR use the directory command (DIR) or file compare (FC).

Do one of the following:

- 1) Run DISKCOMP against the logical name of the physical drive containing the assigned or substituted drive.
- 2) Use the directory command (DIR).
- 3) Use file compare (FC).



## **Can't CHKDSK a network drive; Call Network Administrator if file problem exists.**

### **Cause:**

DOS does not permit running the CHKDSK command on a network drive.

### **Solution:**

If there is a suspected problem with one or more files, contact the Network Administrator for assistance.





## **Cannot DISKCOMP to/from networked drive; Use DOS command FC.**

### **Cause:**

DOS does not allow using the DISKCOMP (disk compare) command on a network drive.

### **Solution:**

Use the DOS directory command (DIR), or the DOS file compare command (FC), to compare files when some (or all) are on a network drive.



## Cannot load COMMAND, system failed; Copy COMMAND.COM from disk onto hard drive.

### Cause:

DOS cannot find COMMAND.COM. Perhaps it was erased/deleted, it is not in the current path, or it is sitting on a bad sector on the disk.

### Solution:

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Insert the DOS system disk into Drive A and reboot the system. Copy COMMAND.COM from a diskette onto the hard drive.

- 1) Insert the DOS system diskette into Drive A.
- 2) Press CTRL+ALT+DEL to reboot the computer.
- 3) Type the following command:  
DIR C:\ (if COMMAND.COM is usually stored in the root directory).  
OR  
DIR C:\DOS (if COMMAND.COM is usually stored in the DOS directory).
- 4) If COMMAND.COM does not appear in the directory listing, copy it from the boot diskette to the hard disk with one of the following commands:  
COPY A:COMMAND.COM C:\ (if copying to root).  
COPY A:COMMAND.COM C:\DOS (if copying to the DOS directory).
- 5) Remove the DOS boot diskette from Drive A.
- 6) Press CTRL+ALT+DEL to reboot the computer.
- 7) Type PATH at the DOS prompt.
- 8) See if the path used in step 3 is contained somewhere in the path statement on the screen.
- 9) If not, Edit AUTOEXEC.BAT and ADD the following path to the path statement:  
PATH=C:\;  
OR  
PATH=C:\DOS; Press CTRL+ALT+DEL to reboot the computer for changes to take effect.





## **Cannot CHKDSK a SUBSTed or ASSIGNed drive; Run CHKDSK on logical drive.**

### **Cause:**

DOS does not permit running disk-oriented commands like CHKDSK against a virtual drive created using substitute or assign.

### **Solution:**

Run CHKDSK against the logical drive name that covers the entire physical drive.



## Cannot read file allocation table; STOP immediately!, run virus scan.

### Cause:

DOS cannot read the file allocation table on the disk because it is located in a bad sector on a defective disk. This is a serious problem. Causes include a virus, physical damage to the hard disk, or a deteriorating disk surface caused by contaminants or wear and tear.

### Solution:

STOP immediately! If the information on the disk is important, there is a chance it can be recovered using the correct technique if the computer is not touched.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until the problem is solved:

- 1) Run a virus scan of the disk using a virus detector.
- 2) Run a disk/file recovery utility to attempt to recover the file allocation table (FAT).
- 3) Run a file/disk repair utility (e.g., Spinrite) program that will attempt to repair the bad sector holding the FAT or move it to a good sector.
- 4) If the sector is repaired but the FAT is still corrupt, try the following:
  - a) Perform high-level format of disk using the FORMAT command.
  - b) Run the UNFORMAT option in a file/disk recovery utility program.

EXPLANATION: The high-level FORMAT simply wipes out the FAT and creates a new empty FAT (the information in files is still physically on the disk; its location is unknown). The UNFORMAT command in a file/disk utility physically reads the disk, picking up the files and their locations, and rebuilds the FAT using this information.

- 5) If Step 4 fails, reformat the disk (low level format) (**CAUTION: ALL DATA WILL BE LOST!**).
- 6) If Step 5 fails, replace the hard disk.



## **Cannot format a network drive; Contact your Network Administrator.**

### **Cause:**

DOS does not permit a user to FORMAT a network drive.

### **Solution:**

There is no work-around for this problem. Double-check the logical name of drive to be formatted. If network drive must be formatted, contact the Network Administrator.



## Can't find FORMAT.EXE; Put DOS directory in PATH & copy FORMAT.EXE to directory.

### Cause:

DOS cannot find FORMAT.EXE to format a floppy diskette while running BACKUP because it is not in a directory in the path, or is not loaded on hard disk.

### Solution:

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Include the DOS directory in PATH statement and make sure FORMAT.EXE is copied into the directory from the DOS master diskette.

- 1) Type PATH from the DOS prompt to display the path statement.
- 2) Check to see if the DOS directory (e.g., C:\DOS) is included in the current path statement.
- 3) If the DOS directory is NOT in the path statement, Edit AUTOEXEC.BAT and insert the DOS directory towards the start of the path statement, after a semicolon, as follows:  
C:\DOS;  
(Where DOS is the name of the directory containing all the DOS files.)
- 4) Check to see if FORMAT.EXE exists in the DOS directory by entering the following command at the DOS prompt:  
DIR C:\DOS\FORMAT.EXE
- 5) If FORMAT.EXE does not appear in the directory listing, insert the DOS system diskette into drive A and enter the following command:  
COPY A:FORMAT.EXE C:\DOS
- 6) Retry the backup procedure using BACKUP command.



## Cannot start COMMAND, exiting; Edit CONFIG.SYS & increase number of files.

### Cause:

Attempting to load (via keyboard or application) second copy of COMMAND.COM. Attempt failed because of either insufficient memory or number of FILES specified in CONFIG.SYS.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Edit CONFIG.SYS and increase the number of files (FILES=nn).

- 1) Evaluate the need to run two command interpreters.
- 2) Edit Edit CONFIG.SYS and increase the number of files by 5-10 in the following statement:  
FILES=nn
- 3) Save the file.
- 4) Press CTRL+ALT+DEL to reboot the computer.





## **Current drive is not longer valid; Reinsert diskette, close the drive door.**

### **Cause:**

Removed the disk from the drive (or released drive lever) while still logged into that drive, or chose 'Fail' from the 'Abort, Retry, Fail?' prompt.

### **Solution:**

Reinsert disk, lock drive lever or switch to the hard disk and resume the task.

Do one of the following:

- 1) If reading the disk:
  - a) Reinsert the disk and make sure the lever is locked.
  - b) Resume the task.
- 2) If answering 'Fail' to 'Abort, Retry, Fail?':
  - a) After answering 'F' for 'Fail', enter the following and press 'ENTER' key:  
C:  
(Where the hard disk is the 'C' drive)
  - b) Resume the task.



## Configuration too large for memory; Reduce one or more values in CONFIG.SYS.

### Cause:

DOS does not load because either the FILES or BUFFERS statements in CONFIG.SYS are set too high or the /E switch in SHELL command is set too high.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Reboot the computer from the floppy disk and reduce one or more of these values in CONFIG.SYS.

- 1) Insert the DOS boot diskette in Drive A.
- 2) Reboot the computer.
- 3) Edit CONFIG.SYS
- 4) Reduce the value of one or more of the following parameters:  
FILES=nn  
BUFFERS=nn  
SHELL /E:nnn
- 5) Save CONFIG.SYS.
- 6) Remove the boot diskette from Drive A.
- 7) Reboot the computer.
- 8) If the error message persists, repeat steps 1-7, again reducing the value of one or more items, until the computer boots successfully.



## Convert lost chains to files (Y/N)?; Enter CHKDSK/F at C: prompt to fix.

### Cause:

CHKDSK found lost chains of clusters (parts of one or more files) that are in the file allocation table (FAT), but not connected to any known file(s). When a file is deleted, the delete process may miss deleting a link in the file chain. During a power problem, errors may be written to FAT.

*NOTE: Lost chains are not a serious problem.*

### Solution:

Run CHKDSK/F (with /F parameter) to correct the errors (unless the user suspects chains may contain useful data).

Do one of the following:

- 1) Run CHKDSK/F (to correct errors).
- 2) Run a file utility program to correct these errors in a more precise and careful way (to recover potentially useful information).



## **Convert directory to file?; Tell CHKDSK 'NO' or directory & files will be lost.**

### **Cause:**

CHKDSK discovered a problem in a directory structure.

### **Solution:**

Tell CHKDSK 'NO'. Otherwise the entire directory and all its files will be lost.

- 1) Type: 'NO' (or 'N') to respond to the CHKDSK 'Convert directory to file?' question.
- 2) Use a file/directory diagnostic/repair utility to locate and repair this problem.



## Configuration error for slot.

**Cause:**

CMOS battery is low or was just removed, or an EISA card was just added and is not yet configured.

**Solution:**

Replace the CMOS battery first (if missing or low) and then run ECU (EISA configuration utility) to configure CARD.



## COM port does not exist.

### Cause:

Attempting to use an invalid COM port, or one not recognized by the computer. Perhaps two physical serial ports are both defined as COM1. If so, this error will appear if data is sent to COM2.

### Solution:

Use a diagnostic program (e.g., Microsoft Diagnostics, MSD) to determine the current COM port configuration.

- 1) Use a diagnostic program to determine the current COM port configuration. To use Microsoft Diagnostics:
  - a) Go to the DOS prompt and enter the following:  
C:\DOS\MSD  
(MSD is a DOS utility. The command given assumes the DOS files are stored in C:\DOS)
  - b) Select the COM Ports (third item from the top on the right).
  - c) Check that the port the user is trying to use has a defined 'Port Address'. Make sure this address is different from all other defined ports.
- 2) If the port exists but is not defined, or it is defined the same way as another COM port, the serial port or card is configured incorrectly.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*
- 3) Remove the serial port/card from the computer and inspect the jumper/switch setting. Compare this setting against the setting for the desired COM port definition in the owner's manual that came with the card or computer. Reset the jumper/switch setting accordingly.
- 4) Reinstall the serial port/card and reboot the computer.
- 5) Double-check which port the application software is sending data to.



## **CMOS time and date not set; Run Setup and enter current date and time.**

### **Cause:**

CMOS memory lost the date and time. Perhaps the battery is low or was just replaced.

### **Solution:**

Run Setup and enter the current date and time.



## CMOS system options not set.

**Cause:**

CMOS data is corrupt.

**Solution:**

Run [Setup](#).





## CMOS memory size mismatch; Correct memory size entry in Setup & restart.

### Cause:

The amount of memory found during the POST does not match the amount of memory set in the CMOS chip. The memory amount may be incorrectly setup in CMOS, or there may be loose memory chip(s) or SIMM(s) not counted during the POST.

### Solution:

Correct the memory size entry in CMOS Setup.

Try one of the following, in sequence, until the problem is solved.

- 1) Correct the memory size entry in the CMOS Setup. Reboot the computer if a change is made.

***CAUTION:*** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

- 2) Inspect and reseat any loose memory chips or SIMMs.
- 3) Count the amount of memory actually installed (while the computer case is off) and compare to the memory entry in the CMOS setup. Run CMOS Setup and change the memory entry if incorrect.
- 4) Reboot the computer with memory chips/SIMMs seated and correct the memory amount in CMOS.



## **CMOS display type mismatch; Run Setup and change the video type.**

### **Cause:**

The video card recorded in the CMOS chip does not match the video card installed (e.g., monochrome versus VGA).

### **Solution:**

Run [Setup](#) and change the video type to match the type of video card and display actually installed.



## CMOS checksum failure.

### Cause:

CMOS battery is low/aged or the CMOS chip or the mainboard is bad.

### Solution:

Replace the CMOS battery.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until the problem is solved:

- 1) Replace the CMOS battery, reboot the computer and run [Setup](#).
- 2) Replace the CMOS chip, reboot the computer and run [Setup](#).
- 3) Replace the mainboard (this is rarely required).



## CMOS battery state low.

**Cause:**

Battery is old/used up.

**Solution:**

***CAUTION:*** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

Replace the CMOS battery, reboot the computer and run [Setup](#).



## CH-2 timer error.

### Cause:

Timer chip 2 (interrupt controller logic chip) is bad.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace the mainboard (because the timer chip is permanently attached).

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover.](#)



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.

- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.

- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.

- c) Locate the jumpers or DIP switches on the mainboard.

- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:

- 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.

- 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.

- e) (Optional) Install BIOS chip.

- 1] Locate BIOS chip on mainboard.

- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.

- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).  
6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.  
7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.

- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).  
6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP's).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).
  - 3] Speed of new memory matches that already installed.



i) (Optional) Install any additional cache or RAM memory. Do one of the following:

1] Install new SIMM(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c] Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.
- e] Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

- f] Repeat steps 3)a)-3)e) to install additional SIMMs.
- g] Make sure all SIMMs are at the same height and angle to the board.

2] Install new SIPP(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c] Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
- e] Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

- f] Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.
- g] Make sure all SIPPs are at the same height and perpendicular to the board.

3] Install new DRAM(s):

- a] Locate the appropriate chip socket on the mainboard.
- b] Touch metal sides of the base unit to discharge static electricity.
- c] Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

- d] Repeat steps 4a-4c to install additional DRAMs.
- e] Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.
- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
- g] Locate and position mounting screws and support spacers:

- h) Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.

*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*

- i) Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
- j) Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.

*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*

- k) Secure mainboard in place by placing screws in the mounting posts and tightening them.

7) Reconnect all wires and cables to mainboard: **(CAUTION: Remember to discharge static first!)**

- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
- b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
- c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

**WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.

- d) Reconnect any other cables to be connected to mainboard.

8) Reinstall all expansion cards.

- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
- b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
- c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.

9) Test new configuration:

- a) Make sure no parts or tools remain in metal sides of the base unit.
- b) Replace necessary cables (power, keyboard, video) and plug in power cable.
- c) Power up computer and related peripherals one at a time.
- d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*
- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.

10) If unable to access drive(s), turn computer off and disconnect power cables.

- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## **CHDIR (.) failed; Use a file recovery diagnostic utility to recover.**

### **Cause:**

The parent directory is corrupt. **CAUTION:** *The hard disk media may be going bad.*

### **Solution:**

Use a file recovery diagnostic utility to attempt a directory/file recovery.

- 1) Use a file recovery diagnostic utility to attempt a directory/file recovery.
- 2) Backup the data on the hard disk often.
- 3) Run a hard disk diagnostic/repair utility to identify and correct the problem(s).
- 4) Keep alert for additional symptoms.



## Cannot recover (.) entry.

### Cause:

The parent directory is corrupt. **CAUTION:** *The hard disk media may be going bad.*

### Solution:

Use the file recovery diagnostic utility to attempt a directory/file recovery.

- 1) Use the file recovery diagnostic utility to attempt a directory/file recovery.
- 2) Backup the data on the hard disk often.
- 3) Run a hard disk diagnostic/repair utility to identify and correct the problem(s).
- 4) Keep alert for additional symptoms.



## Hard disk failure.

### Cause:

Hard disk controller did not receive expected response from hard disk within time limit when attempting to move head to last cylinder (operational test) and issues 'Hard Disk Failure' message. Possible causes include: power cable not connected to hard disk, data cable bad or incorrectly installed, wrong drive select jumper on hard disk, bad hard disk, or bad controller card.

### Solution:

Check the cable connections and jumper settings, and make sure the controller card is properly seated. Reboot the computer.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until the problem is solved.

- 1) Make sure the power cable is securely connected to the hard disk.
- 2) Make sure the data cable between the hard disk and the controller card is correctly and securely installed.
- 3) Check the drive select jumper setting on the hard disk (See the owner's manual that came with the hard disk/computer).
- 4) Reseat the hard disk controller card (reinspect the cables to make sure they are securely fastened).
- 5) Reboot the computer and watch for an error message.
- 6) If Steps 1-5 do not solve problem, double-check each step, referring to the owner's manual.
- 7) Swap the hard disk drive for one that works. Repeat Steps 1-5.
- 8) If the problem does not appear to be the hard disk, swap the controller card. Repeat Steps 1-5.



## Cannot CHDIR to [pathname] tree; Use a file recovery diagnostic utility.

### Cause:

One of the directories is corrupt. **CAUTION:** *The hard disk media may be going bad.*

### Solution:

Use the file recovery/diagnostic utility to attempt a directory/file recovery.

- 1) Use the file recovery diagnostic utility to attempt a directory/file recovery.
- 2) Backup the data on the hard disk often.
- 3) Run the hard disk diagnostic/repair utility to identify and correct the problem(s).
- 4) Keep alert for additional symptoms.



## Cannot recover (.) entry.

### Cause:

The parent directory is corrupt. **CAUTION:** *The hard disk media may be going bad.*

### Solution:

Use a file recovery diagnostic utility to attempt a directory/file recovery.

- 1) Use a file recovery diagnostic utility to attempt a directory/file recovery.
- 2) Backup the data on the hard disk often.
- 3) Run the hard disk diagnostic/repair utility to identify and the correct problem(s).
- 4) Keep alert for additional symptoms.





## **Cannot CHDIR to root; Use a file diagnostic recovery utility to recover file.**

### **Cause:**

Root directory is corrupt. Perhaps the hard disk media is going bad.

### **Solution:**

Use a file recovery/diagnostic utility to attempt a directory/file recovery.

- 1) Use a file recovery diagnostic utility to attempt a directory/file recovery.
- 2) Backup the data on the hard disk often.
- 3) Run the hard disk diagnostic/repair utility to identify and correct problem(s).
- 4) Keep alert for additional symptoms.



## Cannot recover (.) entry.

**Cause:**

The working directory is corrupt. Perhaps hard disk media is going bad.

**Solution:**

Use file diagnostic/recovery utility to attempt directory/file recovery.

- 1) Use file recovery diagnostic utility to attempt directory/file recovery.
- 2) Backup data on hard disk often.
- 3) Run hard disk diagnostic/repair utility to identify and correct problem(s).
- 4) Keep alert for additional symptoms.



## **Cannot format non-removable drive x; Use FORMAT command, not FORMAT/F.**

### **Cause:**

Trying to format hard disk using FORMAT /F. The switch /F (size) is for diskettes only.

### **Solution:**

Use the format command without the /F switch, as follows:

FORMAT x:

(where x: is specified drive, e.g., C:)



## Can't create extended partition; Create primary partition, then create extended.

### Cause:

Trying to create an extended DOS partition before assigning a primary DOS partition while using FDISK.

### Solution:

Create primary DOS partition first, then create extended DOS partition.

Do one of the following:

- 1) To partition first drive (e.g., drive C):
  - a) Type **FDISK** at the DOS prompt (this will open partitioning program on screen).
  - b) First, create a 'Primary DOS Partition' by pressing 'ENTER' twice, and pressing 'Y' once.
  - c) From the same 'Create DOS Partition or Logical DOS Drive' menu, enter '2' to 'Create Extended DOS Partition'.
  - d) Specify size of Logical DOS partition as prompted.
  - e) Press 'ESC' to return to main menu.
  - f) Press 'ESC' to return to DOS.
  - g) Press CTRL+ALT+DEL to reboot the computer (for changes to take effect).
- 2) To partition second drive (e.g., drive D):
  - a) Type FDISK at the DOS prompt (this will open partitioning program on screen).
  - b) Select new option 'Change Current Fixed Disk Drive'.
  - c) Select 'Drive 2'.
  - d) Select 'Create a Logical DOS Partition' (for 2nd drive)
  - e) Specify size of Logical DOS partition as prompted.
  - f) Press 'ESC' and 'ESC' to return to main menu and DOS.
  - g) Press 'CTRL+ALT+DEL to reboot the computer.





## Cache memory bad, do not enable cache; Reinsert cache memory chips & restart.

### Cause:

Cache on mainboard is malfunctioning.

### Solution:

Reseat cache memory chips and restart.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved.

- 1) Reseat cache memory chips.
- 2) Replace cache memory.
- 3) Replace mainboard (because cache controller chip is bad).

*NOTE: This situation is rare; replace mainboard only as last resort.*



## **C: Drive failure; Check cable and jumper settings, re-insert controller card.**

### **Cause:**

Hard disk controller did not receive expected response from hard disk within time limit when attempting to move head to last cylinder (operational test), and issues 'Hard Disk Failure' message. Possible causes include: power cable not connected to hard disk, data cable bad or incorrectly installed, wrong drive select jumper on hard disk, bad hard disk, or bad controller card.

### **Solution:**

Check cable connections, jumper settings and make sure controller card properly seated. Reboot the computer.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved.

- 1) Make sure power cable to hard disk is securely connected.
- 2) Make sure data cable between hard disk and controller card is correctly and securely installed.
- 3) Check the drive select jumper setting on the hard disk (See owner's manual that came with hard disk/computer).
- 4) Reseat the hard disk controller card (reinspect cables to make sure they are securely fastened).
- 5) Reboot the computer and watch for error message.
- 6) If steps 1-5 do not solve problem, double-check each step, referring to owner's manual.
- 7) Swap hard disk drive for one that works. Repeat steps 1-5.
- 8) If problem does not appear to be the hard disk, swap the controller card. Repeat steps 1-5.

***NOTE:** It may not be possible to swap the controller card separately if the hard disk and controller are combined (as in IDE drives). If so, step 7) is the last step to follow in this solution.*



## **C: drive error; Run Setup and choose the proper hard disk type.**

### **Cause:**

First hard disk is not properly setup in CMOS.

### **Solution:**

Run Setup and choose the proper hard disk type for the first hard disk.





## Hard drive/Floppy drive/controller errors; Check disk for virus or errors.

### Cause:

*NOTE: Disk 1 is second physical drive, usually named logical drive 'D', unless drives are partitioned into additional logical drives.*

Hard disk controller did not receive expected response from disk. Causes include disconnected power cable to disk, incorrectly installed data cable, incorrectly set jumpers on drive, bad hard disk, or bad controller card.

### Solution:

Troubleshoot disk drive/controller subsystem.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Make sure power cable is securely connected to power connector on drive.
- 2) Inspect and correct data cable installation between the controller card and all hard disk drives. Make sure cables are securely connected.
- 3) Verify correct jumper settings on hard disk drive(s) with owner's manual.
- 4) Try swapping controller card to isolate problem to controller card. Replace the original controller card if the second controller card solves the problem.
- 5) Switch hard disks to isolate problem to hard disk. Replace the original hard disk if the second hard disk works properly.



## 1790 Disk 0 error; Troubleshoot disk drive and controller subsystem.

### Cause:

*NOTE: Disk 0 is first physical drive, always named logical drive 'C', even though it may be partitioned into additional logical drives.*

Hard disk controller did not receive expected response from disk. Causes include disconnected power cable to disk, incorrectly installed data cable, incorrectly set jumpers on drive, bad hard disk, or bad controller card.

### Solution:

Troubleshoot disk drive/controller subsystem.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Make sure power cable is securely connected to power connector on drive.
- 2) Inspect and correct data cable installation between the controller card and all hard disk drives. Make sure cables are securely connected.
- 3) Verify correct jumper settings on hard disk drive(s) with owner's manual.
- 4) Try swapping controller card to isolate problem to controller card. Replace the original controller card if the second controller card solves the problem.
- 5) Switch hard disks to isolate problem to hard disk. Replace the original hard disk if the second hard disk works properly.



## 1782 disk controller failure; Check hard disk cable, replace controller card.

### Cause:

Disk controller is bad, hard disk cable installed upside down on controller or address interference with certain BIOS ROM.

### Solution:

Check installation of hard disk cable and swap controller cards.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Make sure hard disk cable is connected to controller card properly (it might be upside down).
- 2) Swap controller card (usual problem is bad controller card).
- 3) If a new BIOS ROM was just installed and this error occurs, remove card and reboot computer. If error does not appear, controller card is interfering with new BIOS ROM.



## 1781 Disk 1 error; Check power cable.

### Cause:

*NOTE: Disk 1 is second physical drive, usually named logical drive 'D', unless drives are partitioned into additional logical drives.*

Hard disk controller did not receive expected response from disk. Causes include disconnected power cable to disk, incorrectly installed data cable, incorrectly set jumpers on drive, bad hard disk, or bad controller card.

### Solution:

Troubleshoot disk drive/controller subsystem.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Make sure power cable is securely connected to power connector on drive.
- 2) Inspect and correct data cable installation between the controller card and all hard disk drives. Make sure cables are securely connected.
- 3) Verify correct jumper settings on hard disk drive(s) with owner's manual.
- 4) Try swapping controller card to isolate problem to controller card. Replace the original controller card if the second controller card solves the problem.

*NOTE: Swapping the controller card separately will not be possible with most IDE drives.*

- 5) Switch hard disks to isolate problem to hard disk. Replace the original hard disk if the second hard disk works properly.



## 1780 Disk 0 failure; Troubleshoot disk drive and controller subsystem.

### Cause:

*NOTE: Disk 0 is first physical drive, always named logical drive 'C', even though it may be partitioned into additional logical drives.*

Hard disk controller did not receive expected response from disk. Causes include disconnected power cable to disk, incorrectly installed data cable, incorrectly set jumpers on drive, bad hard disk, or bad controller card.

### Solution:

Troubleshoot disk drive/controller subsystem.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Make sure power cable is securely connected to power connector on drive.
- 2) Inspect and correct data cable installation between the controller card and all hard disk drives. Make sure cables are securely connected.
- 3) Verify correct jumper settings on hard disk drive(s) with owner's manual.
- 4) Try swapping controller card to isolate problem to controller card. Replace the original controller card if the second controller card solves the problem.

*NOTE: Swapping the controller card separately will not be possible with most IDE drives.*

- 5) Switch hard disks to isolate problem to hard disk. Replace the original hard disk if the second hard disk works properly.



## 1701 hard disk failure.

### Cause:

Hard disk controller did not receive expected response from disk. Causes include disconnected power cable to disk, incorrectly installed data cable, incorrectly set jumpers on drive, bad hard disk, or bad controller card.

### Solution:

Troubleshoot disk drive/controller subsystem.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Make sure power cable is securely connected to power connector on drive.
- 2) Inspect and correct data cable installation between the controller card and all hard disk drives. Make sure cables are securely connected.
- 3) Verify correct jumper settings on hard disk drive(s) with owner's manual.
- 4) Try swapping controller card to isolate problem to the controller card. Replace the original controller card if the second controller card solves the problem.
- 5) Switch hard disks to isolate problem to hard disk. Replace the original hard disk if the second hard disk works properly.



## 602 disk boot record error; Restart with different system diskette.

### Cause:

Bad boot diskette, loose drive cable, drive installed incorrectly, bad drive or faulty controller card.

### Solution:

Reboot using different boot diskette of same size (pretest in another computer first).

Try one of the following, in sequence, until problem solved:

- 1) Reboot using different boot diskette of same size (pretest in another computer first).

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) Recheck drive cabling for correct installation (especially when just completed working inside base unit).
- 3) If problem persists, swap floppy drives (previous one is most likely bad).
- 4) Replace controller card if computer still will not boot.



## 601 Disk error; Update CMOS Setup to reflect current device status.

### Cause:

Error will appear on bootup if CMOS still contains setup definition of a removed or unplugged drive. Primary cause is nonexistent floppy drive. Less likely causes include bad disk, bad disk drive or bad controller card.

### Solution:

Update CMOS Setup to reflect current device status.

Try one of the following, in sequence, until problem solved:

- 1) Update CMOS Setup to reflect current device status.
- 2) If error is for a floppy drive, check for a bad diskette by trying a different one.

***CAUTION:*** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

- 3) Check for bad disk drive.
- 4) Check for bad disk drive controller.





## **Error: 304 keyboard or system unit error, keyboard clockline error.**

### **Solution:**

Check keyboard cable and keyboard selection switch.

Try one of the following, in sequence, until problem solved.

- 1) Inspect keyboard for obvious damage.
- 2) Check keyboard cable for damage and make sure it is securely connected to keyboard connector on back of base unit.
- 3) Make sure keyboard switch (if exists) is properly positioned (e.g., AT position for AT computer).
- 4) Make sure no keyboard keys are stuck in down position.



## **303/304 Keyboard or system unit error; Check keyboard cable and switch position.**

### **Cause:**

Keyboard is not responding properly to keyboard controller chip during POST. Problem is bad keyboard, keyboard cable keyboard switch positioned improperly or stuck key.

### **Solution:**

Check keyboard cable and keyboard switch position.

Try one of the following, in sequence, until problem solved.

- 1) Inspect keyboard for obvious damage.
- 2) Check keyboard cable for damage and make sure it is securely connected to keyboard connector on back of base unit.
- 3) Make sure keyboard switch (if it exists) is properly positioned (e.g., AT position for AT computer).
- 4) Make sure no keyboard keys are stuck in down position.
- 5) Try connecting another keyboard to computer.



## 302 System unit keylock is locked; Unlock keyboard lock with key.

### Cause:

Keyboard keylock is locked (with key), keyboard lock jumper wires to mainboard are disconnected, keylock is faulty or keyboard key is stuck.

### Solution:

Unlock keyboard lock with key and check for stuck key(s).

Try one of the following, in sequence, until problem is solved:

- 1) Unlock keyboard lock with key.
- 2) Make sure no keys are stuck in down position.

***CAUTION:*** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

- 3) Check to see if jumper wires leading from keylock to mainboard are securely connected to proper jumpers (perhaps they were accidentally disconnected while installing another component, such as a hard disk).
- 4) Test and replace faulty keylock switch.



## **301 Keyboard error; Connect keyboard, unstick keys, restart computer.**

### **Cause:**

Keyboard is not connected, key(s) are stuck or something on top of keyboard is pressing key(s) down.

### **Solution:**

Make sure keyboard is connected, no keys are stuck and nothing is sitting on top of keyboard. Reboot system.



## 203 Memory address error lines 16-23; Press down memory chips to fully seat them.

### Cause:

Bad memory chip(s).

### Solution:

Press down on all memory chips, ensuring they are fully seated.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Press down on all memory chips, ensuring they are fully seated and retest.
- 2) Remove and test each socketed memory chip. Replace any chips that fail test. Retest system.
- 3) Replace mainboard. Retest system.



## 202 Memory address error lines 0-15; Press down memory chips to fully seat them.

### Cause:

Bad memory chip(s).

### Solution:

Press down on all memory chips, ensuring they are fully seated.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Press down on all memory chips, ensuring they are fully seated and retest.
- 2) Remove and test each socketed memory chip. Replace any chips that fail test. Retest system.
- 3) Replace mainboard. Retest system.



## 201 Memory error; Press down on memory chips to fully seat them.

### Cause:

Bad memory chip(s).

### Solution:

Press down on all memory chips, ensuring they are fully seated.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Press down on all memory chips, ensuring they are fully seated and retest.
- 2) Remove and test each socketed memory chip. Replace any chips that fail test. Retest system.
- 3) Replace mainboard. Retest system.



## 164 Memory size error; Replace CMOS battery.

### Cause:

CMOS has lost system setup information due to failing battery, loose or bad memory chip(s), bad power supply mainboard.

### Solution:

Run Setup and retest system.

Try one of the following, in sequence, until problem solved:

- 1) Run Setup and retest system.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) Replace battery and run Setup.
- 3) Press down on all memory chips, ensuring they are firmly seated. Run Setup and retest system.
- 4) Remove and test each memory chip. Replace those that fail test.

*(NOTE: If the first 64K RAM is soldered to mainboard, test rest of the memory first) Run SetupPCDGS009.TXT and retest system.*

- 5) Replace power supply and run Setup.
- 6) Replace mainboard. (**CAUTION:** Mainboard problem is rare. Exhaust all previous steps first.)





## 163 Time and date not set; Replace battery.

### Cause:

CMOS has lost system setup information due to bad battery, power supply or RTC-CMOS chip.

### Solution:

Replace battery.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Replace battery and run [Setup](#).
- 2) Replace power supply and run [Setup](#).
- 3) Replace RTC-CMOS chip (if socketed) and run [Setup](#).
- 4) Replace mainboard if RTC-CMOS chip soldered to mainboard.



## 162 System option not set; Replace battery.

### Cause:

CMOS has lost system setup information due to bad battery, power supply or RTC-CMOS chip.

### Solution:

Replace battery.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Replace battery and run [Setup](#).
- 2) Replace power supply and run [Setup](#).
- 3) Replace RTC-CMOS chip (if socketed) and run [Setup](#).
- 4) Replace mainboard if RTC-CMOS chip soldered to mainboard.



## 161 System option not set; Replace battery.

### Cause:

CMOS has lost system setup information due to bad battery, power supply or RTC-CMOS chip.

### Solution:

Replace battery.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Replace battery and run [Setup](#).
- 2) Replace power supply and run [Setup](#).
- 3) Replace RTC-CMOS chip (if socketed) and run [Setup](#).
- 4) Replace mainboard if RTC-CMOS chip soldered to mainboard.



## 109 Problem with first 64K RAM; Replace defective memory chips.

### Cause:

Bad memory chip(s).

### Solution:

Replace bad memory chip(s).

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) For 286 computer: Test and replace one or more chips in first 2 rows of nine (marked Bank 0 & Bank 0 or Bank 0 & Bank 1) (18 chips).
- 2) For 386 or 486 computer: Test and replace one or more chips of the first 36.



## 108 Failed system timer test; Replace mainboard inside computer.

### Cause:

Bad timer chip on mainboard.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to



fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

- a]** Touch the metal sides of the base unit to discharge any static electricity.
- b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.
- e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.

- f]** Repeat steps 3)a)-3)e) to install additional SIMMs.
- g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

- a]** Touch the metal sides of the base unit to discharge any static electricity.
- b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
- e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.

- f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.
- g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

- a]** Locate the appropriate chip socket on the mainboard.
- b]** Touch metal sides of the base unit to discharge static electricity.
- c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.

- d]** Repeat steps 4a-4c to install additional DRAMs.
- e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## 107 NMI test failed; Replace CPU chip inside computer.

### Cause:

Bad CPU chip.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace CPU chip.

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Identify the type of CPU socket used on mainboard.
  - a) Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
  - b) Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 3) Insert the new CPU chip. Do one of the following:
  - a) Standard straight-push socket.
    - 1] Touch the metal sides of the base unit to ground any static.
    - 2] Remove the CPU chip from its protective anti-static envelope.
    - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
    - 4] Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

***CAUTION:** If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into place

***WARNING:** If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

**b) Zero Insertion Force (ZIF) sockets.**

- 1] Touch the metal sides of the base unit to ground any static.
- 2] Remove the CPU chip from its protective anti-static envelope.
- 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7] Gently slide the CPU chip into place.

***CAUTION:** Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8] Close and secure the lever.

**4) Replace base unit cover.**



Photo: Replacing cover



## 106 POST logic test problem; Identify defective adapter card and replace it.

### Cause:

Faulty adapter card or bad mainboard. This is catch-all error code for POST problems that do not fit other specific error codes.

### Solution:

Identify which adapter card is bad and replace it.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Remove all adapter cards, except video card, from the base unit.
- 2) Reboot the computer and see if error reoccurs.
- 3) If error does NOT reoccur, reinstall 1 adapter card back into computer, reboot computer and see if error reoccurs.
- 4) Repeat step 3 until error reoccurs. The last card installed is the faulty card -- replace it.
- 5) If error occurs at step 2, the video card may be faulty. Replace video card, reboot computer and see if error reoccurs.
- 6) If error consistently occurs during steps 1-5, problem is mainboard. Replace it.



## **105 8042 Command not accepted. Keyboard comm failure; Try another keyboard.**

### **Cause:**

Bad keyboard controller chip (8042) or bad keyboard.

### **Solution:**

Try another keyboard.

Try one of the following, in sequence, until problem solved.

- 1) Try another keyboard.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) Replace 8042 chip on mainboard if it is socketed.
- 3) Replace mainboard if 8042 is permanently attached.



## **Keyboard switch set incorrectly; Reset keyboard AT switch correctly.**

### **Cause:**

AT computer only.

A bad keyboard or mainboard is causing the 8042 keyboard controller chip to continually send signals to the processor using address line 20. Processor needs line 20 but the 8042 chip will not quit. Finally, BIOS sends error message.

### **Solution:**

Check the keyboard switch to make sure it is set properly.

Try one of the following, in sequence, until problem solved:

- 1) Check the keyboard switch to make sure it is set properly.
- 2) Try another keyboard.
- 3) Have a qualified computer technician replace the mainboard.





## 103 System timer interrupt failed; Replace mainboard inside computer.

### Cause:

Timer chip on mainboard cannot get interrupt controller chip to send timer interrupt (interrupt zero). Bad mainboard.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)

- b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.
- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
- c) Locate the jumpers or DIP switches on the mainboard.
- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
  - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
  - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.

- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).
  - 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.  
*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*
- f) (Optional) Install CPU chip.
- 1] Identify the type of CPU socket used on mainboard.
    - a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
    - b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:
  - a] Standard straight-push socket.
    - 1} Touch the metal sides of the base unit to ground any static.
    - 2} Remove the CPU chip from its protective anti-static envelope.
    - 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
    - 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.
  - 1} Touch the metal sides of the base unit to ground any static.
  - 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## 102 System timer failed; Replace mainboard inside computer.

### Cause:

Bad timer chip on mainboard.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off



- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## 101 System interrupt failed; Replace mainboard inside computer.

### Cause:

AT clone (286 & 386 CPU chips) only. Unusual error.  
Bad mainboard or adapter is interfering with interrupt controller chip.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover](#).



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)



- b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.
- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
- c) Locate the jumpers or DIP switches on the mainboard.
- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
  - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
  - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.



- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).
  - 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.  
*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*
- f) (Optional) Install CPU chip.
- 1] Identify the type of CPU socket used on mainboard.
    - a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
    - b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:
  - a] Standard straight-push socket.
    - 1} Touch the metal sides of the base unit to ground any static.
    - 2} Remove the CPU chip from its protective anti-static envelope.
    - 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
    - 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.
  - 1} Touch the metal sides of the base unit to ground any static.
  - 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## **Math coprocessor may be bad; Test math coprocessor with testing software.**

### **Cause:**

Math coprocessor may be bad.

### **Solution:**

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Test coprocessor using math coprocessor testing software and replace if bad.



## Parallel port failed power on self-test; Replace the parallel port.

### Cause:

Parallel port failed POST.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace parallel port.



## Serial port failed power on self-test; Replace the serial port.

### Cause:

Serial port failed POST.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace serial port.





## Batteries or power supply bad; Reset CMOS/replace batteries or power supply.

### Cause:

Bad batteries or power supply. (In rare cases, bad mainboard.)

### Solution:

Run computer 'Setup' to reset CMOS.

Try one of the following, in sequence, until problem solved:

- 1) Run computer Setup to reset CMOS.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 2) Replace batteries in base unit, reset CMOS, reboot computer.
- 3) Replace power supply, reset CMOS, reboot computer.
- 4) Replace mainboard (rare circumstances only).



## Timer chip bad; Replace motherboard inside the computer.

### Cause:

Bad timer chip.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard (because timer chip is permanently attached to mainboard)

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## Programmer interval timer bad; Replace motherboard inside the computer.

### Cause:

Programmer interval timer (used in refresh memory) is bad.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard (because timer is permanently attached to mainboard).

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover](#).



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)

- b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.
- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
- c) Locate the jumpers or DIP switches on the mainboard.
- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
  - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
  - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.

- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).
  - 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.  
*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*
- f) (Optional) Install CPU chip.
- 1] Identify the type of CPU socket used on mainboard.
    - a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
    - b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:
  - a] Standard straight-push socket.
    - 1} Touch the metal sides of the base unit to ground any static.
    - 2} Remove the CPU chip from its protective anti-static envelope.
    - 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
    - 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.
  - 1} Touch the metal sides of the base unit to ground any static.
  - 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD







## Memory address logic chips failed; Replace motherboard inside the computer.

### Cause:

Memory address logic chips on mainboard failed.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD







## Adapter card bad; Identify bad adapter card and replace it.

### Cause:

Bad adapter card (e.g., VGA card, network card) or bad mainboard.

### Solution:

Identify which adapter card is bad and replace it.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Remove all adapter cards, except video card, from the base unit.
- 2) Reboot the computer and see if error reoccurs.
- 3) If error does NOT reoccur, reinstall 1 adapter card back into computer, reboot computer and see if error reoccurs.
- 4) Repeat step 3 until error reoccurs. The last card installed is the faulty card--replace it.
- 5) If error occurs at step 2, the video card may be faulty. Replace video card, reboot computer and see if error reoccurs.
- 6) If error consistently occurs during steps 1-5, problem is mainboard. Replace it.



## Controller chip loose; Re-insert loose keyboard controller chip and retest.

### Cause:

Gate A20 failure due to bad keyboard or bad mainboard.

### Solution:

Reseat loose keyboard controller chip and retest.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Reseat loose keyboard controller chip.
- 2) Replace keyboard controller.
- 3) Try a different keyboard.
- 4) Replace keyboard fuse (if present).
- 5) Replace mainboard.



## Keyboard problem; Swap keyboards (check AT switch position) & restart.

### Cause:

Cause may be the keyboard controller chip, bad keyboard or a bad mainboard.

*NOTE: Error message applies to AT clones only!*

### Solution:

Check the keyboard switch position or try new keyboard.

Try one of the following, in sequence, until problem solved.

- 1) Make sure the keyboard switch on back of keyboard is set to AT position. Reboot computer and see if beep error reoccurs.
- 2) Swap keyboards (check switch position) and reboot computer. See if beep error reoccurs.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 3) Replace mainboard (because keyboard controller chip is permanently attached).



## Motherboard is bad; Replace mainboard inside computer.

### Cause:

Bad mainboard.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.



- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Interrupt controller chip bad; Replace motherboard inside computer.

### Cause:

Bad interrupt controller chip.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard (because interrupt controller chip is permanently attached).

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.



- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*



- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## **Video card resets trace bit too slowly; Replace the video adapter card.**

### **Cause:**

Video card will not reset trace bit in timely manner.

### **Solution:**

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace video card.



## Video chip on video card is bad; Replace the video adapter card.

### Cause:

Bad video chip on video card.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace video card.

- 1) Update or create a System Rescue Diskette that includes currently installed drivers, AUTOEXEC.BAT, CONFIG.SYS, WIN.INI and SYSTEM.INI files. (This process may install a video driver that is incompatible with certain applications or other hardware in system.)
- 2) Remove base unit cover.  
*NOTE: If removing an old video card is not required, skip to Step 4 for installation steps.*
- 3) Remove the old video card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Place the card in a static-resistant envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 4) Install new video card:
  - a) Remove the video card from its box and from the protective static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
  - c) Read the video card manual and identify which, if any, settings need to be changed on the card to use the COM port and interrupt chosen in Step 1.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo: Moving jumpers



Photo: DIP Switches

e) Identify an appropriate size expansion slot for the type of video card to be installed. Identify the required slot type by examining the row of connector pins along the bottom of the card. An older adapter may fit an 8-bit slot. Most ISA-based video cards require a 16-bit slot while a VESA Local Bus card requires an even longer slot. Choose an appropriate slot by matching the length and gaps in this row of connector pins with slots on the mainboard. Remove the rear metal expansion plate cover.

f) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, insert the card bottom (part with the gold-striped bars) into the free slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).

g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.

h) (Optional) If installing 2 video cards for a 2-display setup, attach the VGA pass-through cable to the pin connector or edge-style connector along the top of the video card.

- 5) Connect the video cable from the display unit to the socket on the back of the video card. Secure connector with attached screws.
- 6) Check the display unit for a Analog/TTL switch. Make sure it is set to 'Analog' (unless it is an old digital display). **CAUTION: Setting this switch in the wrong position could damage the display unit.**
- 7) (Optional) Some high-end video cards and displays ship with BNC connectors (twist on/off) labeled RGB (Red, Green, Blue). If supplied, they should be used because they provide better color separation and screen appearance. 2 types are available:
  - a) If RGB, connect the red cable to the color input socket marked 'Red' and so on for the others.
  - b) If composite (Ext. sync) connect the white or gray cable to 'Horizontal' and the black cable to 'Vertical'.
- 8) Install the video driver and test new configuration:
  - a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, mouse, etc.) and plug power cable into surge protector or wall outlet.
  - c) Power up computer and related peripherals one at a time. (System should boot normally, assuming there are no memory or address conflicts.)
  - d) Insert the video driver diskette that came with the videocard into floppy drive and enter the following:  
A:INSTALL (or SETUP (Refer to program instructions))  
Press ENTER
  - e) Follow installation/setup instructions.
  - f) If a specific memory address was set on card in Step 4, exclude this area from Windows management by entering the following line in the [386enh] section of SYSTEM.INI and reboot computer:  
EMMExclude=xxxx-xxxx  
(Where xxxx-xxxx is the video card address (e.g., C800-CFFF).  
(This prevents Windows from using the video portion of memory preventing lockups and crashes.)

- g) Test video card, driver installation and display configuration by running installed programs.
- 9) If display does not work right or a message about address or interrupt (IRQ) conflicts during use or another device (e.g., mouse) fails:
  - a) Turn computer system off and check seating of video card and all cable connections.
  - b) Reread settings instructions and recheck DIP Switch and Jumper settings.
  - c) Make sure proper video driver is selected.
  - d) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - e) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[Example: MSD IRQ Status](#)

- f) See [IRQ Conflicts](#) for advice on eliminating interrupt conflicts.
- g) Contact video card manufacturer for technical support.
- 10) [Replace base unit cover.](#)
- 11) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:  
DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.  
OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Video card not installed; Install a video adapter card.

### Cause:

No video card installed in computer.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Install a video card.

- 1) Update or create a System Rescue Diskette that includes currently installed drivers, AUTOEXEC.BAT, CONFIG.SYS, and Windows .INI and .GRP files. (This process may install a video driver that is incompatible with certain applications or other hardware in system.)
- 2) Remove base unit cover.  
*NOTE: If removing an old video card is not required, skip to Step 4 for installation steps.*
- 3) Remove the old video card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily).
  - c) Place the card in a static-resistant envelope.
  - d) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 4) Install new video card:
  - a) Remove the video card from its box and from the protective static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
  - c) Read the video card manual and identify which, if any, settings need to be changed on the card to use the COM port and interrupt chosen in Step 1.
  - d) Move Jumpers and/or Change DIP Switches, if necessary.



Photo: Moving jumpers



Photo: DIP Switches

- e) Identify an appropriate size expansion slot for the type of video card to be installed. Identify the required slot type by examining the row of connector pins along the bottom of the card. An older adapter may fit an 8-bit slot. Most ISA-based video cards require a 16-bit slot while a VESA Local Bus card requires an even longer slot. Choose an appropriate slot by matching the length and gaps in this row of connector pins with slots on the mainboard. Remove the rear metal expansion plate cover.
  - f) Touch the metal sides of the base unit to ground any static and, grasping the video card by its edges, insert the card bottom (part with the gold-striped bars) into the free slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily).
  - g) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - h) (Optional) If installing 2 video cards for a 2-display setup, attach the VGA pass-through cable to the pin connector or edge-style connector along the top of the video card.
- 5) Connect the video cable from the display unit to the socket on the back of the video card. Secure connector with attached screws.
  - 6) Check the display unit for a Analog/TTL switch. Make sure it is set to 'Analog' (unless it is an old digital display). **CAUTION: Setting this switch in the wrong position could damage the display unit.**
  - 7) (Optional) Some high-end video cards and displays ship with BNC connectors (twist on/off) labeled RGB (Red, Green, Blue). If supplied, they should be used because they provide better color separation and screen appearance. Two types are available:
    - a) If RGB, connect the red cable to the color input socket marked 'Red' and so on for the others.
    - b) If composite (Ext. sync) connect the white or gray cable to 'Horizontal' and the black cable to 'Vertical'.
  - 8) Install the video driver and test new configuration:
    - a) Make sure no parts or tools remain in metal sides of the base unit.
    - b) Replace necessary cables (power, keyboard, mouse, etc.) and plug power cable into surge protector or wall outlet.
    - c) Power up computer and related peripherals one at a time. (System should boot normally, assuming there are no memory or address conflicts.)
    - d) Insert the video driver diskette that came with the video card into floppy drive and enter the following:  
A:INSTALL (or SETUP (Refer to program instructions))  
Press ENTER
    - e) Follow installation/setup instructions.
    - f) If a specific memory address was set on card in Step 4, exclude this area from Windows management by entering the following line in the [386enh] section of SYSTEM.INI and reboot computer:  
EMMExclude=xxxx-xxxx  
(Where xxxx-xxxx is the video card address (e.g., C800-CFFF).  
(This prevents Windows from using the video portion of memory preventing lockups and crashes.)
    - g) Test video card, driver installation and display configuration by running installed programs.
  - 9) If display does not work right or a message about address or interrupt (IRQ) conflicts during use or another device (e.g., mouse) fails:
    - a) Turn computer system off and check seating of video card and all cable connections.

- b) Reread settings instructions and recheck DIP Switch and Jumper settings.
- c) Make sure proper video driver is selected.
- d) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run Microsoft Diagnostics, enter the following command at DOS prompt and press 'ENTER':

C:\DOS\MSD

- e) Identify interrupt (IRQ) assignments using the IRQ Status screen.



Example: MSD IRQ Status

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- f) See IRQ Conflicts for advice on resolving conflicts.
- g) Contact video card manufacturer for technical support.
- h) If all else fails, reinstall the original video card, reboot from System Recovery Diskette (updated in Step 1) and restore the original configuration.10) Replace base unit cover.
- 11) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows.INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version), STARTUP.CMD





## **Keyboard or cable problem; Check keyboard keys, switch, cable & connection.**

### **Cause:**

Keyboard controller chip is not receiving correct test responses from keyboard during POST. Cause may be keyboard switch, wrong keyboard, bad keyboard, bad keyboard cable or key stuck.

### **Solution:**

Check keyboard keys, switch, cable and connection.

Try one of the following, in sequence, until problem solved.

- 1) Check keyboard, cable and connection.
  - a) Make sure keyboard type matches computer type (e.g., AT keyboard for AT computer).
  - b) Check keyboard type switch on back of keyboard. Make sure switch position reflects computer type.
  - c) Make sure keyboard cable is not damaged.
  - d) Make sure keyboard connector is plugged securely into the keyboard connection on back of computer.
  - e) Make sure no keyboard keys are stuck in on position.
- 2) Replace keyboard/cable with a new keyboard/cable of correct type.



## 3-1-3 beeps pattern.

### Cause:

Bad interrupt controller chip.

### Solution:

**CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.

Replace mainboard (because interrupt controller chip is permanently attached).

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover.](#)



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.

- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.

- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.

- c) Locate the jumpers or DIP switches on the mainboard.

- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:

- 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.

- 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.

- e) (Optional) Install BIOS chip.

- 1] Locate BIOS chip on mainboard.

- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.

- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).  
6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.  
7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.

- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).  
6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP's).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).
  - 3] Speed of new memory matches that already installed.

i) (Optional) Install any additional cache or RAM memory. Do one of the following:

1] Install new SIMM(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c] Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.
- e] Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

- f] Repeat steps 3)a)-3)e) to install additional SIMMs.
- g] Make sure all SIMMs are at the same height and angle to the board.

2] Install new SIPP(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c] Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
- e] Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

- f] Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.
- g] Make sure all SIPPs are at the same height and perpendicular to the board.

3] Install new DRAM(s):

- a] Locate the appropriate chip socket on the mainboard.
- b] Touch metal sides of the base unit to discharge static electricity.
- c] Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

- d] Repeat steps 4a-4c to install additional DRAMs.
- e] Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.
- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
- g] Locate and position mounting screws and support spacers:

- h) Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.

*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*

- i) Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
- j) Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.

*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*

- k) Secure mainboard in place by placing screws in the mounting posts and tightening them.

7) Reconnect all wires and cables to mainboard: **(CAUTION: Remember to discharge static first!)**

- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
- b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
- c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

**WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.

- d) Reconnect any other cables to be connected to mainboard.

8) Reinstall all expansion cards.

- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
- b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
- c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.

9) Test new configuration:

- a) Make sure no parts or tools remain in metal sides of the base unit.
- b) Replace necessary cables (power, keyboard, video) and plug in power cable.
- c) Power up computer and related peripherals one at a time.
- d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*
- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.

10) If unable to access drive(s), turn computer off and disconnect power cables.

- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## DMA chip bad; Replace motherboard (DMA chip permanently attached).

### Cause:

Bad DMA chip.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard (since DMA chip is permanently attached).

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## DMA chip bad; Replace motherboard (DMA chip permanently attached).

### Cause:

Bad DMA chip.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard (DMA chip is permanently attached).

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off



- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## Memory chip holding bit 3 is bad; Replace the memory chip holding bit 3.

### Cause:

Memory chip holding bit 3 is bad.

### Solution:

Replace chip holding bit 3.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 3:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 3.
- 2) If unable to identify memory chip holding bit 3, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.







## Memory chip holding bit 2 is bad; Replace the memory chip holding bit 2.

### Cause:

Memory chip holding bit 2 is bad.

### Solution:

Replace chip holding bit 2.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 2:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 2.
- 2) If unable to identify memory chip holding bit 2, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Memory chip holding bit 13 is bad; Replace the memory chip holding bit 13.

### Cause:

Memory chip holding bit 13 is bad.

### Solution:

Replace chip holding bit 13.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 13:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 13.
- 2) If unable to identify memory chip holding bit 13, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Memory chip holding bit 14 is bad; Replace the memory chip holding bit 14.

### Cause:

Memory chip holding bit 14 is bad.

### Solution:

Replace chip holding bit 14.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 14:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 14.
- 2) If unable to identify memory chip holding bit 14, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Memory chip holding bit 9 is bad; Replace the memory chip holding bit 9.

### Cause:

Memory chip holding bit 9 is bad.

### Solution:

Replace chip holding bit 9.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 9:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 9.
- 2) If unable to identify memory chip holding bit 9, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.







## Memory chip holding bit 6 is bad; Replace the memory chip holding bit 6.

### Cause:

Memory chip holding bit 6 is bad.

### Solution:

Replace chip holding bit 6.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 6:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 6.
- 2) If unable to identify memory chip holding bit 6, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Memory chips holding bit 15 is bad; Replace the memory chip holding bit 15.

### Cause:

Memory chip holding bit 15 is bad.

### Solution:

Replace chip holding bit 15.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 15:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 15. If unable to identify memory chip holding bit 15, remove all chips in first 64K RAM and test each one.
- 2) If unable to identify memory chip holding bit 15, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## 2-2-4 beeps pattern.

### Cause:

Memory chip holding bit 7 is bad.

### Solution:

Replace bad memory chip.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 7:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 7.
- 2) If unable to identify memory chip holding bit 7, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Memory chip holding bit 8 is bad; Replace the memory chip holding bit 8.

### Cause:

Memory chip holding bit 8 is bad.

### Solution:

Replace chip holding bit 8.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 8:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 8.
- 2) If unable to identify memory chip holding bit 8, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.







## Memory chip holding bit 1 is bad; Replace the memory chip holding bit 1.

### Cause:

Memory chip holding bit 1 is bad.

### Solution:

Replace chip holding bit 1.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 1:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 1.
- 2) If unable to identify memory chip holding bit 1, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Memory chip holding bit 5 & 7 is bad; Replace the bad memory chip.

### Cause:

Memory chip holding bit 5 is bad.

### Solution:

Replace bad memory chip.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 5:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 5.
- 2) If unable to identify memory chip holding bit 5, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Memory chip holding bit 4 is bad; Replace the memory chip holding bit 4.

### Cause:

Memory chip holding bit 4 is bad.

### Solution:

Replace chip holding bit 4.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 4:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 4.
- 2) If unable to identify memory chip holding bit 4, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Memory chip holding bit 11 is bad; Replace the memory chip holding bit 11.

### Cause:

Memory chip holding bit 11 is bad.

### Solution:

Replace chip holding bit 11.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 11:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 11.
- 2) If unable to identify memory chip holding bit 11, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.







## Memory chip holding bit 12 is bad; Replace the bad memory chip.

### Cause:

Memory chip holding bit 12 is bad.

### Solution:

Replace bad memory chip.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 12:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 12.
- 2) If unable to identify memory chip holding bit 12, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Memory chip holding bit 10 is bad; Replace the bad memory chip.

### Cause:

Memory chip holding bit 10 is bad.

### Solution:

Replace bad memory chip.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 10:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 10.
- 2) If unable to identify memory chip holding bit 10, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Memory chip holding 0 bit is bad; Replace the memory chip holding bit 0.

### Cause:

Memory chip holding bit 0 is bad.

### Solution:

Replace chip holding bit 0.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Replace the memory chip holding bit 0:
  - a) Do one of the following:
    - 1] Check the mainboard owner's manual for a memory chip location diagram.
    - 2] See if there are memory chip socket identifiers printed on mainboard (e.g., 1 for bit 1).
  - b) Locate, remove and replace memory chip for bit 0.
- 2) If unable to identify memory chip holding bit 0, try one or more of the following.
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips (because the faulty chip in the SIMM/bank is unknown) from a non-critical section of memory in another bank (upper memory), with the SIMM or bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

*NOTE: Your computer should function with reduced memory until replacements are needed.*
- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Motherboard is bad; Replace mainboard inside computer.

### Cause:

Bad mainboard.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip



with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## Port failure on EISA computer; Replace motherboard inside computer.

### Cause:

Port failure on EISA computer.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip



with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## **Bad memory chip or motherboard; Re-insert the memory chips or SIMMs.**

### **Cause:**

Bad memory chip in first 64K of RAM or bad mainboard.

### **Solution:**

Reseat the memory chips or SIMMs.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Reseat the memory chips or SIMMs.
- 2) If chips test OK, replace mainboard.



## Fail safe timer on EISA motherboard failed; Replace motherboard inside computer.

### Cause:

Fail safe timer on EISA mainboard failed.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off



- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## 1-4-1 beeps pattern.

### Cause:

Bad mainboard.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run [Setup](#) and capture setup information (print or write it down) if computer is operational.
- 2) [Remove base unit cover.](#)



[Photo: Removing cover](#)

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off the mainboard jumper.



- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.

- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.

- c) Locate the jumpers or DIP switches on the mainboard.

- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:

- 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.

- 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.

- e) (Optional) Install BIOS chip.

- 1] Locate BIOS chip on mainboard.

- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.

- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).  
6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.  
7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.

- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).  
6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP's).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).
  - 3] Speed of new memory matches that already installed.

i) (Optional) Install any additional cache or RAM memory. Do one of the following:

1] Install new SIMM(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

- c] Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.
- e] Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

- f] Repeat steps 3)a)-3)e) to install additional SIMMs.
- g] Make sure all SIMMs are at the same height and angle to the board.

2] Install new SIPP(s):

- a] Touch the metal sides of the base unit to discharge any static electricity.
- b] Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

- c] Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)
- d] Align pin 1 on the SIPP with the pin 1 hole on the mainboard.
- e] Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

- f] Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.
- g] Make sure all SIPPs are at the same height and perpendicular to the board.

3] Install new DRAM(s):

- a] Locate the appropriate chip socket on the mainboard.
- b] Touch metal sides of the base unit to discharge static electricity.
- c] Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

- d] Repeat steps 4a-4c to install additional DRAMs.
- e] Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.
- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
- g] Locate and position mounting screws and support spacers:

- h) Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.

*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*

- i) Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j) Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k) Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: **(CAUTION: Remember to discharge static first!)**
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

**WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.

- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*
  - e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.

- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD



## First 64K or RAM not responding to CPU; Re-insert memory chips or SIMMs.

### Cause:

First 64K RAM is not responding to CPU. There is a loose or bad memory chip(s) in first 64K RAM or mainboard is bad. The most likely cause is a loose memory chip. A loose or bad memory chip in this section of RAM is critical. The computer will not

operate with a loose or bad memory chip/SIMM in this section.

### Solution:

Reseat the memory chips or SIMMs.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Reseat the memory chips or SIMMs.
- 2) Try switching a SIMM or bank of chips (because the faulty chip/SIMM in bank is unknown) from a non-critical section of memory to replace the suspected bad chip/SIMM. Do one of the following:
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips from a non-critical section of memory (upper memory) with the SIMM/bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

**NOTE:** *Your computer should function with reduced memory until replacements are needed.*

- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.







## Refresh failure; Re-insert memory chips/SIMMs and retest computer.

### Cause:

Timer chip instructed DMA chip to go to RAM and refresh memory. Refresh failure could be due to (1) Bad memory chips, (2) Bad Direct Memory Access (DMA) chip, or (3) Bad memory addressing chips on mainboard.

### Solution:

Reseat memory chips/SIMMs and retest computer.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Reseat memory:
  - a) Turn off computer.
  - b) Reseat memory chips or SIMMs.
  - c) Turn computer on and retest.
- 2) Replace mainboard (since DMA chip and memory addressing chips are soldered to mainboard).



## 1-2-3 beeps pattern.

### Cause:

DMA chip is bad. Remote possibility of a bad adapter card permanently grabbing a DMA line.

### Solution:

Test for bad adapter card. If none found, replace mainboard.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Test for bad card (extremely rare cause of this error).
  - a) Remove all adapter boards from base unit EXCEPT video card.
  - b) Turn on computer and check for same beep error message.
- 2) Replace mainboard.



## **Bad DMA chip; Test for bad adapter card, If not bad, replace motherboard.**

### **Cause:**

DMA chip is bad. Remote possibility of a bad adapter card permanently grabbing a DMA line.

### **Solution:**

Test for bad adapter card. If not found, replace mainboard.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Test for bad card (extremely rare cause of this error).
  - a) Remove all adapter boards from base unit EXCEPT video card.
  - b) Turn on computer and check for same beep error message.
- 2) Replace mainboard.



## Bad timer chip on motherboard; Replace motherboard inside computer.

### Cause:

Bad timer chip on mainboard.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.



- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## Damaged BIOS; Replace BIOS.

### Cause:

BIOS is damaged.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace BIOS by doing the following: remove base unit cover, locate and remove the old BIOS chip, install the new BIOS chip, run setup, and replace base unit cover.

- 1) Remove base unit cover.



Photo: Removing cover

- 2) Locate BIOS chip on mainboard.
- 3) Touch metal sides of the base unit to discharge any static electricity, and remove old BIOS chip using chip puller. Grasp the edges firmly between the tips of the tweezers, and pull straight up (rocking gently back and forth if necessary).
- 4) Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.  
*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*
- 5) Run Setup and follow upgrade instructions to enter new values where appropriate.
- 6) Reboot the computer and use appropriate applications and peripherals to test new BIOS.
- 7) If problem is encountered, contact the hardware vendor that provided the BIOS chip for assistance.
- 8) Replace base unit cover.



Photo: Replacing cover

- 9) If problems persist, reinstall old BIOS, following steps 1-8.



## CMOS configuration cannot be read; Replace motherboard inside computer.

### Cause:

Computer cannot read configuration in CMOS.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to



fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## Beeps with no text error msg.

**Cause:**

None.

**Solution:**

There is no problem here. Beep(s) during bootup is normal behavior for this computer.



## 67 service.

### Cause:

Problem is rarely serious. In a few cases, problem may be due to printer overheating, bad memory chip or another cause.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Turn printer off and wait 15 seconds. Turn printer on and resend print job.

Try one of the following, in sequence, until problem solved:

- 1) Turn printer off and wait 15 seconds. Turn printer on and resend print job.
- 2) Turn printer off. Wait 10 minutes for printer to cool. Turn printer on and resend print job.
- 3) Check printer memory or diagnose other internal problems.



## **UE load.**

**Cause:**

Printer is waiting for an envelope to be loaded in the upper tray.

**Solution:**

Load an envelope in the upper tray.



**MF ready.**

**Cause:**

Printer is waiting for manual paper feed.

**Solution:**

Feed printer paper manually.





## LE load.

**Cause:**

Printer is waiting for an envelope to be loaded in the lower tray.

**Solution:**

Load an envelope in the lower tray.



**LC empty.**

**Cause:**

Printer tray is out of paper.

**Solution:**

Add paper to printer.

- 1) Remove paper tray.
- 2) Insert appropriate size paper until tray is full.
- 3) Replace paper tray.
- 4) Press 'Online' and continue printing.



**FE.**

**Cause:**

Removing a font cartridge from printer while attempting to print or inserting a font cartridge the printer does not recognize. Perhaps, (less likely) the font cartridge is bad.

**Solution:**

Reinsert font cartridge and press 'Continue' or 'Online'.

- 1) Reinsert font cartridge.
- 2) Press 'Continue' or 'Online'.
- 3) If error message continues, return font cartridge to supplier for exchange.

*NOTE: For future reference, turn printer off before removing and inserting font cartridges.*



## FC.

**Cause:**

Removing a font cartridge from printer while attempting to print or inserting a font cartridge the printer does not recognize. Perhaps, (less likely) the font cartridge is bad.

**Solution:**

Reinsert font cartridge and press 'Continue' or 'Online'.

- 1) Reinsert font cartridge.
- 2) Press 'Continue' or 'Online'.
- 3) If error message continues, return font cartridge to supplier for exchange.

*NOTE: For future reference, turn printer off before removing and inserting font cartridges.*



## **EE load.**

**Cause:**

Printer is waiting for an envelope to be loaded in the optional envelope tray.

**Solution:**

Load an envelope in the optional tray.



## EC load.

**Cause:**

Printer is waiting for an envelope to be loaded.

**Solution:**

Load an envelope.



## 79 service.

### Cause:

Problem is rarely serious. In a few cases, problem may be due to printer overheating, bad memory chip or another cause.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Turn printer off and wait 15 seconds. Turn printer on and resend print job.

Try one of the following, in sequence, until problem solved:

- 1) Turn printer off and wait 15 seconds. Turn printer on and resend print job.
- 2) Turn printer off. Wait 10 minutes for printer to cool. Turn printer on and resend print job.
- 3) Check printer memory or diagnose other internal problems.



## 72 service.

**Cause:**

Font cartridge was removed in middle of print job, is not seated correctly, or cartridge is not recognized by printer.

**Solution:**

Reseat or remove the font cartridge and turn printer off. Wait 15 seconds, turn printer on and resend print job.





## **71 error.**

**Cause:**

Font cartridge was removed in middle of print job, is not seated correctly, or cartridge is not recognized by printer.

**Solution:**

Reseat or remove the font cartridge and turn printer off. Wait 15 seconds, turn printer on and resend print job.



## **70 error.**

**Cause:**

Font cartridge was removed in middle of print job, is not seated correctly, or cartridge is not recognized by printer.

**Solution:**

Reseat or remove the font cartridge and turn printer off. Wait 15 seconds, turn printer on and resend print job.



## 69 service.

### Cause:

Problem is rarely serious. In a few cases, problem may be due to printer overheating, bad memory chip or another cause.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Turn printer off and wait 15 seconds. Turn printer on and resend print job.

Try one of the following, in sequence, until problem solved:

- 1) Turn printer off and wait 15 seconds. Turn printer on and resend print job.
- 2) Turn printer off. Wait 10 minutes for printer to cool. Turn printer on and resend print job.
- 3) Check printer memory or diagnose other internal problems.



## 68 service.

### Cause:

Problem is rarely serious. In a few cases, problem may be due to printer overheating, bad memory chip or another cause.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Turn printer off and wait 15 seconds. Turn printer on and resend print job.

Try one of the following, in sequence, until problem solved:

- 1) Turn printer off and wait 15 seconds. Turn printer on and resend print job.
- 2) Turn printer off. Wait 10 minutes for printer to cool. Turn printer on and resend print job.
- 3) Check printer memory or diagnose other internal problems.



## 66 service.

### Cause:

Problem is rarely serious. In a few cases, problem may be due to printer overheating, bad memory chip or another case.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Turn printer off and wait 15 seconds. Turn printer on and resend print job.

Try one of the following, in sequence, until problem solved:

- 1) Turn printer off and wait 15 seconds. Turn printer on and resend print job.
- 2) Turn printer off. Wait 10 minutes for printer to cool. Turn printer on and resend print job.
- 3) Check printer memory or diagnose other internal problems.



## 65 service.

### Cause:

Problem is rarely serious. In a few cases, problem may be due to overheating, bad memory or another cause.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Turn printer off; wait 15 seconds, turn printer on and resend print job.

Try one of the following, in sequence, until problem solved:

- 1) Turn printer off; wait 15 seconds, turn printer on and resend print job.
- 2) Turn printer off. Wait 10 minutes for printer to cool. Turn printer on and resend print job.
- 3) Check printer memory or diagnose other internal problems.



## 64 service.

### Cause:

Problem is rarely serious. In a few cases, problem may be due to printer overheating, bad memory chip or another cause.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Turn printer off and wait 15 seconds. Turn printer on and resend print job.

Try one of the following, in sequence, until problem solved:

- 1) Turn printer off and wait 15 seconds. Turn printer on and resend print job.
- 2) Turn printer off. Wait 10 minutes for printer to cool. Turn printer on and resend print job.
- 3) Check printer memory or diagnose other internal problems.



## 63 service.

### Cause:

Problem is rarely serious. In a few cases, problem may be due to printer overheating, bad memory chip or another cause.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Turn printer off; wait 15 seconds, then turn printer on and resend print job.

Try one of the following, in sequence, until problem solved:

- 1) Turn printer off; wait 15 seconds, turn printer on and resend print job.
- 2) Turn printer off. Wait 10 minutes for printer to cool. Turn printer on and resend print job.
- 3) Check printer memory or diagnose other internal problems.





## 62 service.

### Cause:

Problem is rarely serious. In a few cases, problem may be due to printer overheating, bad memory chip or another cause.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Turn printer off; wait 15 seconds, turn printer on and resend printer job.

Try one of the following, in sequence, until problem solved:

- 1) Turn printer off; wait 15 seconds, turn printer on and resend print job.
- 2) Turn printer off. Wait 10 minutes for printer to cool. Turn printer on and resend print job.
- 3) Check printer memory or diagnose other internal problems.



## 61 service.

### Cause:

Problem is rarely serious. In a few cases, problem may be due to printer overheating, bad memory chip or another cause.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Turn printer off; wait 15 seconds, turn printer on and resend print job.

Try one of the following, in sequence, until problem solved:

- 1) Turn printer off; wait 15 seconds, turn printer on and resend print job.
- 2) Turn printer off. Wait 10 minutes for printer to cool. Turn printer on and resend print job.
- 3) Check printer memory or diagnose other internal problems.



## 57 error.

### Cause:

Memory expansion board in laser printer is not properly seated, is not compatible or is defective.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Turn off printer, reseal memory expansion board, and attempt to reprint.

Try one of the following, in sequence, until problem solved:

- 1) Reseat memory expansion board as follows:
  - a) Turn printer off.
  - b) Reseat memory expansion board.
  - c) Turn printer back on.
  - d) Resend print job to printer.
- 2) If 57 Error message persists, replace memory expansion board.



## 55 error.

**Cause:**

Spurious error.

**Solution:**

Press 'Continue' button and resend print job.

Try one of the following, in sequence until problem is solved:

- 1) Press 'Continue' button. Resend print job.
- 2) Turn the printer off; wait 15 seconds and turn printer back on. Resend print job.



## 54 service.

**Cause:**

*NOTE: 54 Service error message appears only on printers that print double-sided.*

Paper is wrong size.

**Solution:**

Make sure paper is correct size, turn printer off and on, and resend print job.

- 1) Make sure paper is correct size.
- 2) Turn printer off. Wait 15 minutes.
- 3) Turn printer on.
- 4) Resend print job.



## 54 error.

**Cause:**

Spurious error.

**Solution:**

Press 'Continue' Button and resend print job.

Try one of the following, in sequence until problem is solved:

- 1) Press 'Continue' button. Resend print job.
- 2) Turn the printer off; wait 15 seconds and turn printer back on. Resend print job.



## 53 error.

### Cause:

Memory expansion board in laser printer is not properly seated, is not compatible or is defective.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Turn off printer, reseal memory expansion board, and attempt to reprint.

Try one of the following, in sequence, until problem solved:

- 1) Reseat memory expansion board as follows:
  - a) Turn printer off.
  - b) Reseat memory expansion board.
  - c) Turn printer back on.
  - d) Resend print job to printer.
- 2) If 53 Error message persists, replace memory expansion board.



## 52 error.

**Cause:**

Spurious error.

**Solution:**

Press 'Continue' button and resend print job.

Try one of the following, in sequence until problem is solved:

- 1) Press 'Continue' button. Resend print job.
- 2) Turn the printer off; wait 15 seconds and turn printer back on. Resend print job.





## 51 error.

**Cause:**

Spurious error.

**Solution:**

Press 'Continue' button and resend print job.

Try one of the following, in sequence until problem is solved:

- 1) Press 'Continue' button. Resend print job.
- 2) Turn the printer off; wait 15 seconds and turn printer back on. Resend print job.



## 50 service.

**Cause:**

Usually a temporary overheating problem. May be caused by a bad cooling fan or power supply in printer.

**Solution:**

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Turn off printer, wait 10 minutes, then turn printer back on and resend print job.

Do each of the following, in sequence until problem solved:

- 1) Cool printer.
  - a) Turn printer off. Wait 10 minutes.
  - b) Turn printer on.
  - c) Resend print job.
- 2) Move printer to a cooler location and repeat step 1)
- 3) Printer may need a new cooling fan, a new power supply, or both.



## 41 error.

**Cause:**

Spurious error.

**Solution:**

Press 'Continue' button.

Try one of the following, in sequence until problem is solved:

- 1) Press 'Continue' button. Resend print job.
- 2) Turn the printer off; wait 15 seconds and turn printer back on. Resend print job.



## 22 error.

**Cause:**

The computer or software is incorrectly configured for the printer.

**Solution:**

Press 'Continue' button to clear message and reprint job.

Try one of the following, in sequence, until 22 Error goes away:

- 1) Press 'Continue' button to clear message and reprint job.
- 2) Turn printer off; wait 15 seconds, and turn printer back on (this clears the printer's memory). Resend print job.
- 3) Check the printer setup in application and make sure:
  - a) Correct printer is defined.
  - b) A current, valid printer driver is being used.Resend print job.



## 40 error.

**Cause:**

Either the printer cable connection is bad or the application is not configured properly for the printer.

**Solution:**

Check printer cable connections and application printer setup.

Try one of the following, in sequence, until problem solved:

- 1) Check printer cable.
  - a) Check printer cable for damage.
  - b) Make sure printer cable is securely connected to port on computer.
  - c) Make sure printer cable is securely connected to port on printer.
- 2) Check the application printer setup. Make sure it is setup properly for this printer.
- 3) If steps 1) & 2) do not correct problem, try a new printer cable.



## 20 error.

### Cause:

Insufficient printer memory to handle print task. This may be due to a shortage of memory in printer, an excessive number of fonts, or a complex print job.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Press 'Continue' button. To work around problem, clear fonts, reduce complexity of print job or add additional memory to printer.

1) Clear printer by pressing 'Continue' button (this will produce half the document on two pages).

To work around this problem, do one or more of the following:

- 2) Clear extra fonts by turning printer off; wait 15 seconds, and turn printer back on.
- 3) Reduce number of fonts and other graphical complexities in print job.
- 4) Add more memory to printer.



## 16 toner low.

### Cause:

Printer toner cartridge is running low on toner. Error message often appears several hundred pages before users notice the print quality actually deteriorating.

### Solution:

Remove print cartridge, rock it back and forth and reseal it.

- 1) Open printer cover.
- 2) Carefully remove printer toner cartridge.
- 3) Grasp cartridge in center and hold it at arms length away from body and other items (watch out for toner dust).
- 4) Rock cartridge from side to side to redistribute the toner particles evenly inside the cartridge.
- 5) Reseat the toner cartridge inside the printer.
- 6) Close the printer cover.
- 7) Make sure printer is online.
- 8) Resend the print job.

*NOTE: This procedure should extend the life of the print cartridge by several hundred more pages. Repeat procedure later until no improvement in print quality is observed and print quality becomes unacceptable. Then install a new toner cartridge, following instructions on printer/cartridge.*



## 13 paper jam.

### Cause:

One or more pieces of paper are jamming the print path inside the printer.

### Solution:

Remove the paper obstruction(s) and open/close printer cover to reset. Resend print job.

- 1) Turn laser printer power switch off.
- 2) Open the top cover of the laser printer.  
***WARNING: Internal printer components can be extremely hot!***
- 2) Look inside to locate and remove the piece(s) of paper causing the jam. Even if one is found, look around for others. Laser printer paper jams generally occur in one of 3 locations:
  - a) Where the paper enters the printer. Remove the paper tray. Look both inside the printer compartment and in from the paper tray slot. Look for sheets that may have fed only partially into the printer. Remove it by tugging gently so as not to tear it.
  - b) Where paper curls around one or more rollers. Carefully lift all flaps and levers. Sometimes the toner cartridge must be removed. Lift it straight out and set it aside.
  - c) The back or top of the printer where completed pages emerge. Gently work it back and forth to remove it.
- 3) Replace toner cartridge, if removed, and make sure it is fully seated.
- 4) Some printers require opening and closing each cover and latch before recycling. Complete this task, if necessary.
- 5) Close the top cover until it clicks in place.
- 6) Refill and replace the paper tray(s).
- 7) Make sure the control panel returns to normal (e.g., 00 READY) and press the 'Online' button.
- 8) If the jam message reoccurs, press the 'Reset' button.
- 9) If the jam message reoccurs again or the printer jams on the first or second page, it is likely that a scrap of paper remains somewhere on the paper path inside the printer. Repeat steps 1-7 until problem is solved. (See printer user manual (Trouble-shooting Paper Jams section) for further guidance.

*NOTE: For future reference, persistent paper jams indicate that the wrong kind of paper is being used in this printer. Use a light-weight 16-24 pound copier paper. Avoid glossy and shiny or porous and textured paper. It may help to fan the paper to separate the sheets before inserting them into the paper tray.*







## 12 EPL.

**Cause:**

Printer cover or latch is open or the toner cartridge is not properly installed.

**Solution:**

Open printer cover, reseal toner cartridge and close printer cover.

- 1) Open printer cover.
- 2) Reseat toner cartridge.
- 3) Close printer cover.

**CAUTION:** *If message continues, printer cooling fan may be bad. This item should be investigated by a qualified printer technician.*



## 12 open.

**Cause:**

Printer cover or latch is open or the toner cartridge is not properly installed.

**Solution:**

Open printer cover, reseal toner cartridge and close printer cover.

- 1) Open printer cover.
- 2) Reseat toner cartridge.
- 3) Close printer cover.

***CAUTION:** If message continues, printer cooling fan may be bad. This task should be investigated by a qualified printer technician.*



## 11 paper out.

**Cause:**

Printer is out of paper.

**Solution:**

Add paper to printer.

*NOTE: If printer displays 'PC LOAD' message after adding paper, change the paper tray to one of another size.*



**10 reset to save.**

**Cause:**

Changed printer's internal printer menu while in middle of print job.

**Solution:**

Press 'Reset' to continue; press 'Online' to escape.

Do one of the following:

- 1) Press 'Reset' to activate changes.

*NOTE: This deletes printer's memory (fonts, formats, data).*

- 2) Press 'Online' to escape this action.



## 09 reset.

**Cause:**

The printer's 'Reset' button was pressed. This clears all information (files, fonts, formatting information) from printer's memory.

**Solution:**

Press printer's 'Online' button to escape this reset action. Resend the print job.



## 08 reset.

**Cause:**

The printer's 'Reset' button was pressed. This clears all information (files, fonts, formatting information) from printer's memory.

**Solution:**

Press printer's 'Online' button to escape this reset action. Resend the print job.



## Bus timeout NMI at slot x.

### Cause:

EISA error message. An EISA board in computer (in slot x) is incorrectly configured. Possible bad mainboard, but unlikely.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Reseat EISA boards and run EISA configuration utility.





## **Base memory size-nnK; Not a problem, only reporting on memory.**

### **Cause:**

This is NOT an error message. Computer is reporting how much base memory is found for user's information (e.g., Base memory=640K).

### **Solution:**

None required.



## Bad or missing filename; Verify location/path/check spelling of device driver.

### Cause:

This error occurs during bootup. A device driver referenced in CONFIG.SYS cannot be located due to incorrect spelling, incomplete or wrong path, or the driver file is missing.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Verify actual location of driver and then check spelling and path of device driver in CONFIG.SYS. Make necessary corrections and reboot.

- 1) Verify actual location/path of driver using DOS.
- 2) Edit CONFIG.SYS to check spelling and path of device driver. Make necessary corrections.
- 3) Save CONFIG.SYS (if changes were made).
- 4) Press CTRL+ALT+DEL to reboot computer.



## Bad DMA port=xx; Replace motherboard (DMA chip permanently attached).

### Cause:

DMA chip failed POST.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard (DMA chip is permanently attached).

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

- the mainboard jumper.
- c) Label and remove the connector for the external battery pack.
  - d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.
- 5) Remove the old mainboard:
- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.  
*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*
  - b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*
  - c) Place the old mainboard in a protective anti-static envelope for storage or transport.
- 6) Install the new mainboard:
- a) Touch the metal sides of the base unit to ground any static.
  - b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.
  - c) Locate the jumpers or DIP switches on the mainboard.
  - d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:
    - 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
    - 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.
  - e) (Optional) Install BIOS chip.
    - 1] Locate BIOS chip on mainboard.
    - 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.

- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*



- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## Bad or missing keyboard definition file; Copy KEYBOARD.SYS from disk to DOS dir.

### Cause:

Attempting to use KEYB command. DOS could not find KEYBOARD.SYS in path or KEYBOARD.SYS is corrupt.

### Solution:

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

Insert DOS system disk into Drive A and reboot system. Copy KEYBOARD.SYS from diskette onto hard drive.

- 1) Insert DOS system disk into Drive A.
- 2) Press CTRL+ALT+DEL (to reboot computer).
- 3) Type the following command at the DOS prompt:  
DIR C:\DOS (if KEYBOARD.SYS is usually stored in DOS directory).  
OR  
DIR C:(if KEYBOARD.SYS is usually stored in root directory).
- 4) If KEYBOARD.SYS does not appear in the directory listing, copy it from the boot diskette to the hard disk with one of the following commands:  
COPY A:KEYBOARD.SYS C:\DOS (if copying to DOS directory).  
COPY A:KEYBOARD.SYS C:\ (if copying to root).
- 5) Remove DOS boot diskette from Drive A.
- 6) Press CTRL+ALT+DEL to reboot computer.
- 7) Type PATH at the DOS prompt.
- 8) See if the path used in step 3 is contained somewhere in the PATH statement on screen.
- 9) If not, Edit AUTOEXEC.BAT and ADD the following path to the PATH statement:  
PATH=C:\;  
OR  
PATH=C:\DOS; Press CTRL+ALT+DEL to reboot computer (for changes to take effect).





## **Bad call format error.**

**Cause:**

Application program sent a device driver a message with an incorrect header length due to bug in calling application.

**Solution:**

Contact a qualified computer technician or contact the software publisher technical support for assistance.



## **Bad command or filename; Reenter command/path/filename with correct spellings.**

### **Cause:**

Typed/mistyped an incorrect command, batch filename or program; or did not include the correct full path to file.

### **Solution:**

Double-check the spelling of the command and pathname and reenter command/path/filename.



## **Bad partition table; Rerun FDISK and attempt to reformat.**

### **Cause:**

This error occurs only when attempting to format a hard disk. FDISK was run improperly.

### **Solution:**

Rerun FDISK and attempt to reformat.

Try one of the following, in sequence, until problem solved:

- 1) Rerun FDISK and attempt to reformat.
- 2) Retry step 1 several times.
- 3) Replace hard disk (partition table is unreadable).



## Bad or missing command interpreter; Copy COMMAND.COM from disk onto hard drive.

### Cause:

DOS cannot find COMMAND.COM. Perhaps it was erased/deleted, it is not in the current path, or attempting to boot from diskette that does not contain COMMAND.COM.

### Solution:

***WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.*

Insert DOS system disk into Drive A and reboot system. Copy COMMAND.COM from diskette onto hard drive.

- 1) Insert DOS system disk into Drive A.
- 2) Press CTRL+ALT+DEL (to reboot computer).
- 3) Type the following command:  
DIR C:\ (if COMMAND.COM is usually stored in root directory).  
OR  
DIR C:\DOS  
(if COMMAND.COM is usually stored in DOS directory)
- 4) If COMMAND.COM does not appear in the directory listing, copy it from the boot diskette to the hard disk using one of the following commands:  
COPY A:COMMAND.COM C:\ (if copying to root).  
COPY A:COMMAND.COM C:\DOS (if copying to DOS directory).
- 5) Remove DOS boot diskette from Drive A.
- 6) Press CTRL+ALT+DEL to reboot computer.
- 7) Type PATH at the DOS prompt.
- 8) See if the path used in step 3 is contained somewhere in the path statement on screen.
- 9) If not, Edit AUTOEXEC.BAT and ADD the following path to the path statement:  
PATH=C:\;  
OR



PATH=C:\DOS; Press CTRL+ALT+DEL to reboot computer (for changes to take effect).



## **Bad unit error.**

**Cause:**

Device driver received an invalid subunit number due to bug in software program.

**Solution:**

Contact a qualified computer technician or contact the software publisher technical support for assistance.



## **Attempted write-protect violation; Remove write-protection from diskette.**

### **Cause:**

Attempted to format a diskette that is write-protected.

### **Solution:**

Remove the write-protection from the diskette.

- 1) Remove the diskette from the drive.
- 2) If 3.5" diskette, slide the write-protect tab so that it covers the hole.  
OR if 5.25" diskette, remove the write-protect tab from the notch.
- 3) Reinsert the diskette in the drive.
- 4) Reenter the FORMAT command.



## **Allocation error, size adjusted; Check file to make sure data is complete.**

### **Cause:**

CHKDSK found a difference between the physical file size on the disk and the size allocated in the directory. When the physical file is too long, CHKDSK truncates it to match size allocated in directory. When physical file appears to be too short, C

HKDSK changes the directory entry to reflect the physical file size.

*NOTE: This should be a rare occurrence.*

### **Solution:**

No is action required. Check file to make sure data is complete.

*NOTE: For future reference, use a file/disk utility instead of CHKDSK.*



## Available space in extended.

**Cause:**

Attempting to format large hard disk. No room remains in extended partition for more logical drives.

**Solution:**

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Use FDISK to change the size of the extended partition before continuing.



## Address line short; Re-insert the memory chips inside computer.

### Cause:

One or more memory chips are unseated.

### Solution:

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Reseat the memory chips.

Try one of the following, in sequence, until problem solved:

- 1) Reseat memory chips.
- 2) Replace suspect memory chips.
- 3) Replace the mainboard.



## **Access denied; Remove the write protection from the file or diskette.**

### **Cause:**

Attempting to overwrite or delete a protected file, a file in use by another program in Windows or a file on a protected diskette.

### **Solution:**

Remove the protection from the file or diskette.

Do one of the following:

- 1) If file is on a diskette:
  - a) Remove the diskette from the drive.
  - b) If 3.5" diskette, slide the write-protect tab so that it covers the hole.  
OR if 5.25" diskette, remove the write-protect tab from the notch.
  - c) Reinsert the diskette in the drive.
  - d) Reenter the command.
- 2) Check to see if another program has control of the file. If so, close the file in the other application, or close the application, to release the file.
- 3) If diskette is not write-protected and file is not in use by another application, [change the file attributes](#) to permit write access.



## A program was run that took memory that Backup requires; Remove the TSR.

### Cause:

A memory-resident program is installed that uses too much memory. Microsoft Backup needs this memory to run.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Unload the TSR before running Microsoft Backup.

Do one of the following:

- 1) Remove the TSR from memory and run MS Backup.
- 2) Edit AUTOEXEC.BAT.
  - a) Add 'REM' to the start of the line that loads the TSR. This will 'remark out' the line, and DOS will ignore the command.
  - b) Press CTRL+ALT+DEL to reboot the computer.
  - c) Run MS Backup.
  - d) Edit AUTOEXEC.BAT and remove the REM statement to reload the TSR.
  - e) Reboot the computer.





## Bad UMB number; Specify valid memory area in AUTOEXEC.BAT file.

### Cause:

In DOS 6, a LOADHIGH command (in AUTOEXEC.BAT) has an /L parameter pointing to an upper memory block (UMB) that does not exist.

### Solution:

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

Specify a valid memory area in the /L parameter or use MemMaker.

Do one of the following:

- 1) Edit AUTOEXEC.BAT and change the /L parameter to point to a valid upper memory block (UMB) area.
- 2) Use MemMaker to find the correct upper memory block (UMB) area.



## 128K not OK, parity disabled; Replace defective memory chips.

### Cause:

First 128K of RAM failed the POST. Bad memory chip(s) in the first 128K of RAM or bad mainboard.

### Solution:

Test and replace bad memory chips or mainboard.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Technician should do one of the following:

- 1) Remove the first 128K of RAM chips and test them.
- 2) Swap the low and high memory on the mainboard.
- 3) Send the entire base unit to repair shop.
- 4) If all memory chips test OK, replace the mainboard.



## **8042 gate A-20 error; Check keyboard switch to see if set properly.**

### **Cause:**

Error message applies to AT clone only.

A bad keyboard or mainboard is causing the 8042 keyboard controller chip to continually send signals to the processor using address line 20. Processor needs line 20 but the 8042 chip will not quit. Finally, BIOS sends error message.

### **Solution:**

Check the keyboard switch to make sure it is set properly.

Try one of the following, in sequence, until problem solved:

- 1) Check the keyboard switch to make sure it is set properly.
- 2) Try another keyboard.
- 3) Have a qualified computer technician replace the mainboard.



## **8087 NMI at xxxx.xxxx; Enter 'S' to shut off NMI message.**

### **Cause:**

Problem with the 8087 math coprocessor chip causes it to generate a nonmaskable interrupt (NMI) error.

### **Solution:**

To proceed, enter 'S' to shut off NMI message and perform an orderly shutdown of the application.

- 1) Type 'S' to shut off NMI message and proceed.
- 2) Perform an orderly shutdown of the application.
- 3) Contact a qualified computer technician to perform tests on the 8087 math coprocessor and replace if necessary.



## 07 reset.

**Cause:**

The printer's 'Reset' button was pressed. This clears all information (files, fonts, formatting information) from printer's memory.

**Solution:**

Press printer's 'Online' button to escape this reset action. Resend the print job.



## 06 self-test.

**Cause:**

Printer is performing self-test and printing a test sheet.

**Solution:**

Press printer's 'Online' button to stop the self-test.



## 05 self-test.

**Cause:**

Printer is performing self-test and printing a test sheet.

**Solution:**

Press printer's 'Online' button to stop the self-test.



## 04 self-test.

**Cause:**

Printer is performing self-test and printing a test sheet.

**Solution:**

Press printer's 'Online' button to stop the self-test.





## 02 warm up.

**Cause:**

Printer was just turned on and is not ready to print. This message normally occurs each time printer is turned on.

**Solution:**

Wait until printer is warmed up, then print.



**00 ready.**

**Cause:**

The printer is ready to print.

**Solution:**

Use the printer.



## Cache memory test failed; Re-insert cache memory chip and retest.

### Cause:

Cache memory test failed.

### Solution:

Reseat cache memory and retest.

***CAUTION:*** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Reseat cache memory.
- 2) Replace cache memory.



## CMOS shutdown register bad; Replace motherboard inside computer.

### Cause:

Bad CMOS shutdown register.

### Solution:

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Replace mainboard.

Remove cover, remove cards, label and disconnect all wires/cables and P8 & P9 power cables to mainboard, unscrew mainboard and slide it out. Set jumper and DIP switches, install memory, position supports, install mainboard, reinstall wires, cables, cards and power. Power up computer, run setup.

- 1) Run Setup and capture setup information (print or write it down) if computer is operational.
- 2) Remove base unit cover.



Photo: Removing cover

- 3) Remove all expansion cards.
  - a) Carefully disconnect ribbon cables from all expansion cards (e.g., controller card, I/O card) and label the end of each one with masking tape to make reinstallation easier later.
  - b) Make a diagram or note of which expansion cards are in what slots.
  - c) Remove the screws from the top notch of the mounting bracket of each expansion card.
  - d) Touch the metal sides of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily). Repeat this step for each expansion card.
  - e) Place the cards on a static-free flat surface out of the way.
- 4) Label and remove all wires connected to mainboard: (Remember to discharge static first!)
  - a) Label each wire leading from the mainboard to switches and LEDs on the case (e.g., power light, hard disk drive light, reset button). Use a small piece of masking tape on the wire near the mainboard connection. (This will facilitate reconnection on the new mainboard.)
  - b) Remove all mainboard switch and LED wires by grasping the connector and gently pulling them off

the mainboard jumper.

- c) Label and remove the connector for the external battery pack.
- d) Label and remove the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Remove P8 & P9 power connectors

- e) Check for and label and remove any other cables connected to mainboard.

5) Remove the old mainboard:

- a) Locate and remove the mounting screws (often 2) that secure the mainboard to the base unit case.

*NOTE: In some smaller cases, the power supply, floppy disk drive or hard disk drive may have to be removed to gain access to these mounting screws.*

- b) Gently slide the mainboard out of the base unit in the direction it moves freely. Hold it up slightly while sliding it out to release it from mounting spacers. This may require wiggling or angling the mainboard to completely free it from the base unit. *(NOTE: Take note of how the mainboard is oriented in the case.)*

- c) Place the old mainboard in a protective anti-static envelope for storage or transport.

6) Install the new mainboard:

- a) Touch the metal sides of the base unit to ground any static.

- b) Remove the mainboard from its box and from the protective anti-static envelope and lay it down on a table.

- c) Locate the jumpers or DIP switches on the mainboard.

- d) Read the mainboard owner manual and identify which, if any, settings need to be changed on the mainboard for this particular computer configuration. Required switches and jumpers vary with mainboard design, making it a good idea to review each one before installing the mainboard. Check these items:

- 1] If the CPU and additional memory is already installed on the new mainboard, no changes may be required.
- 2] Move Jumpers if necessary.



Photo: Moving jumpers

- 3] Change DIP Switches if necessary.



Photo: DIP Switches

- 4] CPU speed and presence of any supplemental chips.
- 5] Type of memory chips and amount of RAM installed (or to be installed) on board.
- 6] Parallel and/or serial ports.
- 7] Graphics adapter.

- e) (Optional) Install BIOS chip.

- 1] Locate BIOS chip on mainboard.
- 2] Touch metal sides of the base unit to ground any static electricity, and remove the old BIOS chip

with a chip puller. Grasp the edges firmly between the tips of the tweezers and pull straight up (rocking gently back and forth if necessary).

- 3] Install new BIOS chip by aligning its pins with socket and pressing down firmly until seated.

*(CAUTION: Be careful not to bend or damage delicate pins on BIOS chip.)*

- f) (Optional) Install CPU chip.

- 1] Identify the type of CPU socket used on mainboard.

- a] Standard straight-push socket. The chip is removed using a special tool and a new one is seated by pressure.
- b] Zero Insertion Force (ZIF) sockets. The chip is held in place by a hinged arm that when released, allows the CPU chip to be removed easily with fingers.



Photo: ZIF CPU socket

- 2] Insert the new CPU chip. Do one of the following:

- a] Standard straight-push socket.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.
- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this renders the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).

- 6} Set the pin into place, and stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

*CAUTION: If any pin is out of alignment, the pressure applied during the next step will damage the pin and render the chip unusable.*

- 7} Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the CPU chip until the chip is fully seated.



Photo: Pressing processor into

place

*WARNING: If any resistance is felt, STOP immediately. Recheck the alignment of each pin and hole, and then repeat the operation.*

- b] Zero Insertion Force (ZIF) sockets.

- 1} Touch the metal sides of the base unit to ground any static.
- 2} Remove the CPU chip from its protective anti-static envelope.

- 3} Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
- 4} Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5} Center the chip over the socket (there may be more holes than pins).
- 6} Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.
- 7} Gently slide the CPU chip into place.

**CAUTION:** *Do not force the chip into the socket. If any force is necessary, either one or more pins are bent, or the socket lever is not completely open.*

- 8} Close and secure the lever.
- g) (Optional) Install math coprocessor. Insert the new coprocessor chip into the standard straight-push socket:
- 1] Touch the metal sides of the base unit to ground any static.
  - 2] Remove the coprocessor chip from its protective anti-static envelope.
  - 3] Inspect the pins on the chip to make sure they are properly aligned and straight. If a pin is bent, it may splay out when inserted and the chip will not work. No pins should be bent or missing: this makes the chip unusable.
  - 4] Orient the chip by either lining up the cut-off corner or the little dot, with the corresponding side of the socket (pin 1). Refer to instruction manual for specifics.



Photo: Orient new processor chip

- 5] Center the chip over the socket (there may be more holes than pins).
- 6] Set the pins into place. Stop and examine the pins on all sides to make sure they are properly aligned with their respective holes.

**CAUTION:** *If any pin is out of alignment, the pressure applied during the next step will damage the pin and make the chip unusable.*

- 7] Using a thumb and finger from each hand, apply steady, even downward pressure on each corner of the coprocessor chip until the chip is fully seated.



Photo: Pressing processor into place

**WARNING:** *If there is any resistance, STOP IMMEDIATELY. Recheck the alignment of each pin and hole; then repeat operation.*

- h) Determine whether to install any additional cache or RAM memory. Read owner's manual and inspect mainboard to determine what type of memory chips or modules are required. Determine/verify the following items:
- 1] Type of memory required (e.g., DRAM, SIMMs, SIPP).
  - 2] Amount of memory desired/required. (Sometimes memory must be added in certain increments to

fill an entire memory bank (e.g., 1MB, 2MB, 4MB or 8MB)).

**3]** Speed of new memory matches that already installed.

**i)** (Optional) Install any additional cache or RAM memory. Do one of the following:

**1]** Install new SIMM(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIMM module from the protective anti-static envelope.

*NOTE: The bottom edge has a row of gold or silver metal connectors that will seat into the socket. Along that bottom edge is a cutout that will only fit one way in the socket.*

**c]** Identify the bank and row to install SIMM. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Grasp SIMM with thumb and two fingers by top edge, and insert it into SIMM slot at an angle.

**e]** Press down, applying even pressure across the chip, and rock it back into place towards the back of the socket. *(NOTE: The metal or plastic latches or clips on both sides of the socket will fit into the hole on either end of the SIMM to hold it in place. Listen for a 'click' as the springs engage. This may require manual manipulation.)*

**CAUTION:** *Never force a SIMM into the slot. Both the SIMM and its slot may be damaged.*

**f]** Repeat steps 3)a)-3)e) to install additional SIMMs.

**g]** Make sure all SIMMs are at the same height and angle to the board.

**2]** Install new SIPP(s):

**a]** Touch the metal sides of the base unit to discharge any static electricity.

**b]** Remove a SIPP module from the protective anti-static envelope.

*NOTE: One edge has a row of pins that will seat into the memory socket.*

**c]** Identify the bank and row to install SIPP. It should be the lowest numbered row and bank available. (Refer to labels on mainboard or diagram in owner's manual)

**d]** Align pin 1 on the SIPP with the pin 1 hole on the mainboard.

**e]** Grasp the SIPP using a finger and thumb of each hand on either end of the SIPP, and gently press it down into the memory socket.

**CAUTION:** *Never force a SIPP into the slot. Both the SIPP and its slot may be damaged.*

**f]** Repeat steps 2)a]-2)e] (immediately above) to install additional SIPPs.

**g]** Make sure all SIPPs are at the same height and perpendicular to the board.

**3]** Install new DRAM(s):

**a]** Locate the appropriate chip socket on the mainboard.

**b]** Touch metal sides of the base unit to discharge static electricity.

**c]** Install new DRAM chip by aligning its pins with socket, and pressing down firmly until seated.

**CAUTION:** *Be careful not to bend or damage delicate pins on DRAM chip, or damage chip socket on board.*

**d]** Repeat steps 4a-4c to install additional DRAMs.

**e]** Make sure all DRAMs are level and completely seated by pressing down firmly on each chip again.



- f] Check owner's manual to determine if any jumpers or DIP switches on mainboard must be changed so that computer will recognize the added memory.
  - g] Locate and position mounting screws and support spacers:
  - h] Locate holes in mainboard for mounting screws, and position mounting posts in matching locations in the metal sides of the base unit.  
*NOTE: The holes in the mainboard with gold or silver rings (solder) around them are for the mounting screws.*
  - i] Locate holes in mainboard for Teflon support spacers, and position or install them in matching locations in the metal sides of the base unit.
  - j] Touch the metal sides of the base unit to ground any static, and slide the mainboard into the base unit.  
*NOTE: If this is a tower case, it will be easier to lay the tower on its side so that the mainboard will lay on the 'bottom' of the case.*
  - k] Secure mainboard in place by placing screws in the mounting posts and tightening them.
- 7) Reconnect all wires and cables to mainboard: (**CAUTION: Remember to discharge static first!**)
- a) Consult the new mainboard manual, and reconnect all wires to switches and LEDs on the case to appropriate jumpers on the mainboard. *NOTE: Each mainboard has these jumpers in different locations, and often uses different colored wires. Use the tape labels applied earlier along with diagrams in the new mainboard manual.*
  - b) Reconnect the wire lead to the external battery pack, to the designated mainboard jumper.
  - c) Reconnect the P8 and P9 power connectors leading from the power supply to the mainboard.



Photo: Reconnect P8 & P9 power connectors

- WARNING:** Make sure the P8 and P9 power connectors are properly installed and secure. If not, the mainboard may be damaged when the power is turned on.
- d) Reconnect any other cables to be connected to mainboard.
- 8) Reinstall all expansion cards.
- a) Touch the metal sides of the base unit to ground any static and, grasping the expansion card by its edges, insert the bottom of the card (part with the gold-striped bars) into the proper slot. Press down firmly until card is completely seated (especially if it is an EISA card). Avoid side-to-side movements when positioning the card (circuit boards crack easily). Repeat this step for each additional expansion card.
  - b) Insert the screws, previously removed from the rear metal slots on each expansion card, into the top notch of the mounting bracket on each card and the screw hole, and tighten it securely. Repeat for each expansion card.
  - c) Carefully reconnect ribbon cables from devices to appropriate expansion cards (e.g., controller card, I/O card). Place the colored (red or blue) side of the cable on pin 1.
- 9) Test new configuration:
- a) Make sure no parts or tools remain in metal sides of the base unit.
  - b) Replace necessary cables (power, keyboard, video) and plug in power cable.
  - c) Power up computer and related peripherals one at a time.
  - d) Run Setup and enter all information. *NOTE: This version of Setup may differ from the one previously used on this computer because of different or updated BIOS on the new mainboard.*

- e) Run several programs, and access each disk drive and other installed and attached devices (watch lights and LEDs) to make sure everything is operational.
- 10) If unable to access drive(s), turn computer off and disconnect power cables.
- a) Reseat offending expansion card(s).
  - b) Recheck all ribbon and power cable connections to both the controller card and disk drives.
  - c) If setup information is lost, check connection of battery pack to mainboard. (Also, batteries may need to be replaced.)
  - d) Reconnect the power, reboot and retest.
- 11) If still unable to access one or more drives but computer seems to operate OK, run [Setup](#) and check setup and drive type for faulty drives. Make changes, if necessary, and reboot computer.
- 12) If message appears about interrupt (IRQ) conflicts during use, or another device fails (e.g., the mouse):
- a) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. Type the following command at DOS prompt and press 'ENTER':  
C:\DOS\MSD
  - b) Identify interrupt (IRQ) assignments using the IRQ Status screen.



[MSD IRQ Status example](#)

*CAUTION: Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

- c) See [IRQ Conflicts](#) for advice on resolving conflicts.
- 13) [Replace base unit cover.](#)



[Photo: Replacing cover](#)

- 14) Create/update a System Rescue Diskette that includes copies of necessary drivers and the following system-specific files:

DOS/Windows: AUTOEXEC.BAT, CONFIG.SYS, Windows .INI and .GRP files.

OS/2: OS2.INI, OS2SYS.INI, AUOTEXEC.BAT (for DOS sessions), CONFIG.SYS (OS/2 version),  
STARTUP.CMD





## **ROM BIOS chip bad; Replace ROM BIOS chip inside computer.**

### **Cause:**

Bad ROM BIOS chip.

### **Solution:**

Replace ROM BIOS chip.

***CAUTION:*** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.



## Video card or video card memory bad or missing; Install or replace video card.

### Cause:

Missing or bad video card, or bad video card memory.

### Solution:

Install or replace video card.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Do one of the following:

- 1) Install missing video card.
- 2) Replace bad memory on existing video card.



## 7 beeps processor exception.

### Cause:

Dead CPU chip or bad memory or bad mainboard.

### Solution:

Reseat loose memory chips and retest.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Reseat the memory chips.
- 2) Replace CPU chip if possible and cost efficient  
*(NOTE: Make sure same model and speed).*
- 3) Replace mainboard.



## **Bad keyboard or motherboard; Re-insert loose keyboard controller chip & retest.**

### **Cause:**

Gate A20 Failure due to bad keyboard or bad mainboard.

### **Solution:**

Reseat loose keyboard controller chip and retest.

***CAUTION:*** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Reseat loose keyboard controller chip.
- 2) Replace keyboard controller.
- 3) Try a different keyboard.
- 4) Replace keyboard fuse (if present).
- 5) Replace mainboard.



## **Bad or dead CPU/memory chip, motherboard; Re-insert loose memory chips & retest.**

### **Cause:**

Processor error due to bad CPU chip, bad memory or bad mainboard.

### **Solution:**

Reseat loose memory chips and retest.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Reseat the memory chips or SIMMs .
- 2) Replace CPU chip if possible and cost efficient  
*(NOTE: Make sure same model and speed).*
- 3) Replace mainboard.





## Timer failure; Re-insert loose memory chips and retest.

### Cause:

Timer failure caused by either a memory failure in first 64K RAM or by a bad timer.

### Solution:

Reseat loose memory chips and retest.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Reseat the memory chips.
- 2) Test for faulty mainboard by temporarily replacing all memory with a good set (e.g., from another PC that is working properly).
  - a) 286-based two rows of chips (16 bits not counting parity).
  - b) 386/486-based four rows of chips (32 bits not counting parity).

*NOTE: A 386SX, a 486SLC, or a 486SLC2 should also have two rows of chips (16 bits).*
  - c) Pentium-based eight rows of chips (64 bits not counting parity)
- 3) If memory not faulty, replace mainboard (timer chip bad).



## 3 beeps base 64k memory fail.

### Cause:

There is a loose or bad memory chip(s) in first 64K RAM or mainboard is bad. The most likely cause is a loose memory chip. A loose or bad memory chip in this section of RAM is critical. The computer will not operate with a loose or bad memory chip

/SIMM in this section.

### Solution:

Reseat the memory chips or SIMMs.

***CAUTION:** The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Reseat the memory chips or SIMMs.
- 2) Try switching a SIMM or bank of chips (because the faulty chip/SIMM in bank is unknown) from a non-critical section of memory to replace the suspected bad chip/SIMM. Do one of the following:
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips from a non-critical section of memory (upper memory) with the SIMM/bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

***NOTE:** Your computer should function with reduced memory until replacements are needed.*

- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Loose or bad memory chip; Re-insert the memory chips or SIMMs.

### Cause:

There is a loose or bad memory chip(s) in first 64K RAM or mainboard is bad. The most likely cause is a loose memory chip. A loose or bad memory chip in this section of RAM is critical. The computer will not operate with a loose or bad memory chip/

SIMM in this section.

### Solution:

Reseat the memory chips or SIMMs.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Reseat the memory chips or SIMMs.
- 2) Try switching a SIMM or bank of chips (because the faulty chip/SIMM in bank is unknown) from a non-critical section of memory to replace the suspected bad chip/SIMM. Do one of the following:
  - a) Switch the faulty SIMM or bank of chips with new ones (if available).
  - b) If extra SIMMs or chips are not available, try switching a SIMM or bank of chips from a non-critical section of memory (upper memory) with the SIMM/bank of chips in the bad bank (lower memory). Do one of the following, depending on the type of memory used in the computer:
    - 1] Memory chips. Switch the first bank of memory chips with a bank of memory chips from upper memory.
    - 2] SIMMs. Switch the lower memory SIMM with a higher memory SIMM from another bank.
- 3) Remove all tools and items from inside the base unit. Reconnect all cables and power up computer system.
- 4) If computer seems to work properly after switching SIMMs/banks of chips, the SIMM/bank of chips is bad, and should be replaced as soon as possible.

**NOTE:** *Your computer should function with reduced memory until replacements are needed.*

- 5) If computer still fails to work, have all the memory SIMMs/chips in computer tested with a memory tester. If the chips are good, the mainboard is bad and should be replaced.





## Refresh failure; Re-insert memory chips/SIMMs and retest computer.

### Cause:

Refresh failure could be due to (1) Bad memory chips, (2) Bad Direct Memory Access (DMA) chip, or (3) Bad memory addressing chips on mainboard.

### Solution:

Reseat memory chips/SIMMs and retest computer.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

Try one of the following, in sequence, until problem solved:

- 1) Reseat memory:
  - a) Turn off computer.
  - b) Reseat memory chips or SIMMs.
  - c) Turn computer on and retest.
- 2) Replace mainboard (since DMA chip and memory addressing chips are soldered to mainboard).



## Computer virus; Save all open files, close all programs, remove virus.

### Solution:

Save any open files, close all open applications and turn computer off immediately!

Arrange for local qualified computer technicians to diagnose and eradicate virus(es) as soon as possible using the most recent versions of special virus detection and cleanup programs.

**CAUTION:** *Computer viruses are extremely dangerous. Your data may be in danger of being corrupted or lost.*

1) Perform immediate shutdown:

- a) Save any open files.
- b) Close all open applications.
- c) Turn the computer off.
- d) Identify and isolate all diskettes that have been used in this computer within the last month (to be scanned and, if necessary, disinfected).

**CAUTION:** *Viruses should be diagnosed and repaired by qualified computer technicians using updated virus detection and cleanup software, as follows:*

2) Detect and eradicate virus(es).

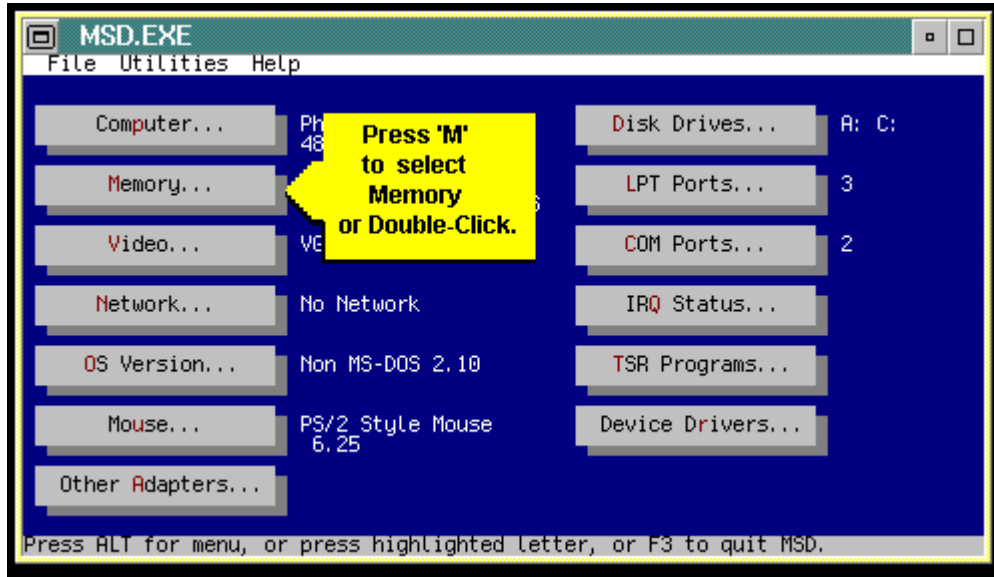
- a) Insert a bootable, write-protected diskette in the bootable floppy drive (usually drive A), and turn on the computer.
- b) After boot, insert a write-protected diskette that contains a virus detection program in the floppy drive.
- c) Scan all memory and connected drives for viruses (i.e., all hard disks, all network drives, all backups and every floppy diskette in the vicinity).
- d) Delete all infected files through detection/disk clean virus program.
- e) If virus has infected the boot sector of hard disk, the following command may be useful. Type it at the DOS prompt:  
FDISK /MBR  
(The /MBR switch rebuilds the Master Boot Record on the disk.)
- f) Coldboot the computer (Turn computer off, wait 15 seconds, and turn it back on again) to remove any lingering viruses from memory.
- g) Scan all memory and connected drives for viruses again, using most thorough scan pattern (some detectors miss viruses on first pass). Use another virus detection program if available (to be absolutely sure all remnants are gone).

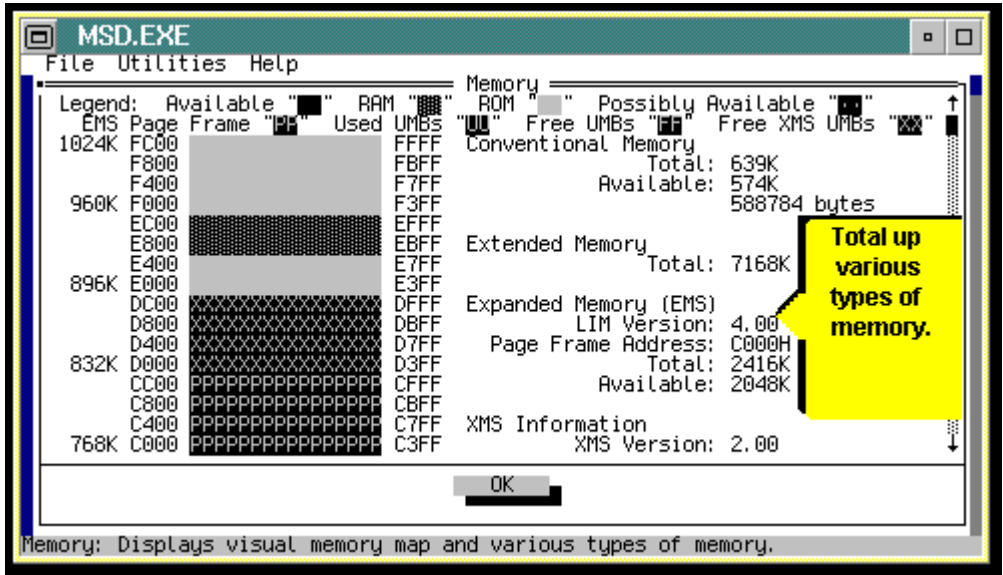
- 3) Check surrounding area and notify appropriate parties:
- a) Scan all nearby PCs and floppy diskettes for viruses (reinfection of disinfected computer from other previously infected diskettes commonly occurs).
  - b) Notify diskette/transmission providers and receivers. Make sure the owner of the source diskette knows of the infection.
  - c) Report details of virus (which virus, number of machines affected, suspected damage sustained, and results of cleanup operations) to designated company authority .
- 4) Call for expert help from virus software and / or 3rd party providers if required .

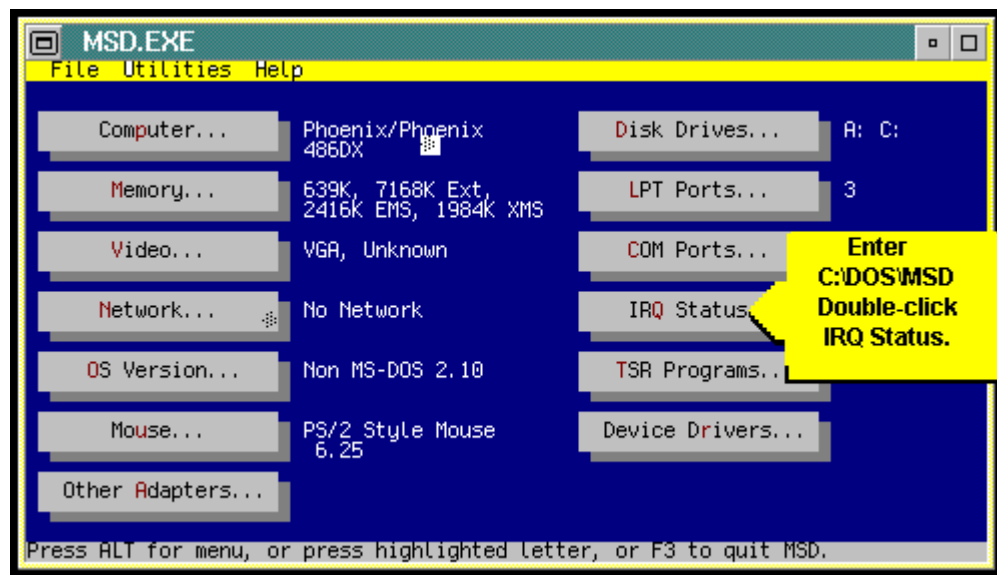
*NOTE: For future reference, consider installing a memory resident anti - virus monitor that runs all the time to detect and report suspicious program behavior as soon as it occurs .*

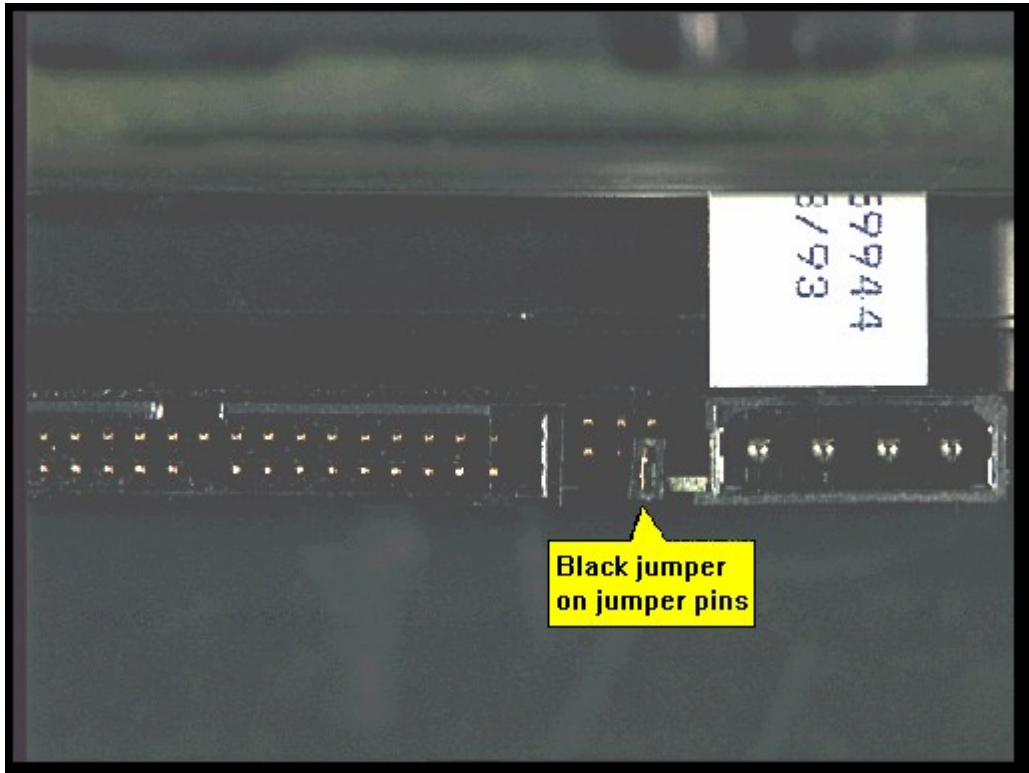


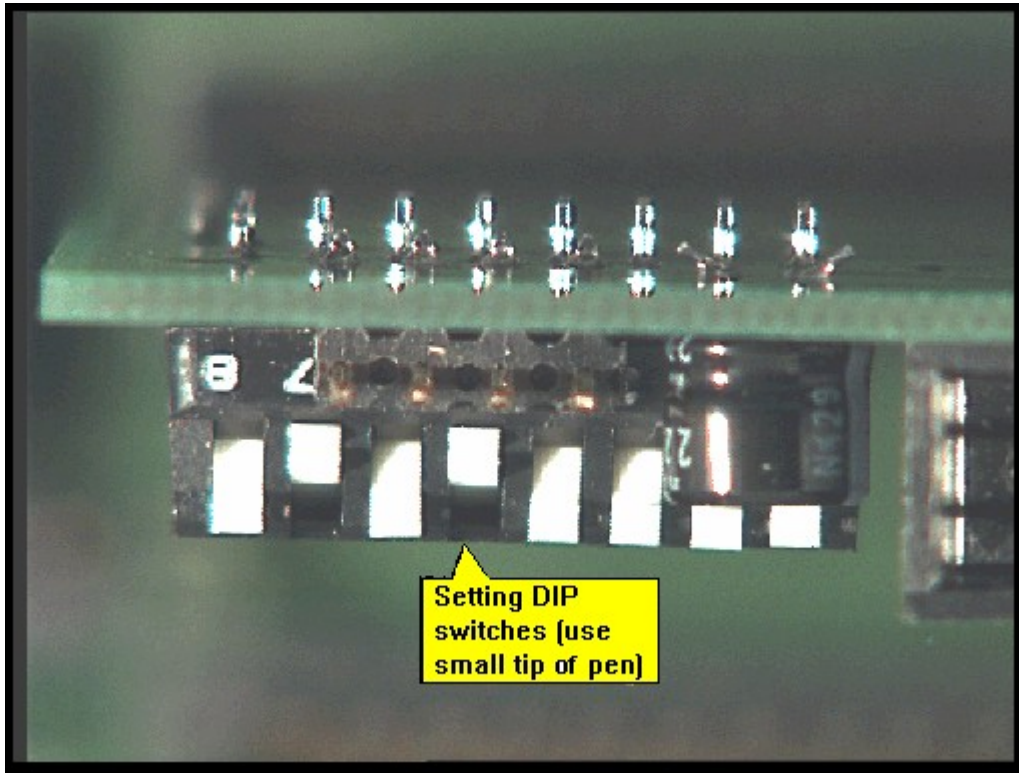












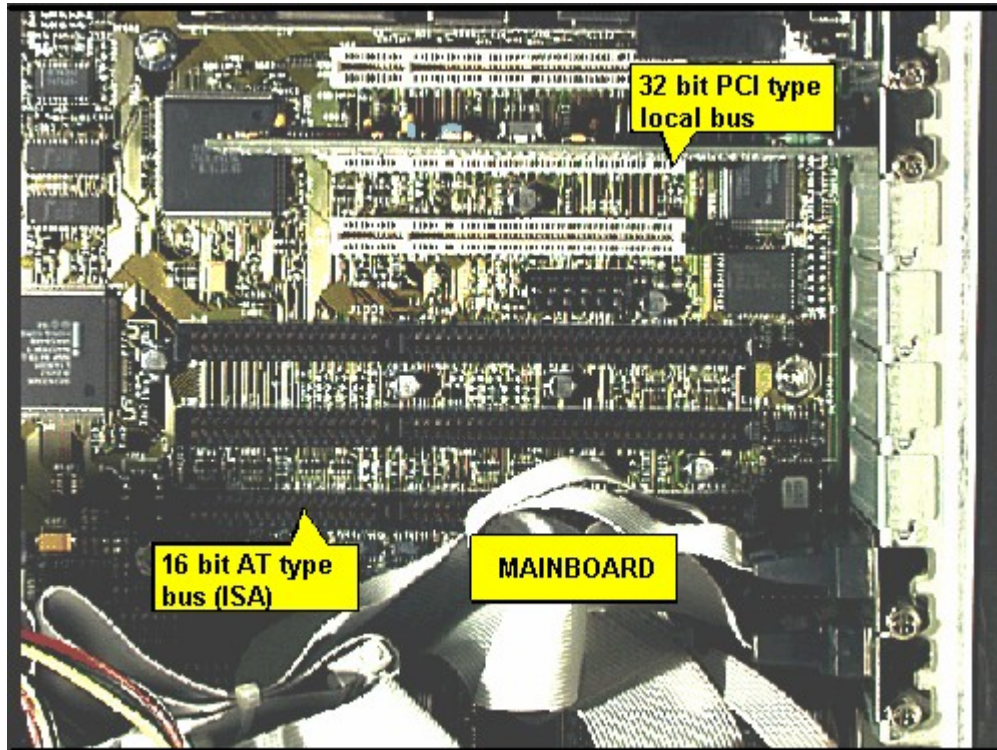
***CyberMedia***<sup>®</sup>

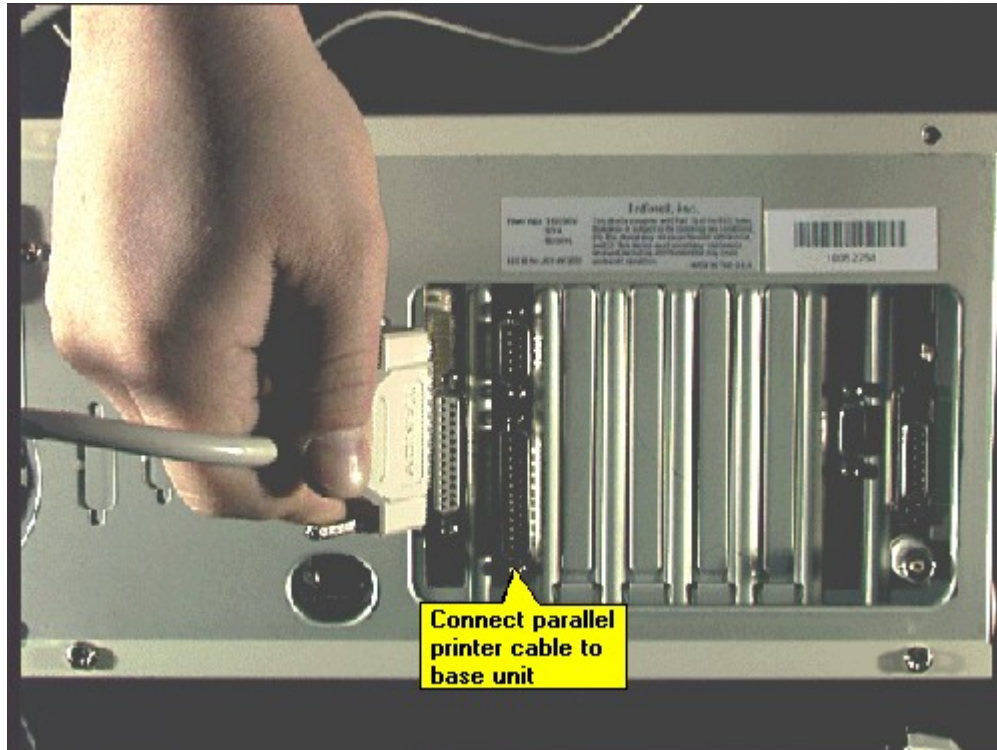
16-bit adapter  
card

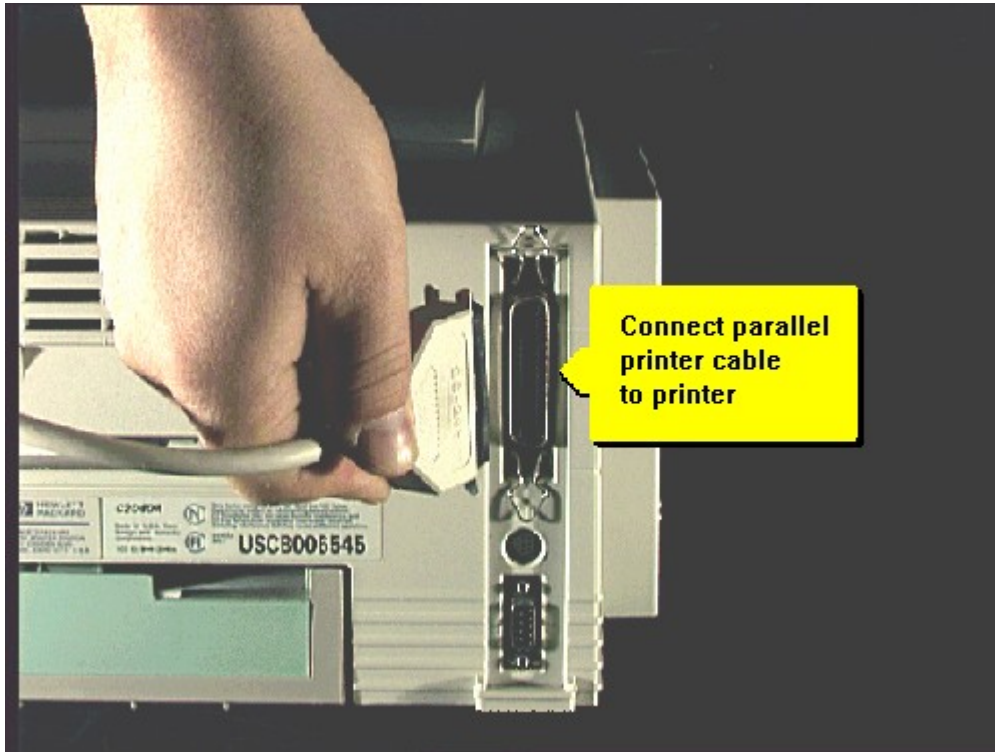


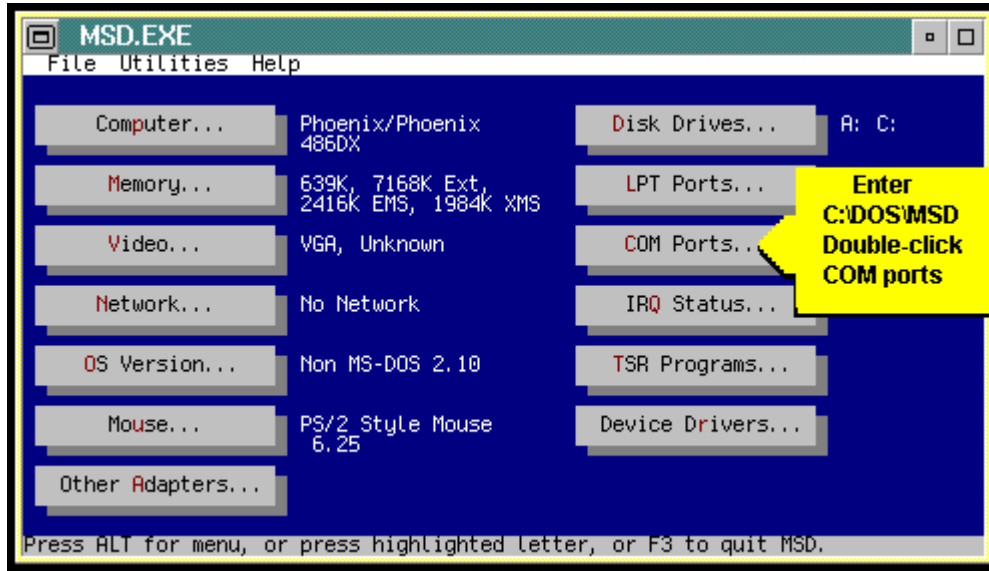
Note notch in  
connector tab

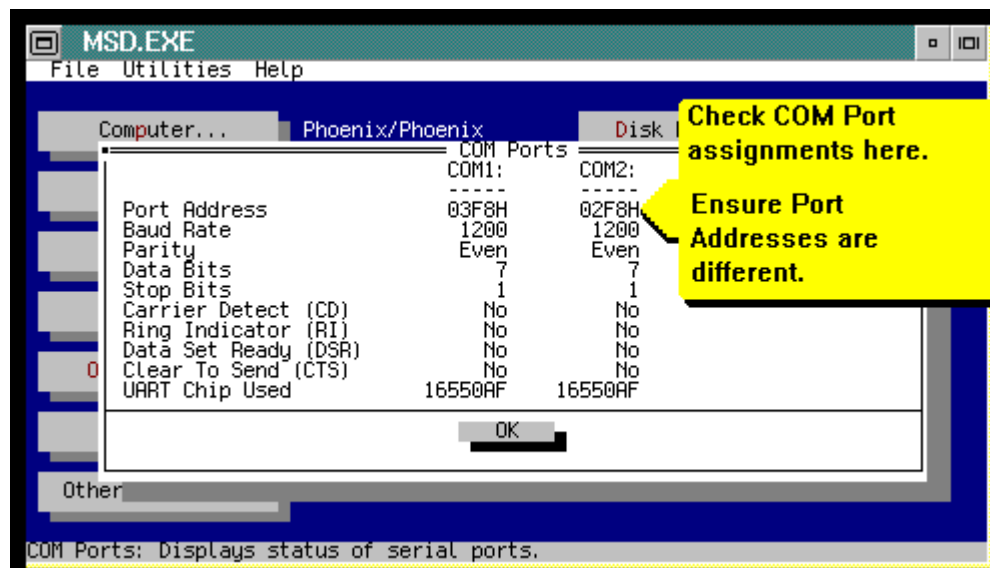


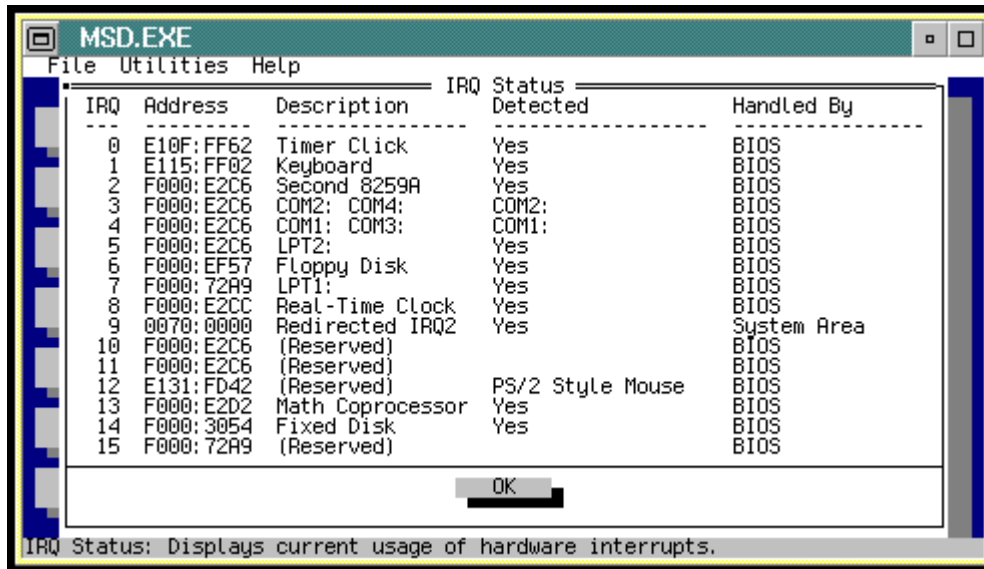


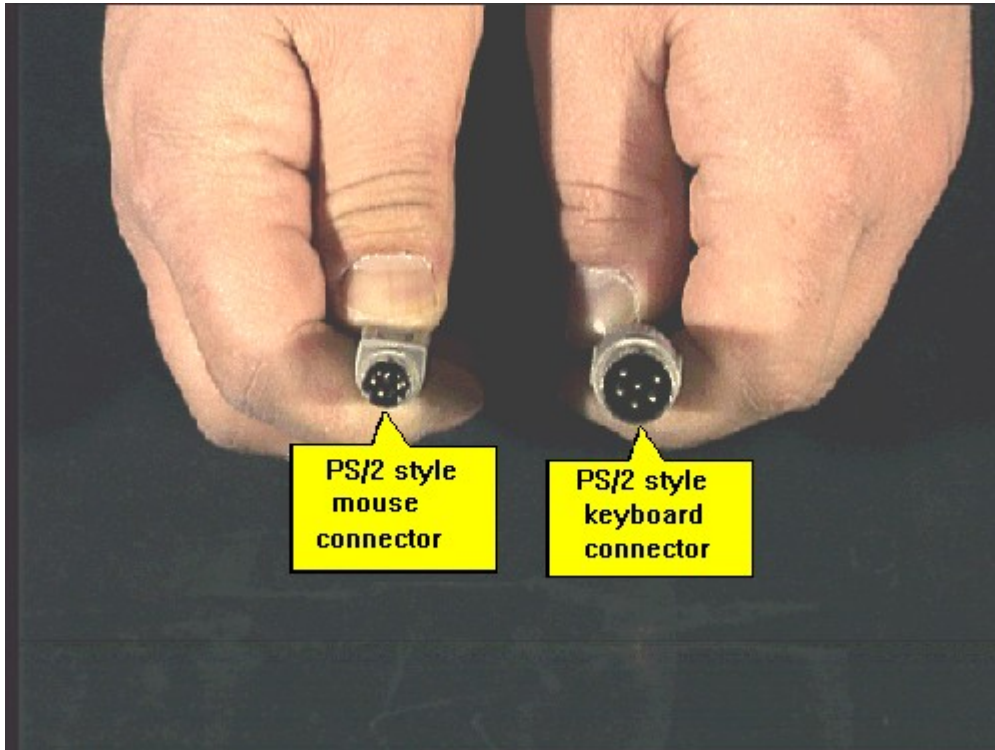






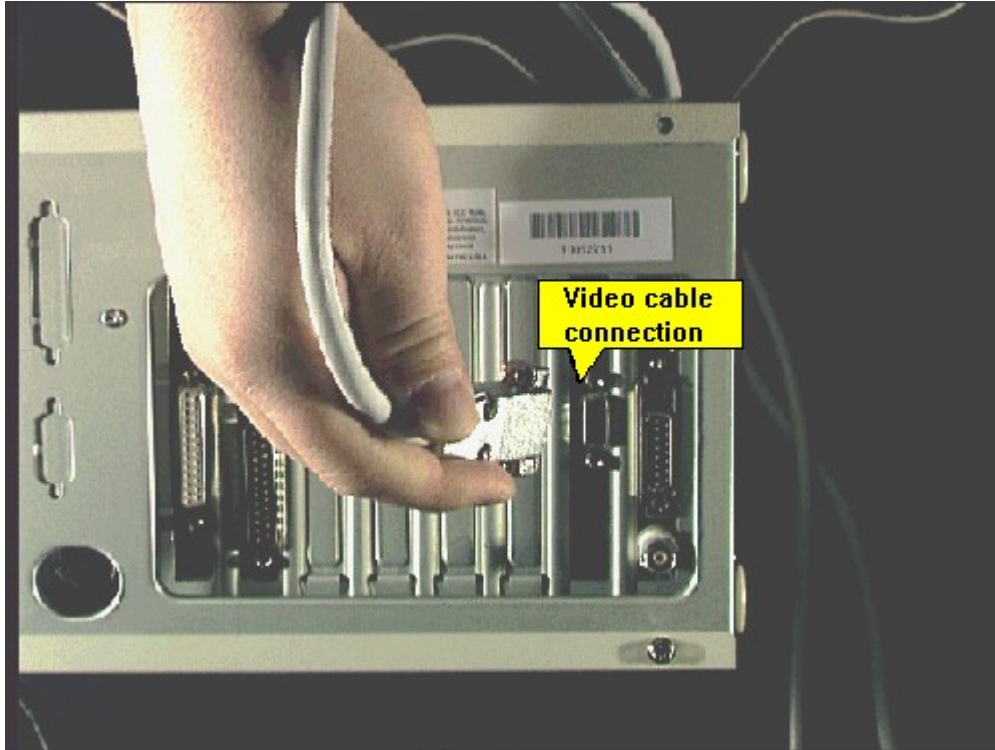






PS/2 style  
mouse  
connector

PS/2 style  
keyboard  
connector





### Specify Function and Workspace

SELECT sets up your computer to run DOS and your programs most efficiently based on the option you choose.

Note: You can review the results of your choice later in this program.

Choose an option:

1. Minimum DOS function; maximum program workspace
2. Balance DOS function with program workspace
3. Maximum DOS function; minimum program workspace

Each option sets up a specific configuration.

Enter

Esc=Cancel

F1=Help

## Microsoft MemMaker

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There are two ways to run MemMaker:

Express Setup optimizes your computer's memory automatically.

Custom Setup gives you more control over the changes that MemMaker makes to your system files. Choose Custom Setup if you are an experienced user.

Use Express or Custom Setup? **Custom Setup**

Choose the  
Custom Setup  
option.

ENTER=Accept Selection   SPACEBAR=Change Selection   F1=Help   F3=Exit

## Microsoft MemMaker

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### Advanced Options

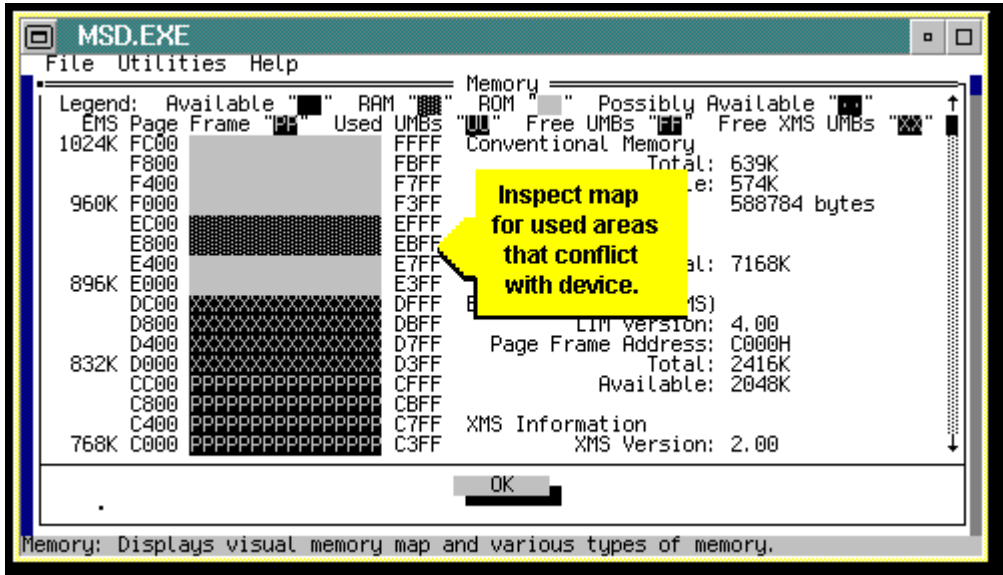
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Specify which drivers and TSRs to include in optimization?	No
Scan the upper memory area aggressively?	No
Optimize upper memory for use with Windows?	No
Use monochrome region (B000-B7FF) for running programs?	No
Keep current EMM386 memory exclusions and inclusions?	Yes
Move Extended BIOS Data Area from conventional to upper memory?	No

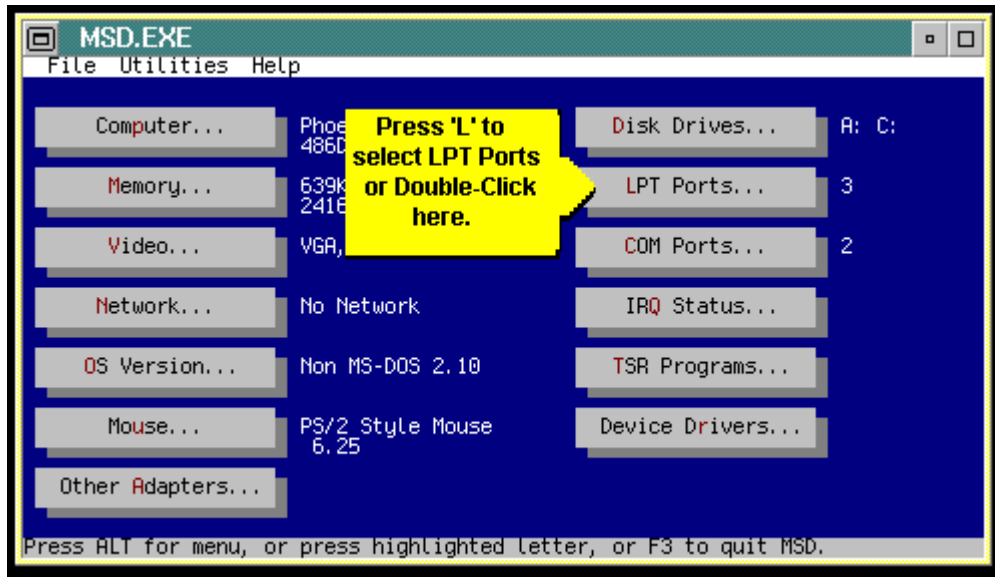
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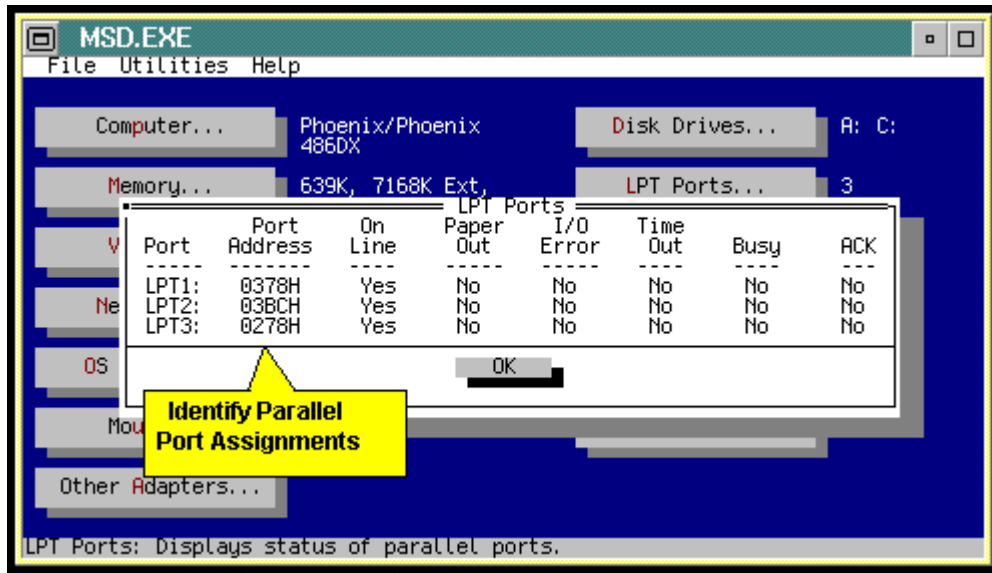
To select a different option, press the UP ARROW or DOWN ARROW key.  
To accept all the settings and continue, press ENTER.

ENTER=Accept All   SPACEBAR=Change Selection   F1=Help   F3=Exit



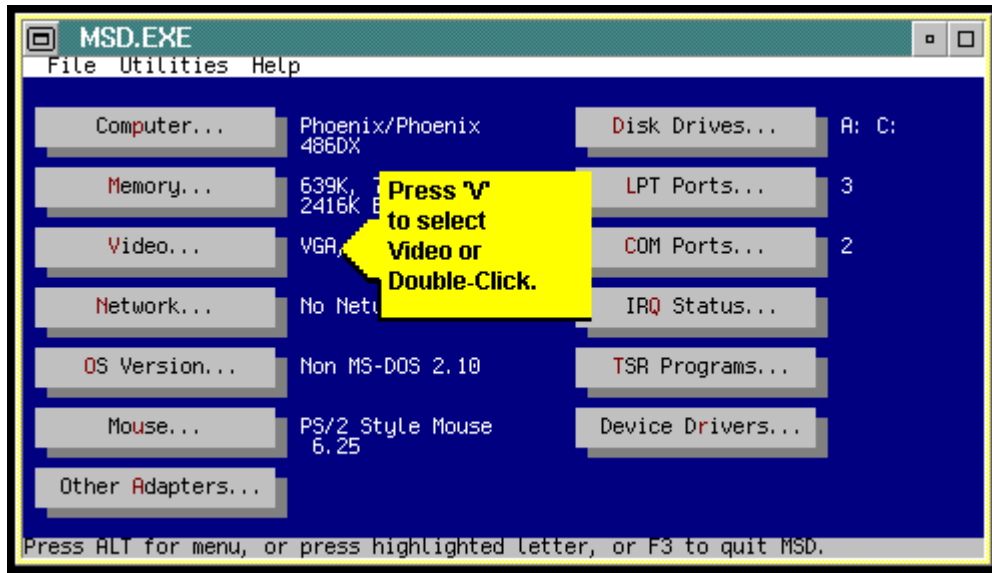
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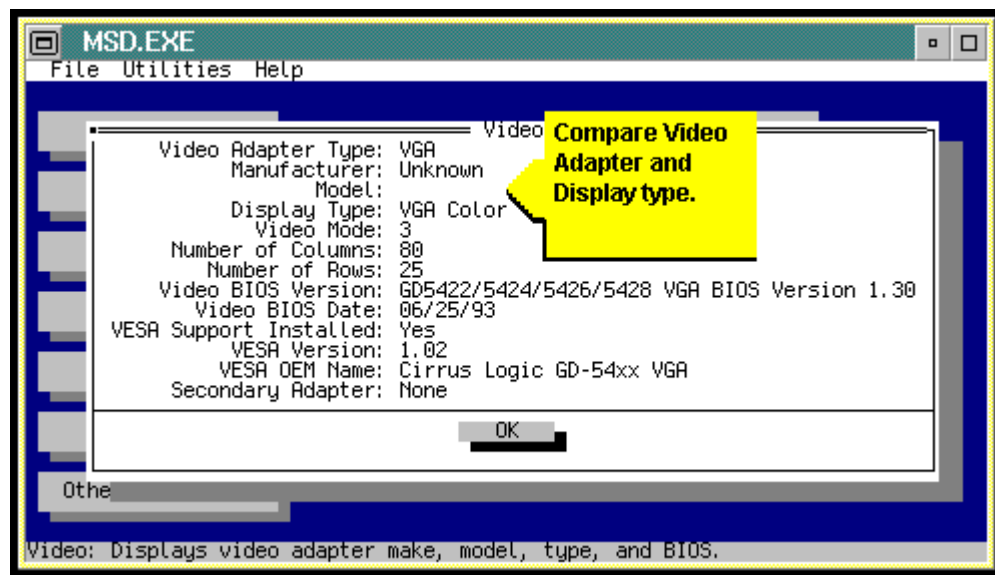


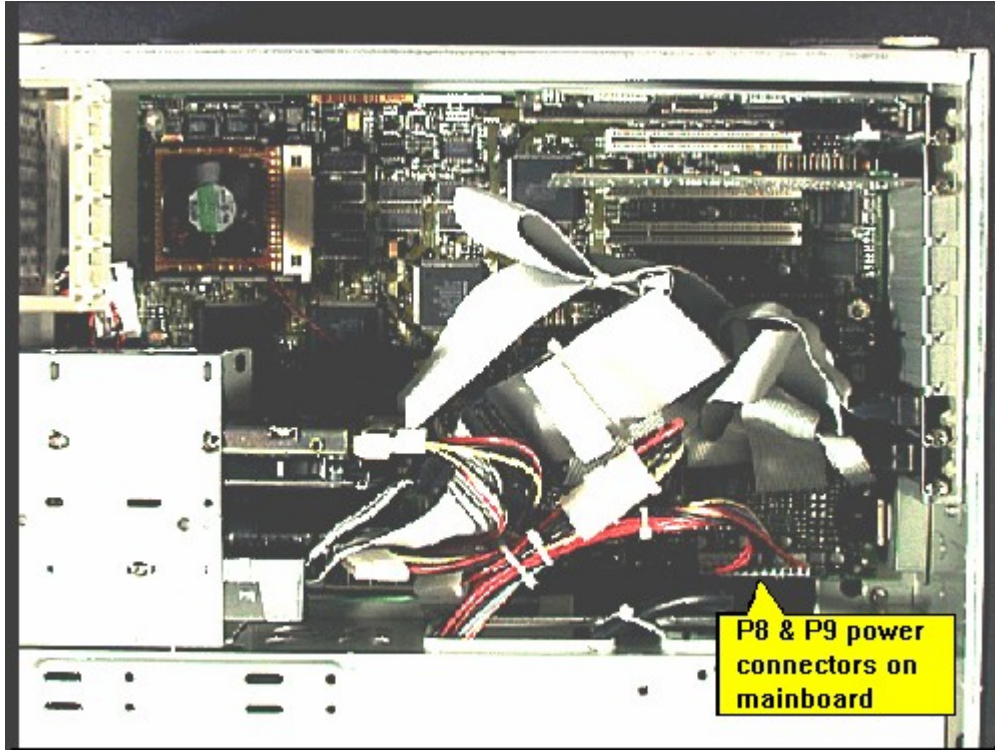


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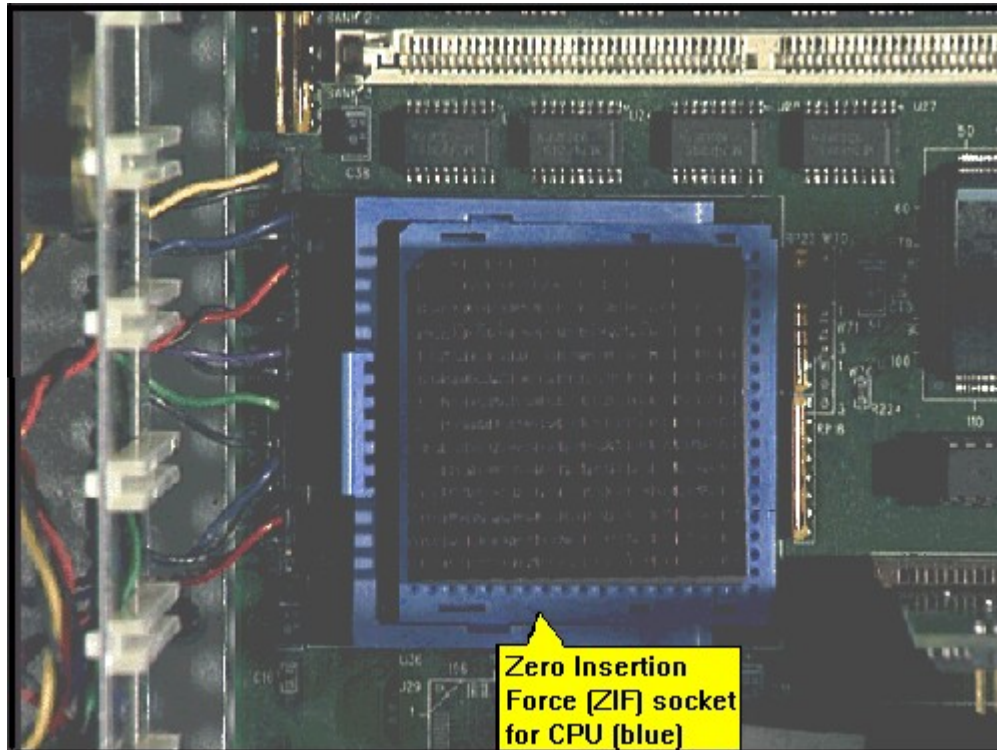


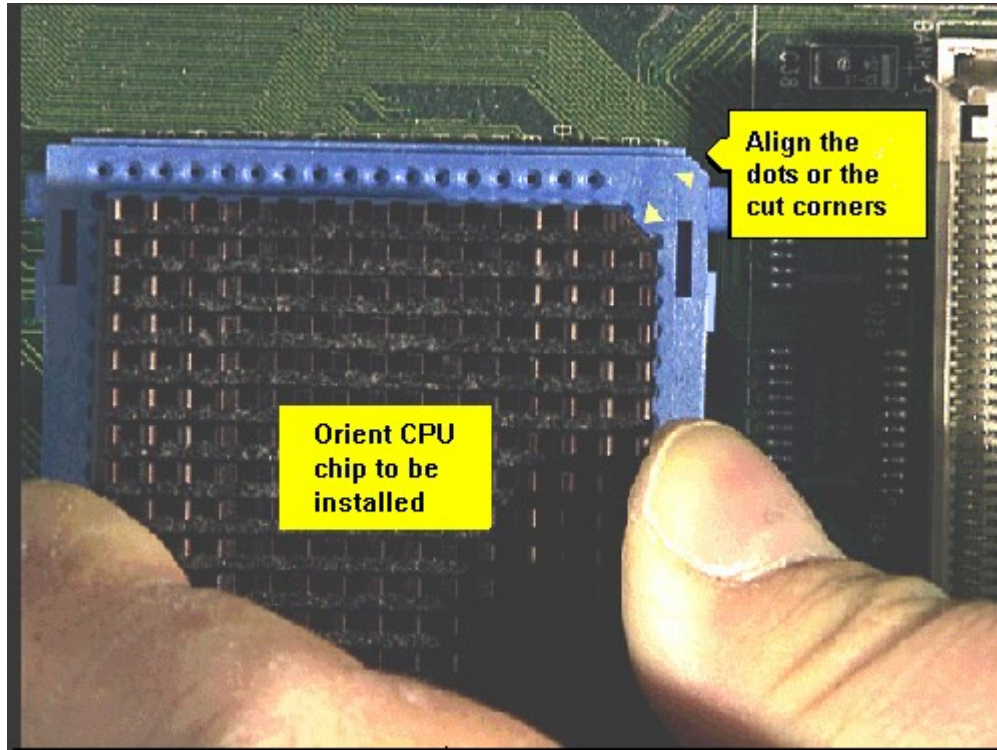


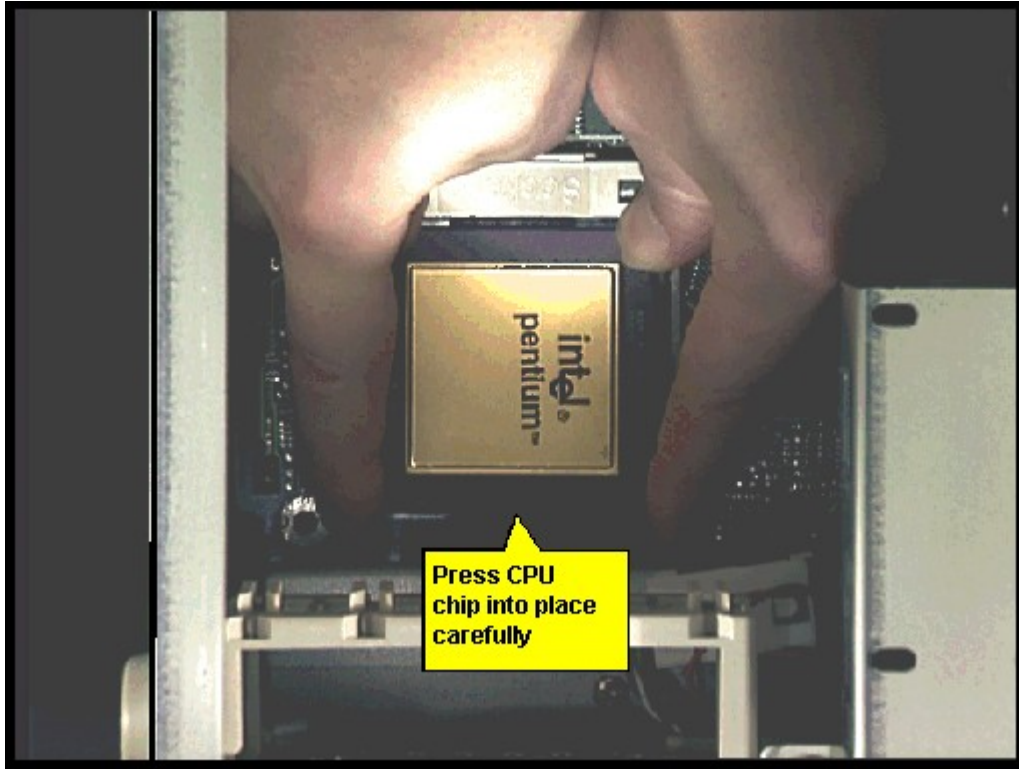


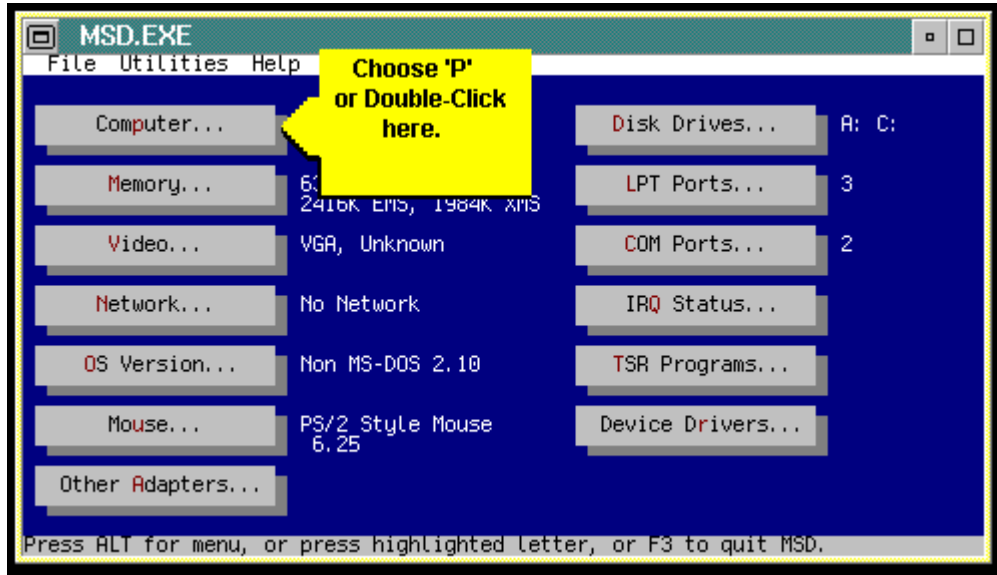


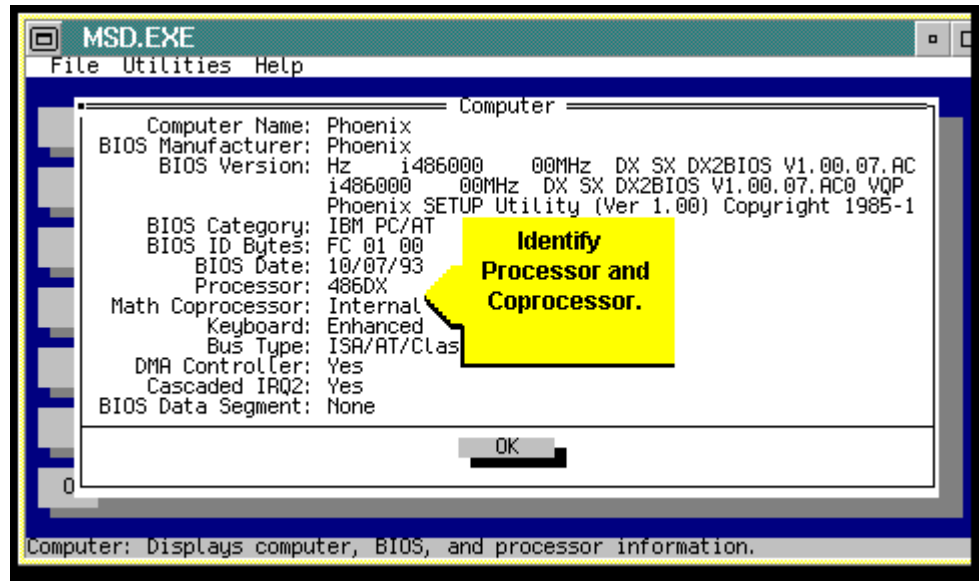
P8 & P9 power  
connectors on  
mainboard



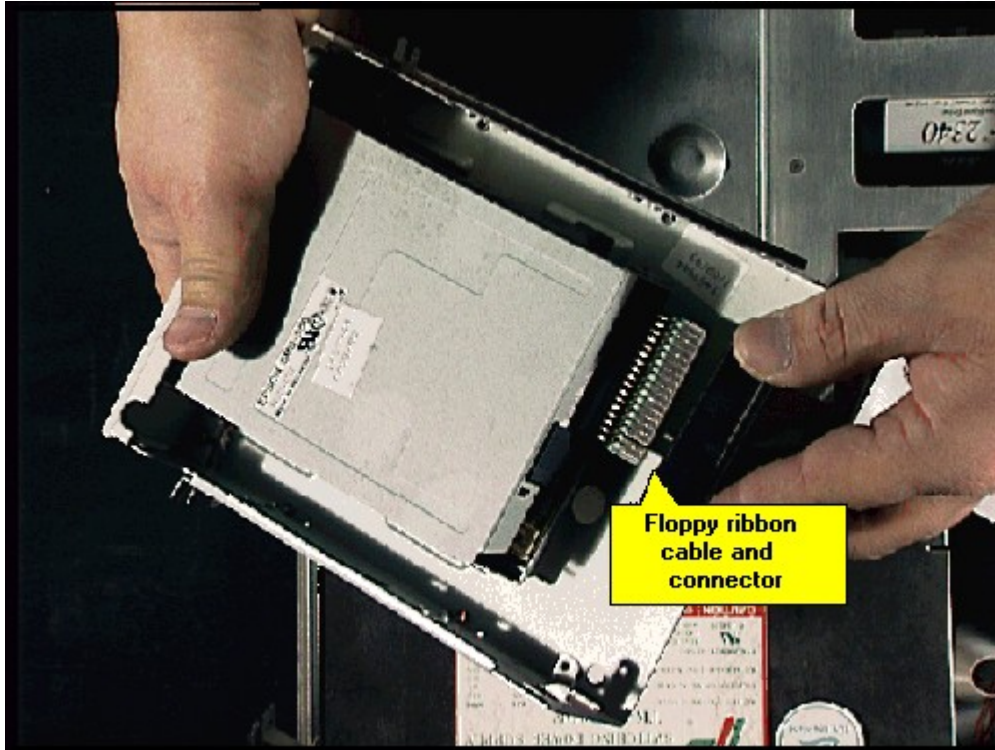




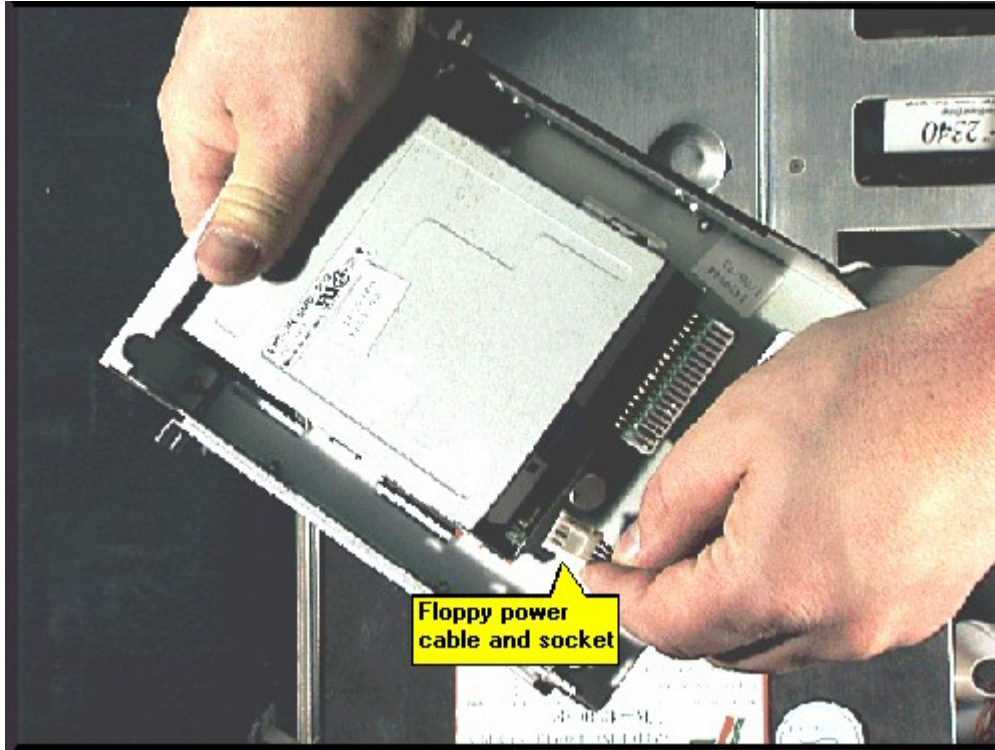




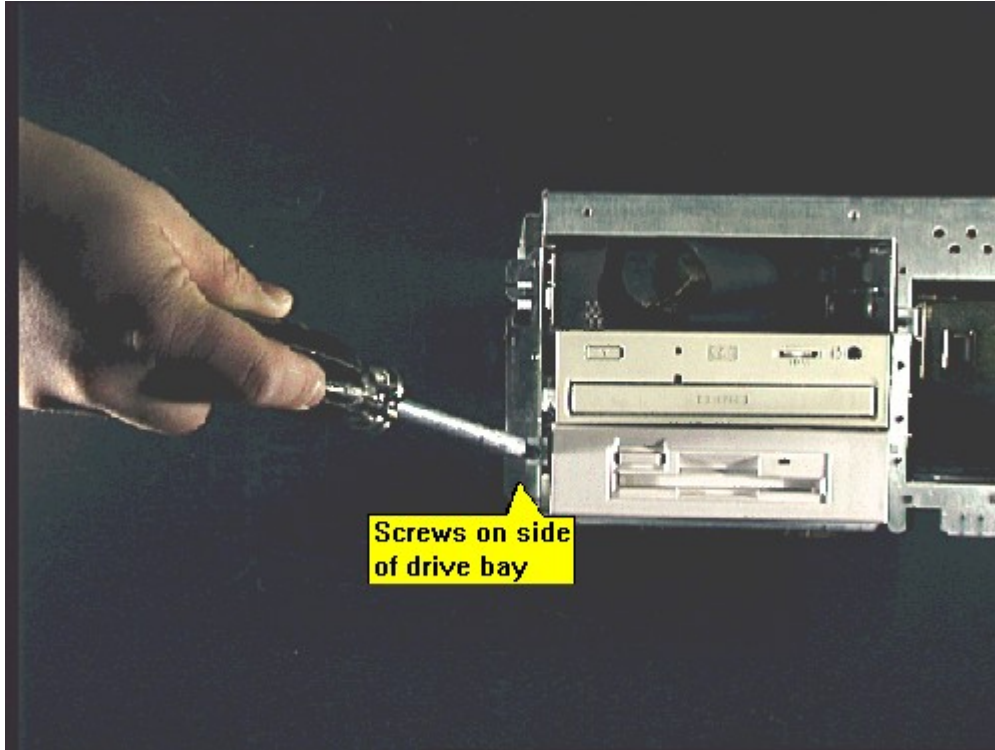


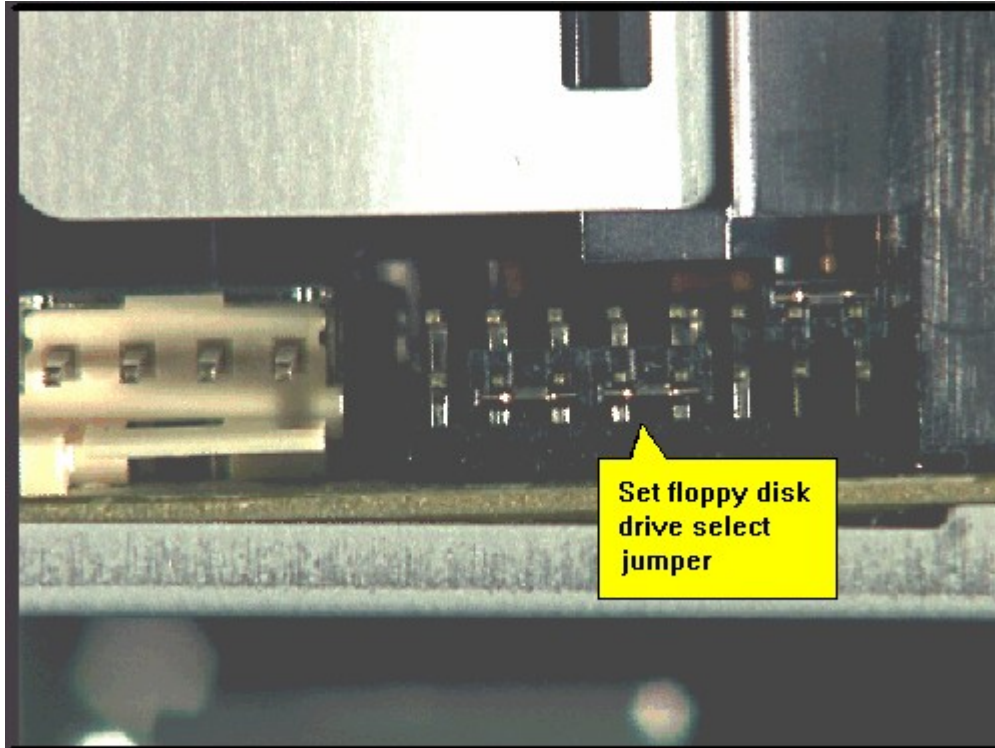


Floppy ribbon  
cable and  
connector

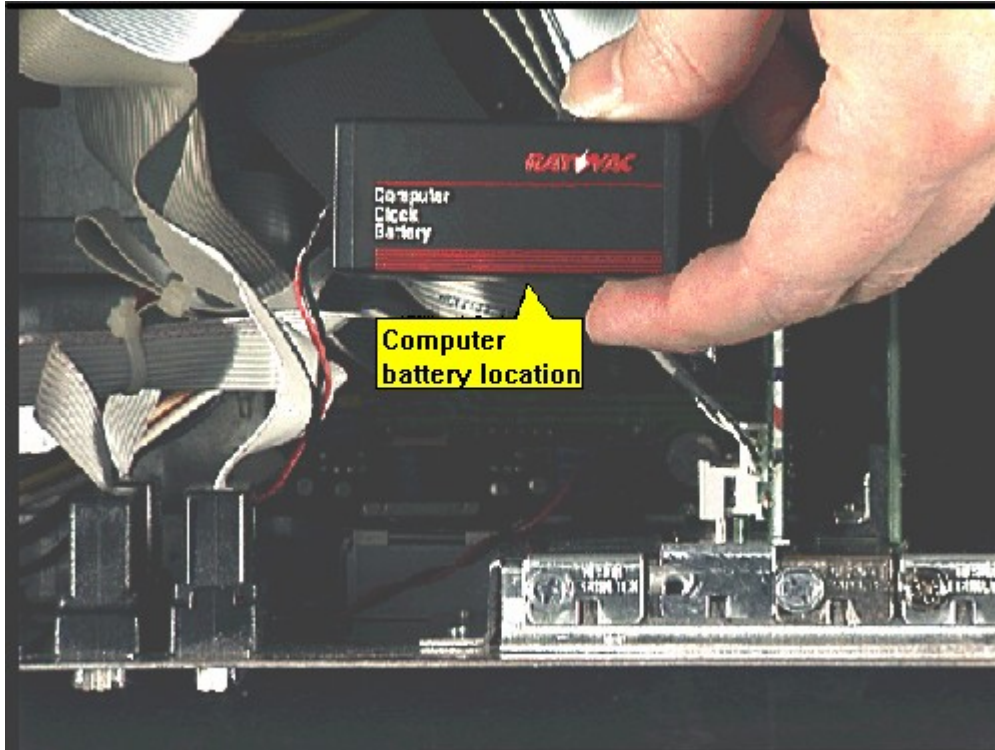


Floppy power  
cable and socket

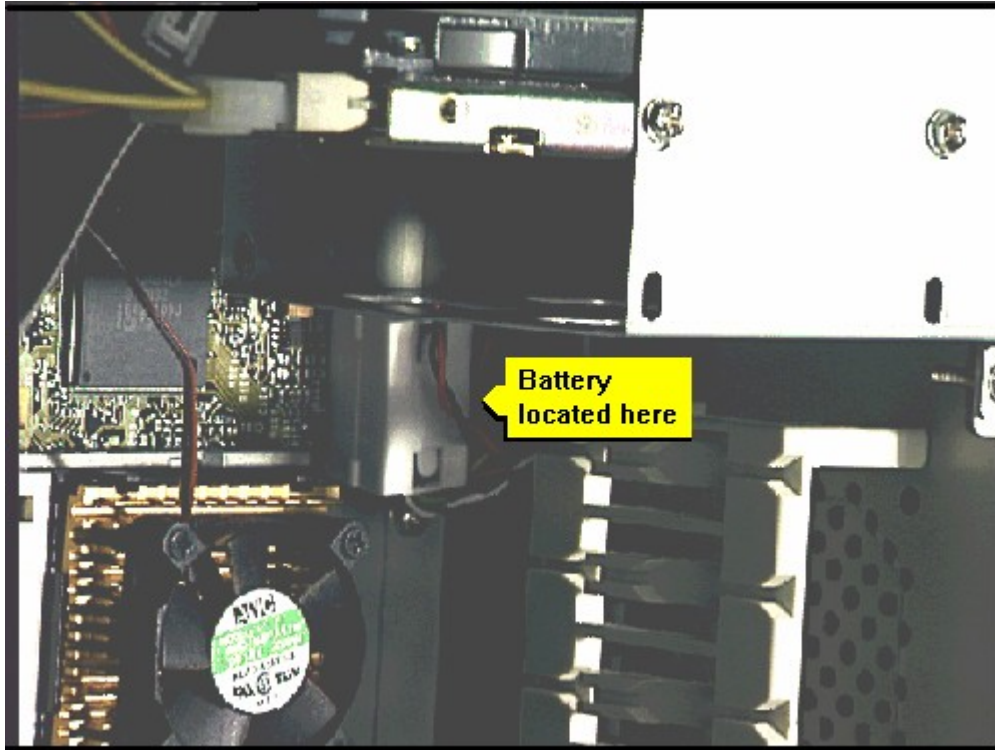


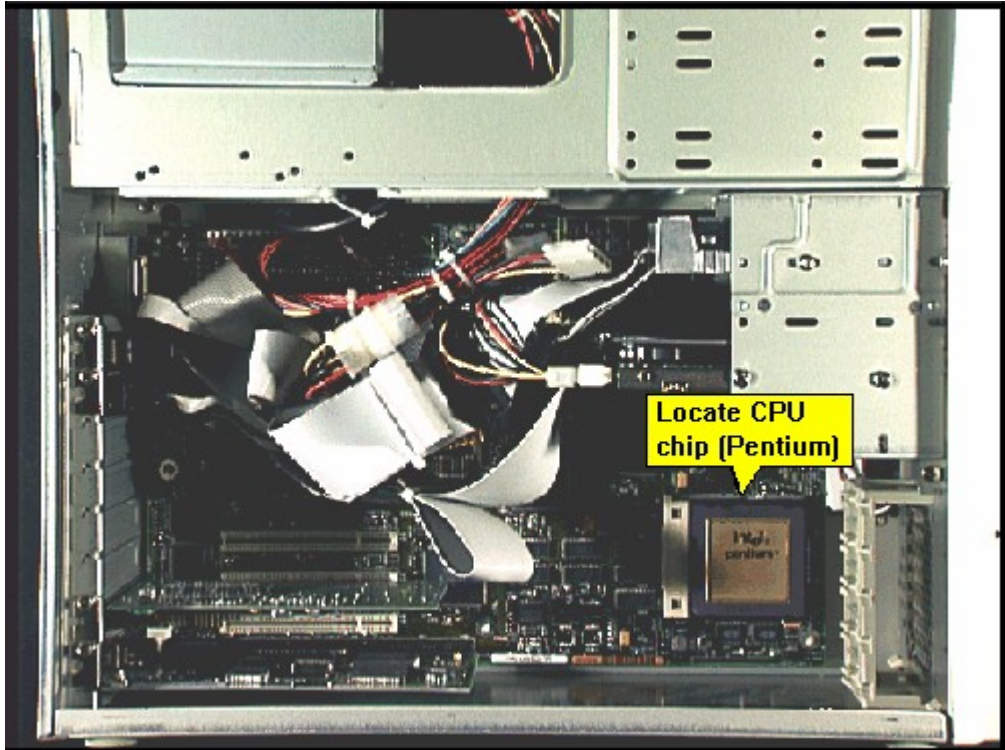


Set floppy disk  
drive select  
jumper

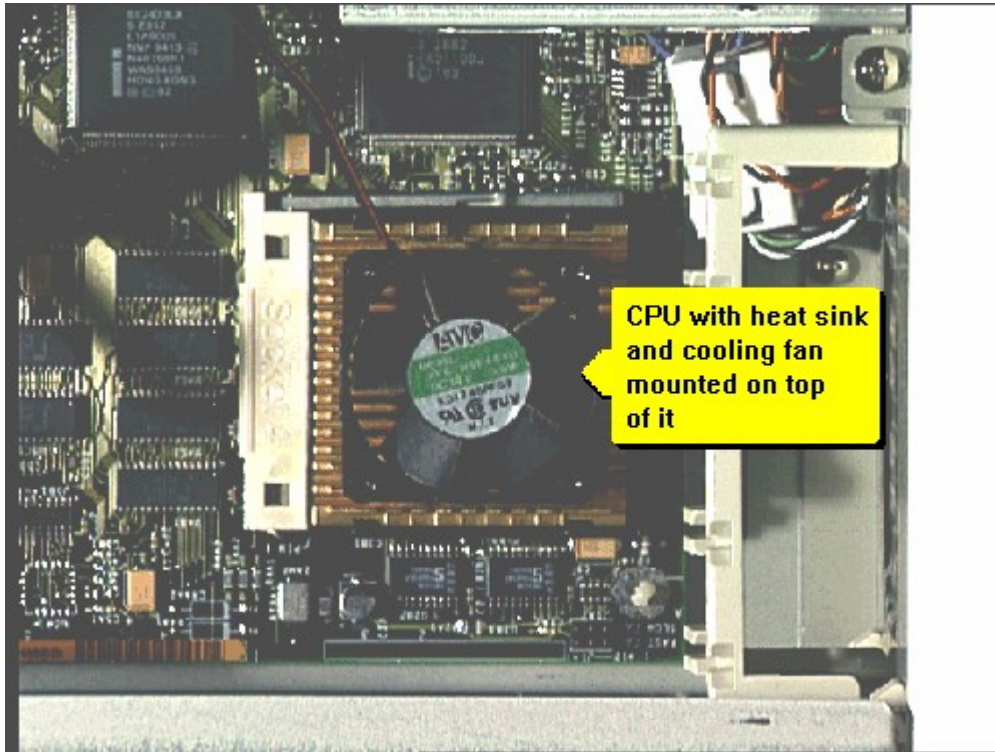






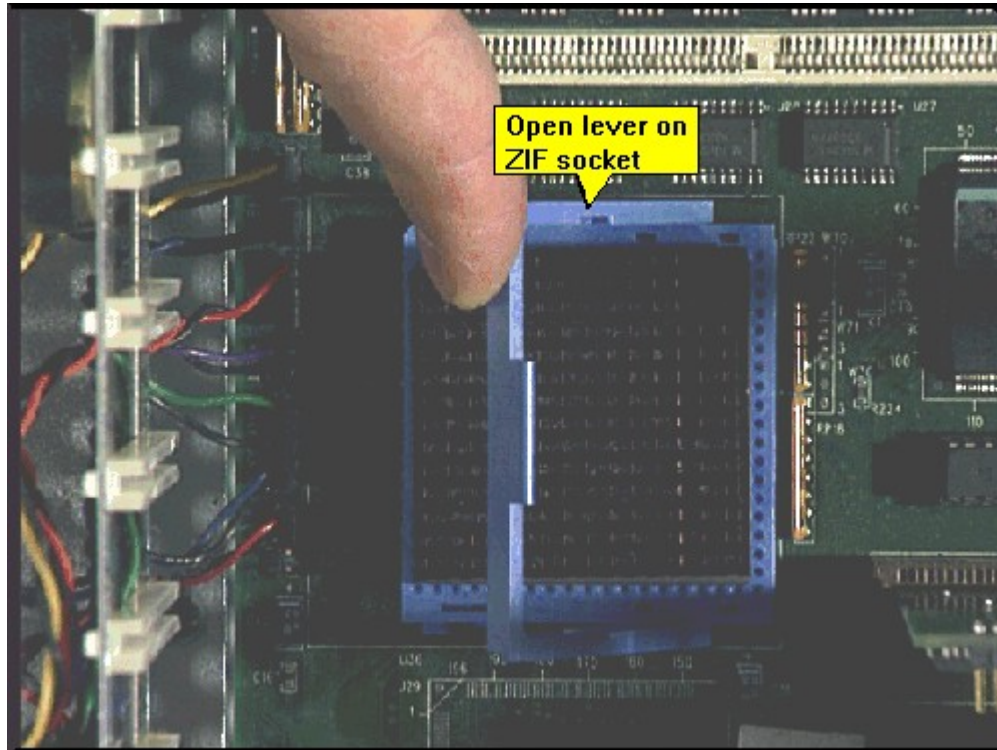


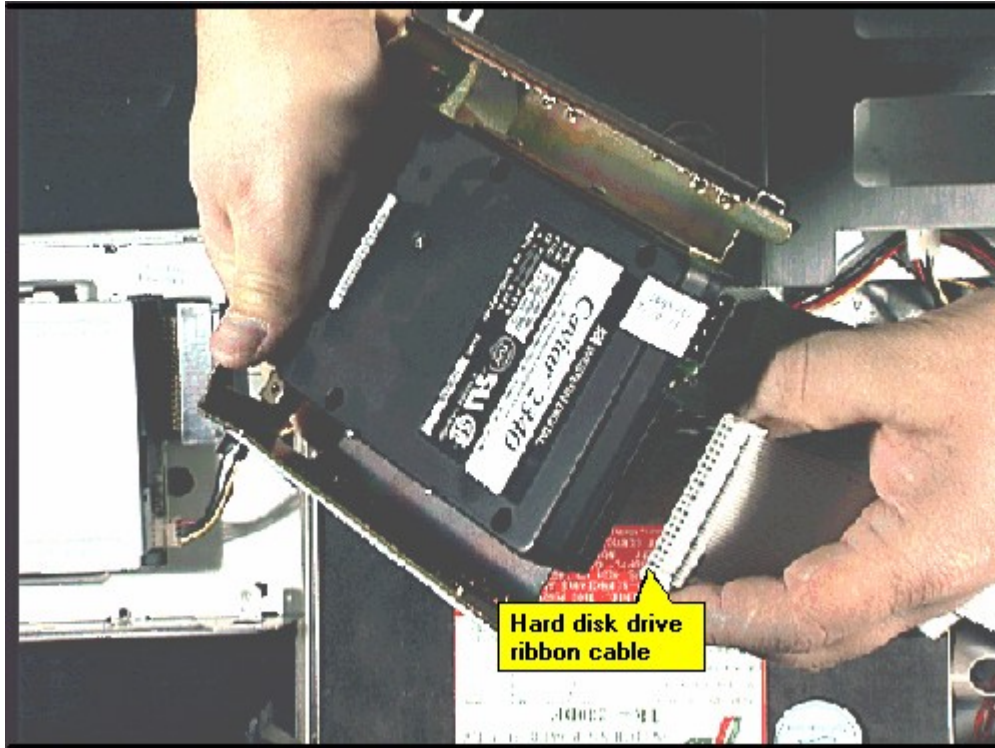
Locate CPU  
chip (Pentium)

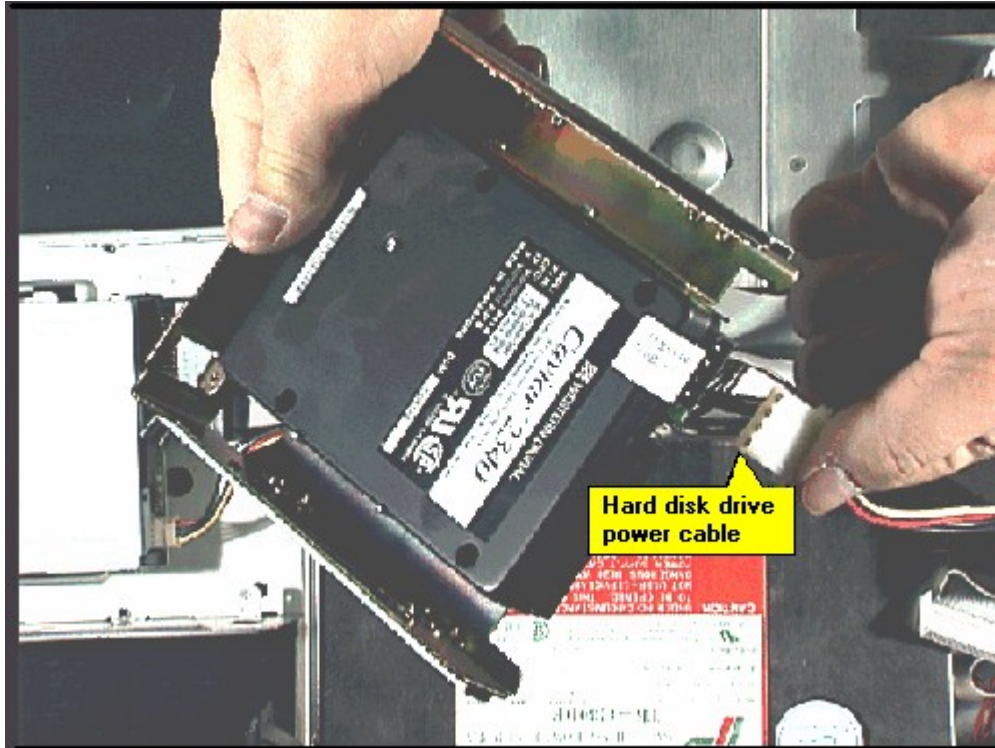


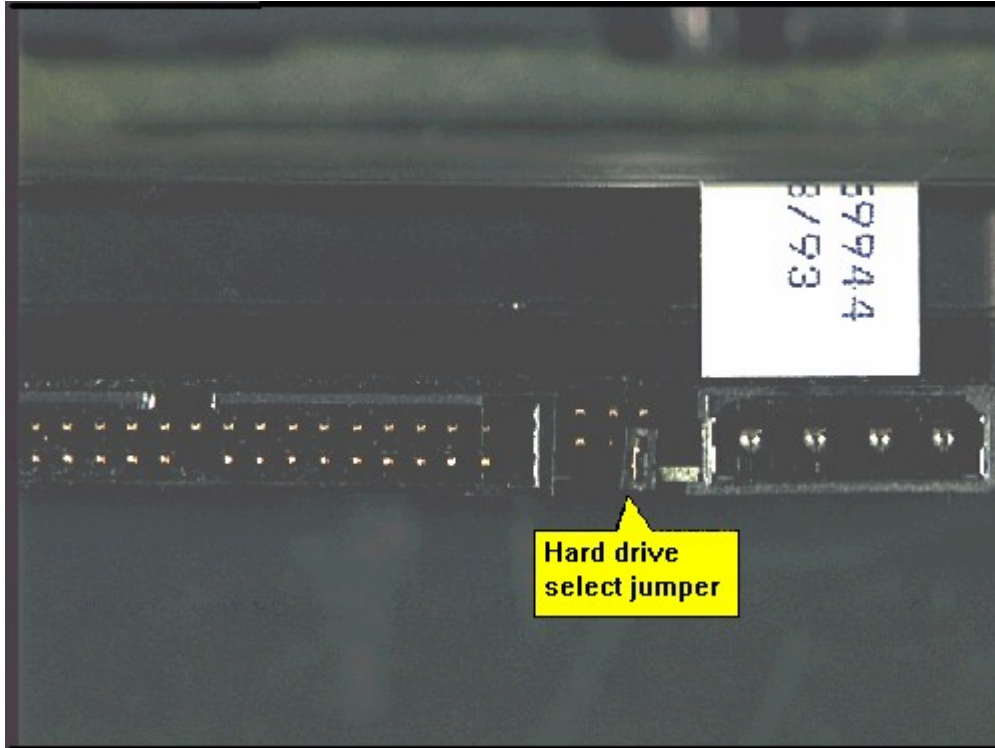
**CPU with heat sink  
and cooling fan  
mounted on top  
of it**

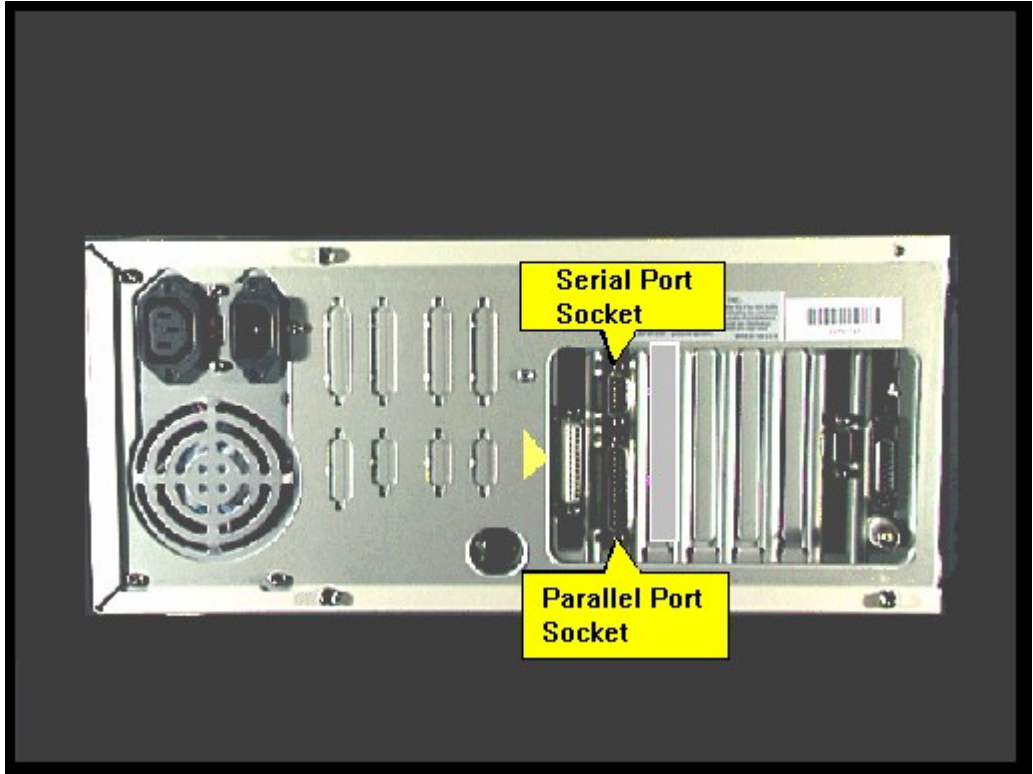


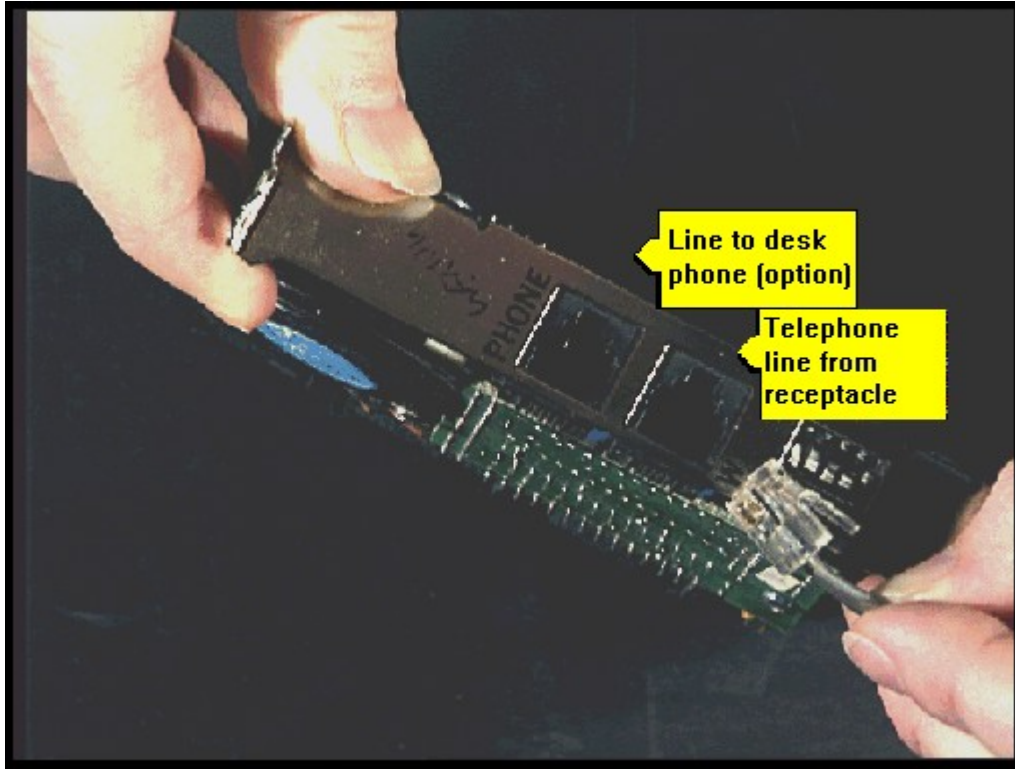




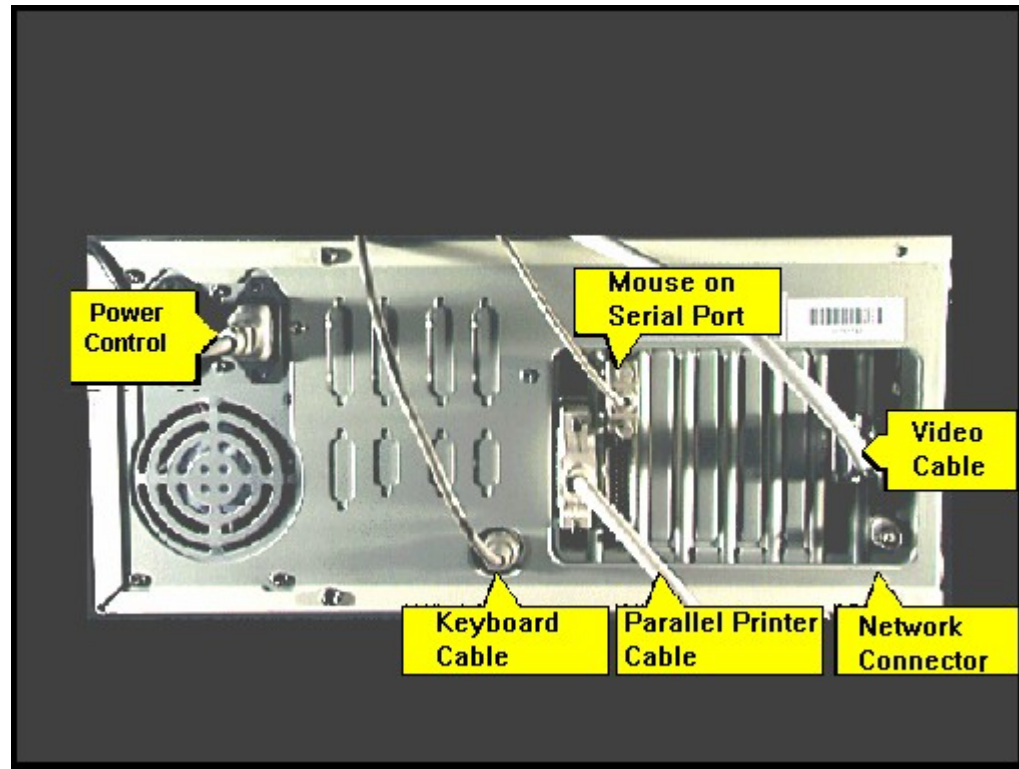














## Removing base unit cover.

**CAUTION:** All installation, diagnostic or maintenance tasks described below should be performed by a qualified computer technician.

- 1) Turn the power off on computer and all components attached to the computer, such as a printer and monitor.
- 2) Switch the surge protector off and unplug the power cable from the wall socket.

**WARNING:** Ensure all components are turned off and power cable is disconnected.

- 3) Pull the base unit out slightly so you can get to the rear panel of the base unit.
- 4) Carefully remove all cables from back of base unit.
  - a) Check each cable for screw or finger -screw connections. Unscrew connectors.
  - b) Remember the location and orientation of each connector during removal. (If necessary, draw a wiring diagram or tag the end of each cable noting its destination.
  - c) Gently remove each cable. Do not force or bend connectors to avoid costly damage to the connector or pins.
- 5) Remove the screws from the top and sides of the back edge of the base unit. Store them together in a safe location.
- 6) Grasp the cover along the sides with two hands. SLOWLY and GENTLY slide the cover forward and off. Set it aside.

**CAUTION:** Watch carefully to ensure parts of cover DO NOT catch on power or ribbon cables inside the base unit.

- 7) Ground yourself by touching the metal case of the base unit with a finger.





cyber

## Reseat CD-ROM controller card.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

**NOTE:** *Many CD-ROM drives are connected to a sound card that also serves as the CD-ROM controller card.*

- 1) Remove the internal ribbon and other cables from the CD-ROM controller card.
- 2) Remove the screw from the top notch of the mounting bracket on the card.
- 3) Touch the metal case of the base unit to ground any static.
- 4) Grasp the CD-ROM controller card (may be the sound card) by its edges.
- 5) Remove the card by gently pulling straight up. Avoid side-to-side movements (circuit boards crack easily)
- 6) Grasp the controller card by its edges.
- 7) Reinsert the bottom of the card (part with the gold-striped bars) into the same slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily)
- 8) Replace the screw in the top notch of the mounting bracket on the card.
- 9) Replace any necessary ribbon and other cables that were connected to the CD-ROM controller card.



## Replacing base unit cover.

- 1) Test the computer to make sure it is working properly before reinstalling the cover.
  - a) Reconnect the keyboard, video and power cables.
  - b) Plug the surge protector back into the power outlet and turn it on.
  - c) Turn on the computer and the other components, such as the printer and monitor one at a time.
  - d) Make sure the computer is working properly.

***CAUTION:** DO NOT touch or probe with a tool anywhere inside the base unit with the computer turned on. An electrical shock could occur or one or more components could sustain catastrophic damage.*
  - e) Turn computer and all the components off and disconnect power cable from electrical outlet.
  - f) Disconnect all of the cables.
- 2) Make any adjustments and trouble-shoot and repair problems. Repeat steps 1 and 2 as necessary.
- 3) Make sure all of the adapter cards are secured with screws (cards work their way loose unless they are secured)
- 4) Make sure all empty slots are covered with slot covers (missing slot covers distort airflow patterns and can cause the chips and the components to overheat).
- 5) Make sure all cabling (especially ribbon cables) is tucked inside metal base unit case and do not protrude or catch on the cover.
- 6) Retrieve the base unit cover and slowly slide it in place, making sure not to catch or pinch any protruding cables.
- 7) Replace the screws along the top and the sides of the back of base unit.
- 8) Carefully orient and replace all of the cables into the connectors on back of computer.
- 9) Secure with screws where appropriate.

***CAUTION:** Do not force or bend connectors or pins.*
- 10) Plug the surge protector back into the power outlet and turn it on.
- 11) Reposition the base unit to its original position.
- 12) Turn on the computer and all of the other components, such as the printer and monitor one at a time.
- 13) Retest using different programs to make sure the computer and all of the other components are working properly.





## **Post-power on self test.**

The POST, or power-on self test, is a series of hardware test instructions contained in the BIOS ROM that runs each time the computer is turned on (cold-booted). The BIOS (Basic Input/Output System) ROM is a set of programs that control the communication between different parts of the computer system and accessory devices.



## Interrupt.

When installation manuals and other literature speak of interrupts, they are actually referring to wires on the system board. These special wires are provided so that peripheral devices, such as the printer and monitor, can signal the system that they need attention. Only one device may use a single interrupt wire so that the system knows which device is signaling. If two devices use the same interrupt wire, the system will not know which device is signaling.

When a device that requires an interrupt is installed, the installation manual will instruct you to set the interrupt by installing a jumper. The jumper actually routes an interrupt signal to a certain interrupt line. You must know which interrupts are already in use. If you place the jumper so that the new device uses an already used interrupt, the system device (or possibly the entire computer) will not work properly.

The installation may also involve some installation software. The installation software will request the interrupt setting which is to be used for the device. This information will be set (sometimes in the device driver and sometimes in the CONFIG.SYS as a /fx or C:x option) so that the computer knows which device driver routine to execute when the indicated interrupt line is signaled.

*NOTE: This request for the interrupt in software is often misunderstood. Software assignment of the interrupt is NOT a substitute for the actual jumper placement. The software is asking "what the installer did" and not "where is the jumper to be placed". This is where many installation problems arise: the new device does not work, you might check the settings reported from software and find them to be correct, but the actual hardware settings are not correct. Check the installation manual for interrupt jumper pin assignments.*

The important rule for interrupts is that only one device can use a single interrupt line. To put it in other words, no two devices can share the same interrupt line.

When installing a new peripheral, the adapter card should have a jumper or a tiny block of switches that will allow the user to select which line will be used to interrupt the processor. The user CANNOT select an already used interrupt.

*NOTE: It is very possible that software can be used to change an interrupt signal line connection (like an LED clock changing the on/off condition of the red bars so that it can make different numbers) but this requires costly and sophisticated hardware and software. Moving a jumper is a popular, quick, and cheap way to deal with this important IRQ routing. Although 'Plug and Play' devices promise a 'magic bullet' (a kind of software 'jumper'). However, at this time there is too much speculation and too little real Plug and Play hardware to accurately describe the "absolutes". Because board component costs are very competitive and improvements are constantly being implemented, look for Plug and Play devices to eventually replace user/installer interrupt jumper selection.*

Some peripherals do not allow the interrupt line to be changed (such as floppy drive and hard drive controllers) Many devices ship with a default setting that may be already used by another device.

*NOTE: The video card MAY use an interrupt. This possibility is often overlooked because older video boards do not need an interrupt to operate.*



## Resolving conflicts with a CD-ROM drive.

*WARNING: Any changes made to these files will seriously affect the performance and operation of your computer.*

- 1) Choose one of the following methods for conflict resolution (Choice 'a' is more reliable if the source of the conflict with the CD-ROM drive is unknown)
  - a) Remove all cards and extra devices from the base unit.
    - 1] Reinstall the cards/devices one at a time.
    - 2] Restart the computer after each new device is added until you can determine which device is causing the conflict.
  - b) Choose the card or device that is believed to be the cause of the problem.
    - 1] Change the settings:
      - a] Refer to the documentation that came with your CD-ROM drive to determine the range of acceptable memory address, interrupt (IRQ) or DMA channels.
      - b] Change jumpers or DIP switches as appropriate to support the new memory address, interrupt (IRQ) or DMA channels.
    - 2] Reboot the computer.
    - 3] Try using the CD-ROM drive again.
- 2) If method 1)a) is selected, do the following, if it hasn't been done:
  - a) Edit the AUTOEXEC.BAT file from MS-DOS:
    - 1] Choose the 'Start' button to display the Windows 'Start' menu.
    - 2] Select 'Programs'.
    - 3] Select 'MS-DOS Prompt'.
    - 4] Enter the following command at the DOS prompt:  
EDIT AUTOEXEC.BAT
    - 5] Use the arrow keys to move to the line(s) to be changed.
    - 6] Remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications.
    - 7] Save the file:
      - a] Select the 'File' menu and select 'Save'.
      - b] Select the 'File' menu and select 'Exit'.
    - 8] Restart the computer.

- b) Edit the CONFIG.SYS file from MS-DOS.
  - 1] Choose the 'Start' button to display the Windows 'Start' menu.
  - 2] Select 'Programs'.
  - 3] Select 'MS-DOS Prompt'.
  - 4] Enter the following command at the DOS prompt:  
EDIT CONFIG.SYS
  - 6] Use the arrow keys to move to the line(s) to be changed.
  - 7] Remove (or comment out) all memory managers, device drivers, TSRs and extraneous applications.
  - 8] Save the file:
    - a] Select the 'File' menu and select 'Save'.
    - b] Select the 'File' menu and select 'Exit'.
  - 9] Restart the computer.
- c) Remove base unit cover.
- d) Disconnect all cables from the installed cards (except the video and controller card)
- e) Remove each card by doing the following:
  - 1] Remove the screw from the top notch of the mounting bracket on the card.
  - 2] Touch the metal case of the base unit to ground any static and, grasping the card by its edges, remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily)
  - 3] Place the card on a static-free surface near by, noting which slot it was in.
- f) After appropriate cards or devices are removed, make sure no tools or parts remain inside the base unit, reconnect the power and other cables and turn on the computer (it should work fine)
- 3) Do one of the following:
  - a) Run a hardware utility program (e.g., WinSleuth) to identify assigned memory addresses, DMA channels and IRQ assignments.
  - b) Run Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments.
    - 1] Enter the following command at the DOS prompt:  
C:\DOS\MSD
    - 2] Press ENTER.  
Choose 'IRQ Status...' from MSD main screen.  
***CAUTION:** Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*
- 4) Print out the screen or write down the memory addresses, IRQs and DMA assignments.



- 5) (Optional) Create a card and device inventory sheet that lists each card or device, vendor, memory address, IRQ, DMA (when applicable) and the driver. This is strictly for your future use.
- 6) Read the user manual and inspect the next device (assuming that you have removed multiple devices from your computer) to make sure it does not use a memory address, interrupt (IRQ) or DMA channel that is already assigned. If it does, select an unused setting and move jumpers and/or change DIP switches to apply the new setting to the card or device. (Consult card or device user manual for more information.)
- 7) Turn off the machine.
- 8) Remove the power cables.
- 9) Install the card.
- 10) Connect any necessary ribbon or power cables.
- 11) Turn on the computer. Watch the boot process and the display to make sure the card or device just added creates no conflicts.
- 12) Edit AUTOEXEC.BAT or Edit CONFIG.SYS:
  - a) Add (or uncomment) the device driver for the card/device just installed.
  - b) Save the file.
  - c) Restart the machine.
- 13) Rerun the hardware utility and check all assignments to make sure no conflicts exist.
- 14) If the computer locks up or something does not work properly, there is a conflict between the card or device just added and what is already installed:
  - a) Change the setting(s) on ONE of the cards/devices (preferably the one just added) Be careful not to create additional conflicts by changing a setting.
- 15) Repeat steps 9-14 to install each additional card/device one at a time, until the offender is identified.
- 16) Edit CONFIG.SYS:
  - a) Add (or uncomment) the memory manager (e.g., HIMEM.SYS).
  - b) Save the file.
  - c) Restart the machine. (This prevents Windows from using this portion of memory, and prevents lockups and crashes.)
- 17) Edit AUTOEXEC.BAT:
  - a) Add (or uncomment) any desired TSRs or applications one at a time.
  - b) Save the file.
  - c) Restart the machine. Make sure they do not create new conflicts.
- 18) If unable to resolve a conflict with a particular card or device, contact the card manufacturer for technical support and assistance.



## Edit CONFIG.SYS.

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

The CONFIG.SYS file contains system configuration information/commands. When it exists (almost always) it is the first file executed when the computer is turned on or rebooted in either a DOS or OS/2 configuration.

### SPECIAL NOTES FOR DUAL BOOT CONFIGURATIONS:

*NOTE: In a dual boot configuration (i.e., DOS and OS/2) there are two distinct CONFIG.SYS files: one for DOS and one for OS/2. The current boot configuration determines which CONFIG.SYS file is in effect. When in DOS, the OS/2 file is named CONFIG.OS2. When in OS/2, the DOS CONFIG.SYS is named CONFIG.DOS.*

**CAUTION:** Recommend NOT editing/changing CONFIG.SYS files for another boot configuration when not booted in it (e.g., Do not change CONFIG.SYS for OS/2 while booted in a DOS configuration)

EDIT/CHANGE CONFIG.SYS file, using one of the following procedure sets, depending on the current environment:

#### 1) Edit CONFIG.SYS:

- a) Get to the MS DOS prompt:
  - 1] Choose the 'Start' button to display the Windows 'Start' menu.
  - 2] Select 'Programs'.
  - 3] Select 'MS-DOS Prompt'.
- b) Enter the following command at the DOS prompt to save the original CONFIG.SYS file:  
COPY C:\CONFIG.SYS C:\CONFIG.OLD
- c) Press ENTER.
- d) Enter the following command at the DOS prompt to change the CONFIG.SYS file:  
EDIT C:\CONFIG.SYS
- e) Press ENTER.
- f) Use the arrow keys to move to the line(s) to be changed.
- g) Add new command lines or edit existing lines.
- h) Review all changes, checking for correct spelling (e.g., commands,

directories, filenames) and command syntax.

- i) Enter the following keystrokes to save the file:
    - 1] Press ALT+F (file menu)
    - 2] Press X (exit).
    - 3] Press ENTER.
  - j) Type exit at the C:> prompt.
  - k) Press ENTER.
  - l) Choose the 'Start' button to display the Windows 'Start' menu.
  - m) Select 'Shut Down'.
  - n) Select 'Restart your computer?'.
  - o) Choose the 'Yes' button. The computer will shutdown and restart.
- 2) If unable to save/overwrite CONFIG.SYS:
- a) Exit CONFIG.SYS file without saving the changes.
    - 1] Select the 'File' menu and select 'Exit'.
  - b) Change the file attributes on CONFIG.SYS:
    - 1] Enter the following command at the DOS prompt:  
ATTRIB -x CONFIG.SYS  
(Where x is the attribute to be removed)
    - 2] **EXAMPLES:**
      - a] To remove Read-only attribute enter the following command:  
ATTRIB -R CONFIG.SYS
      - b] To remove Hidden attribute enter the following command:  
ATTRIB -H CONFIG.SYS
    - c) Re-edit file by making the changes that you attempted in step 1).
    - d) Save the CONFIG.SYS file:
      - 1] Select the 'File' menu and select 'Save As'.
      - 2] Enter the following in the 'File Name' box:  
CONFIG.SYS
      - 3] Choose 'OK'.
    - e) Select the 'File' menu and select 'Exit'.
- 3) Watch the bootup process to make sure changes are working properly.
- 4) If problems are encountered with DOS CONFIG.SYS, try one or more of the following at the DOS prompt, to diagnose and repair problem:
- a). Place REM in front of @ECHO OFF statement to show every command on display while troubleshooting problems.
    - 1] Access the MS DOS prompt:
      - a] Choose the 'Start' button to display the Windows 'Start' menu.
      - b] Select 'Programs'.
      - c] Select 'MS-DOS Prompt'.

- 2] Enter the following command at the DOS prompt to change the CONFIG.SYS file:  
EDIT C:\CONFIG.SYS
- 3] Press ENTER.
- 4] Place REM in front of @ECHO OFF statement.
- b) Place REM in front of auxiliary commands while troubleshooting critical commands.
- c) (Optional) Press CTRL-S to pause execution to view error messages on screen. Then press any key to continue execution.
- d) (Optional) Press F5 as soon as 'Starting Windows 95' appears on display to completely by-pass both the AUTOEXEC.BAT and CONFIG.SYS files.
- e) (Optional) Run MemMaker at DOS prompt to optimize CONFIG.SYS and CONFIG.SYS to free more conventional memory.
- 7) Save the corrected copy of CONFIG.SYS to an alternate directory and to the System Recovery Diskette.

- 8) If you are unable to correct problem or improve operation, enter the following command at the DOS or OS/2 prompt to return to the original CONFIG.SYS:

```
COPY CONFIG.OLD CONFIG.SYS
```

```
SAMPLE MS-DOS CONFIG.SYS
```

*NOTE: Lines are numbered in this example only for easy reference in explanation below. DO NOT number lines in an actual CONFIG.SYS file.*

**WARNING:** Do not attempt to use this entire sample CONFIG.SYS. Some sample lines (included for illustration purposes) may conflict with each other and cause problems on the computer.

```
1  DEVICE=C:\DOS\HIMEM.SYS
2  DEVICE=C:\DOS\EMM386.EXE RAM
3  DOS=HIGH,UMB
4  SHELL=C:\DOS\COMMAND.COM /E:1024 /P
5  DEVICE=C:\<pathname>\<filename> /D:MSCD000
6  DEVICE=C:\<pathname>\<filename> /D:MSCD001
7  FILES=60
8  BUFFERS=20
9  LASTDRIVE=E
10 STACKS=9,256
```

#### LINE BY LINE EXPLANATION OF MS-DOS CONFIG.SYS

- 1 Loads the memory manager HIMEM.SYS. NOTE: If used, this memory manager should almost ALWAYS be loaded FIRST.
- 2 Loads the EMM386 device driver. The RAM parameter tells EMM386 to provide both expanded and upper memory.

3 Enables use of upper memory blocks (provided by EMM386) 4 Used to either change the default settings for SHELL (e.g., change the size of the DOS environment) or load a 3d party command line processor to replace COMMAND.COM (e.g., SHELL=C:\NDOS.COM /P) The /E parameter sets the environment space size and

the /P parameter makes the change permanent. NOTE: Do NOT confuse this command with DOSSHELL (loads the graphical DOS Shell Program) 5 Assigns CD-ROM device 001 to Drive G and CD-ROM device 000 to Drive H.

6 Sets the maximum number of files that can be open at any one time.

*NOTE: Certain applications may require a higher number of file handles than others. Set this accordingly. Recommend 20 files, or 30 for Windows.*

7 Sets the number of buffers used by DOS to speed disk access.

8 If computer has NO extended or expanded memory Microsoft Corporation recommends the following number of buffers, based on hard disk size:

Hard disk size	Buffers
----------------	---------

<40MB	20
-------	----

40-79MB	30
---------	----

80-119MB	40
----------	----

>120MB	50	NOTE: Buffers > 50 begins to decrease performance.
--------	----	--

9 Sets the highest drive letter that can be used with either the SUBST command or for a network drive letter.

10 Reserves extra space for hardware interrupt handlers. Used to fine-tune system. Often added by MemMaker. Valid range is 0 and 8-64. Default is 9.

#### TIPS:

- 1) To make temporary changes, place REM (remarks command) at the beginning of each command line to be changed. Then try booting with this configuration. Or, copy lines to be changed and change the copies. This preserves the original configuration of the command line in case changes do not work properly.
- 2) Make sure a semicolon follows each path component in the PATH= command line.
- 3) Make sure the backslash (\) is used in path statements (not forward slash (/)).



## Edit AUTOEXEC.BAT.

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

AUTOEXEC.BAT is a special-purpose batch file containing commands that are automatically executed by MS-DOS whenever the computer is turned on or rebooted in an MS-DOS configuration.

**1) Edit AUTOEXEC.BAT from MS-DOS:**

**a) Access the MS DOS prompt:**

- 1]** Choose the 'Start' button to display the Windows 'Start' menu.
- 2]** Select 'Programs'.
- 3]** Select 'MS-DOS Prompt'.

**b) Enter the following command at the DOS prompt to save the current AUTOEXEC.BAT file:**

```
COPY C:\AUTOEXEC.BAT C:\AUTOEXEC.OLD
```

**c) Press ENTER.**

**d) Enter the following command at the DOS prompt to edit the AUTOEXEC.BAT file:**

```
EDIT C:\AUTOEXEC.BAT
```

**e) Press ENTER.**

**f) Use the arrow keys to move to the line(s) to be changed.**

**g) Add new command lines or edit existing lines.**

**h) Review all changes, checking for correct spelling (e.g., commands, directories, filenames) and command syntax.**

**i) Enter the following keystrokes to save the file:**

**1]** Press ALT+F (file menu)

**2]** Press X (exit).

**3]** Press ENTER.

**j) Choose the 'Start' button to display the Windows 'Start' menu.**

**k) Select 'Shut Down'.**

**l) Select 'Restart your computer?'.**

**m) Choose the 'Yes' Button. The computer will shutdown and restart.**

**2) If unable to save/overwrite AUTOEXEC.BAT:**

- a) Exit AUTOEXEC.BAT file without saving the changes
    - 1] Select the 'File' menu and select 'Exit'.
  - b) Change the file attributes on AUTOEXEC.BAT:
    - 1] Enter the following command at the DOS prompt:  
ATTRIB -x AUTOEXEC.BAT  
(Where x is the attribute to be removed)
    - 2] **EXAMPLES:**
      - a] To remove Read-only attribute enter the following command:  
ATTRIB -R AUTOEXEC.BAT
      - b] To remove Hidden attribute enter the following command:  
ATTRIB -H AUTOEXEC.BAT
  - c) Re-edit file by making the changes that you attempted in step 1).
  - d) Save the AUTOEXEC.BAT file:
    - 1] Select the 'File' menu and select 'Save As'.
    - 2] Enter the following in the 'File Name' box:  
AUTOEXEC.BAT
    - 3] Choose 'OK'.
  - e) Select the 'File' menu and select 'Exit'.
- 3) Watch the bootup process to make sure changes are working properly.
- 4) If problems are encountered, try one or more of the following at the DOS prompt, to diagnose and repair problem:
- a) Place REM in front of @ECHO OFF statement to show every command on display while troubleshooting problems.
    - 1] Access the MS DOS prompt:
      - a] Choose the 'Start' button to display the Windows 'Start' menu.
      - b] Select 'Programs'.
      - c] Select 'MS-DOS Prompt'.
    - 2] Enter the following command at the DOS prompt to change the AUTOEXEC.BAT:  
EDIT C:\AUTOEXEC.BAT
    - 3] Press ENTER.
    - 4] Place REM in front of @ECHO OFF statement.
  - b) Place REM in front of auxiliary commands while troubleshooting critical commands.
  - c) (Optional) Press CTRL-S to pause execution to view error messages on screen. Then press any key to continue execution.
  - d) (Optional) Press F5 as soon as 'Starting Windows 95' appears on display to completely by-pass both the CONFIG.SYS and AUTOEXEC.BAT files.
- 7) Save corrected copy of AUTOEXEC.BAT to an alternate directory and the System Recovery Diskette.

- 8) If unable to correct problem or improve operation, enter the following command at the DOS or OS/2 prompt to return to the original AUTOEXEC.BAT:

```
COPY AUTOEXEC.OLD AUTOEXEC.BAT
```

```
SAMPLE AUTOEXEC.BAT
```

*NOTE: Lines are numbered in this example only for easy reference in explanation below. DO NOT number lines in an actual AUTOEXEC.BAT file.*

**WARNING:** *Do not attempt to use this entire sample AUTOEXEC.BAT. Some sample lines (included for illustration purposes) may conflict with each other and cause problems on the computer.*

```
1  @ECHO OFF
2  C:\QEMM\LOADHI /R:1 /RES=28400 /SQT=D800-DBFF C:\WINDOWS\SMARTDRV.EXE /L
3  PROMPT=$p$g
4  PATH C:\;C:\DOS;C:\WINDOWS;C:\EXCEL;
5  MSCDEX /D:MSCD001 /L:G /D:MSCD000 /L:H
6  SET TMP=C:\
7  SET COMSPEC=C:\DOS\COMMAND.COM
8  LOADHIGH DOSKEY FINDFILE=DIR /A /S /B $*
9  SET TEMP=C:\WIN\TEMP
10 MODE COM1:=LPT1:
11 WIN
```

#### LINE BY LINE EXPLANATION

- 1 Turns off the console (display) while executing the remaining commands in this file.
- 2 Loads SMARTDrive into upper memory, under the control of the QEMM memory driver.
- 3 Sets the DOS prompt to show the current drive and current directory path.
- 4 Path statement tells DOS to look in these listed directories for files not in current directory.
- 5 Assigns CD-ROM device 001 to Drive G and CD-ROM device 000 to Drive H. (See related device drivers in CONFIG.SYS)
- 6 Creates the environment variable TMP and sets it to store temporary files in the C:\ directory.
- 7 Sets an environment variable (COMSPEC) to define the location of COMMAND.COM to use.
- 8 Loads the TSR DOSKEY (retrieves last few DOS commands) into high memory. Also loads the FINDFILE command into high memory.
- 9 Creates the environment variable TEMP, and sets it to store temporary files for Windows in the C:\WINDOWS\TEMP directory.
- 10 Redirects all output for the parallel port LPT1 to the serial port COM1.
- 11 Loads Microsoft Windows.



#### TIPS

- 1) To make temporary changes, place REM (remarks command) at the beginning of each command line to be changed. Then try booting with this configuration. Or, copy lines to be changed and change the copies. This preserves the original configuration of the command line in case changes do not work properly.
- 2) Make sure a semicolon follows each path component in the PATH= command line.
- 3) Make sure the backslash (\) is used in path statements (not forward slash (/)).
- 4) Editing the AUTOEXEC.BAT file to change more than a few lines is a risky and complicated process. Get a good MS-DOS reference book that gives detailed descriptions of what each line in the AUTOEXEC.BAT file does, and examples of how the lines should look with various computer configurations.



## MSCDEX (MS-DOS CD-ROM extensions) command line options.

*NOTE: While newer CD-ROM drives use Windows 95 drivers, certain games that run in 'MS-DOS Mode' still require the MSCDEX driver to be loaded.*

Use the following MSCDEX command line options to set up a CD-ROM drive:

- 1) Access the MS DOS prompt:
  - a) Choose the 'Start' button to display the Windows 'Start' menu.
  - b) Select 'Programs'.
  - c) Select 'MS-DOS Prompt'.
- 2) Enter the following command at the DOS prompt to change the CONFIG.SYS file:  
`EDIT C:\CONFIG.SYS`
- 3) Press ENTER.
- 4) Set the CD-ROM drive name in the device driver line in CONFIG.SYS. For example, `DEVICE=C:\TSY\TSYCDROM.SYS /D:TSYCD1 /P:SM`
- 5) Enter the following at the MS-DOS prompt:  
`/D:xxxxxxx`  
(The '`/D:xxxxxxx`' switch tells DOS to access the CD-ROM drive with the name '`xxxxxxx`').
- 6) Press ENTER.
- 7) Enter the following at the MS-DOS prompt:  
`/L:x`  
(The '`/L:x`' switch sets the CD-ROM drive to a particular drive letter. Replace the '`x`' with '`D`', '`E`', or whatever drive letter is desired for the CD-ROM drive. Make sure the '`LASTDRIVE=x`' command, if used in CONFIG.SYS, does not exclude the desired drive letter. *(NOTE: The LASTDRIVE default is the last drive letter used by the disk partitions set up on the hard disk(s) or E.)*)
- 8) Press ENTER.

For example, a line that sets MSCDEX to use a Mitsumi IDE CD-ROM device driver, and drive letter 'D' to access the CD-ROM, should look like the following (in AUTOEXEC.BAT) `C:\DOS\MSCDEX.EXE /D:MTMIDE01 /L:D`

*NOTE 1: The NAME of the CD-ROM device driver is usually established with the '/D:' switch on the device driver command line in CONFIG.SYS. The name used on the device driver and the MSCDEX line MUST match. However, a particular name does NOT have to be used.*

*NOTE 2: If more than one CD-ROM drive is attached to the computer, the MSCDEX line in AUTOEXEC.BAT should look similar to the following:*

```
C:\DOS\MSCDEX.EXE /D:MTMIDE01 /L:D /D:NECCDR /L:E
```

(where the above line sets a MITSUMI CD-ROM drive to use drive letter 'D' and a NEC CD-ROM drive to use drive letter 'E.' For each additional CD-ROM drive, add pairs of '/D:xxxxxxx' and '/L:x' switches in the same way as in the above example.)

*NOTE 3: The MSCDEX command can also be used from the DOS command line. However, if access to the CD-ROM drive is always desired when the computer boots, it is better to add this line to AUTOEXEC.BAT.*



## **Create new configurations for different device driver and TSR load sequences.**

***WARNING:*** Any changes made to these files will seriously affect the performance and operation of your computer.

*NOTE 1: Refer to the previously printed copies of CONFIG.SYS and AUTOEXEC.BAT for easy reference in completing the following tasks.*

*NOTE 2: Because CONFIG.SYS is always processed first, device drivers will ALWAYS load before TSRs.*

- 1) Access the MS DOS prompt:
  - a) Choose the 'Start' button to display the Windows 'Start' menu.
  - b) Select 'Programs'.
  - c) Select 'MS-DOS Prompt'.
- 2) Make a backup copy of the current CONFIG.SYS:

- a) Enter the following command at the DOS prompt:  
COPY C:\CONFIG.SYS CONFIG.BAK
  - b) Press ENTER.
- 3) Make a backup copy of the current AUTOEXEC.BAT:
  - a) Enter the following command at the DOS prompt:  
COPY C:\AUTOEXEC.BAT AUTOEXEC.BAK
  - b) Press ENTER.
- 4) Edit CONFIG.SYS.
  - a) Change the order in which device drivers load in CONFIG.SYS by cutting and pasting the lines into a new sequence.  
  
***CAUTION:** Do not disrupt the sequence in which HIMEM.SYS and EMM386.EXE load, or using upper memory will be impossible.*
  - b) Save the CONFIG.SYS with the new load sequence to CONFIG.SQ1:
    - 1] Select the 'File' menu and select 'Save As'.
    - 2] Enter CONFIG.SQ1
    - 3] Press ENTER.
  - c) Repeat steps 4) and 4)b) for other possible sequences, saving each configuration to a new CONFIG.SQ# file (where '#' should be a new unused sequence number) Continue until all different load sequence combinations are saved in new CONFIG.SQ# files.
- 5) Edit AUTOEXEC.BAT.
  - a) Change the order in which TSRs load in AUTOEXEC.BAT by cutting and pasting the lines into a new sequence.
  - b) Save the AUTOEXEC.BAT with the new load sequence to AUTOEXEC.SQ1.
    - 1] Select the 'File' menu and select 'Save As'.
    - 2] Enter AUTOEXEC.SQ1
    - 3] Press ENTER.
  - c) Repeat steps 5) and 5)b) for other possible sequences, saving each configuration to a new AUTOEXEC.SQ# file (where '#' should be a new unused sequence number) Continue until all different load sequences to try are saved in new AUTOEXEC.SQ# files.
- 6) If a particular configuration freezes the computer, press CTRL+ALT+DEL to restore a working configuration:
  - a) Wait for the 'Starting Windows 95' message to display.
  - b) Press F5 to bypass the bad configuration files.
  - c) Replace the CONFIG.SYS the with file that did not cause a system freeze:
    - 1] Enter the following at the C:> prompt:  
DEL CONFIG.SYS
    - 2] Press Enter
    - 3] Enter the following command to copy the new CONFIG.SYS file:  
COPY CONFIG.x CONFIG.SYS

(where the 'x' in the above filename should be replaced with the correct 'SQ#' extension for the next load sequence files to try, or the 'BAK' extension of the original CONFIG.SYS backup file.)

4] Press ENTER.

d) Replace the AUTOEXEC.BAT with file that did not cause a system freeze:

1] Enter the following command at the C:> prompt:

DEL AUTOEXEC.BAT

2] Press ENTER.

3] Enter the following command to copy the new AUTOEXEC.BAT file:

COPY AUTOEXEC.x AUTOEXEC.BAT

(where the 'x' in the above filenames should be replaced with the correct 'SQ#' extension for the next load sequence file to try, or the 'BAK' extension of the original AUTOEXEC.BAT backup file.)

4] Press ENTER.

*NOTE: The filenames to use for different sequences are only suggestions. Use any preferred filenames that allow the configurations with different load sequences for TSRs/device drivers to be distinguished.*



## Check if device drivers/TSRs loading high.

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

- 1) Access the MS DOS prompt:
  - a) Choose the 'Start' button to display the Windows 'Start' menu.
  - b) Select 'Programs'.
  - c) Select 'MS-DOS Prompt'.
- 2) Access the CONFIG.SYS file:
  - a) Enter the following at the prompt:  
EDIT C:\CONFIG.SYS
  - b) Press ENTER.
- 3) Print a copy of the CONFIG.SYS file:
  - a) Select the 'File' menu and select 'Print'.
  - b) Select 'Complete Document'.
  - c) Choose 'OK'.
  - d) Select the 'File menu and select 'Exit'.
- 4) Access the AUTOEXEC.BAT file:
  - a) Enter the following at the prompt:  
EDIT C:\AUTOEXEC.BAT
  - b) Press ENTER.
- 5) Print a copy of AUTOEXEC.BAT.
  - a) Select the 'File' menu and select 'Print'.
  - b) Select 'Complete Document'.
  - c) Choose 'OK'.
  - d) Select the 'File menu and select 'Exit'.
- 6) Print the MEM /CLASSIFY command output by entering the following command at the DOS prompt:  
MEM /CLASSIFY > PRN:  
  
*(NOTE: PRN: is mapped by default to the LPT1: parallel port. Use 'LPT2:' instead of 'PRN:' if printer is connected to the LPT2: port.)*
- 7) Check if any TSRs and/or device drivers are loading high, as follows:
  - a) Mark each line on the printouts as follows:

- 1]** Review AUTOEXEC.BAT for lines that begin with the 'LOADHIGH' (or 'LH') command.
  - 2]** Review CONFIG.SYS for lines that begin with the 'DEVICEHIGH' command.
- b)** Look at the printout of the MEM /CLASSIFY command.
  - c)** Compare each line marked in AUTOEXEC.BAT or CONFIG.SYS with the line in the MEM /CLASSIFY output for the same device driver/TSR.
  - d)** Check if a device driver/TSR is loading high by noting if the memory used in Upper Memory (the last column) is greater than zero.
  - e)** Repeat steps 7b-7d for every marked line in CONFIG.SYS and AUTOEXEC.BAT, and note the LOADHIGH/DEVICEHIGH commands that succeed, if any, and those that fail, if any.



## Examples of DOS commands or utilities with parameters or switches that stop loadhigh.

*NOTE: See DOS HELP, the DOS manual or a third-party DOS reference book for more detail on the commands and parameters discussed below.*

COMMAND OR UTILITY LOADHIGH	PARAMETER/SWITCH THAT STOPS
=====	
=====	
EMM386.EXE	NOHI
(DOS 6.x ONLY) INTERLNK.EXE	/LOW
(DOS 6.x ONLY) POWER.EXE	/LOW
(DOS 6.x ONLY) SMARTDRV.EXE	/L
<i>(NOTE: SmartDRIVE loads into the upper memory area by default.)</i>	





## Setting up CONFIG.SYS to use upper memory blocks.

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

*NOTE: IF USING A THIRD-PARTY MEMORY MANAGER (e.g., QEMM or 386MAX) ONLY: DO NOT use the DOS versions of HIMEM.SYS and EMM386.EXE, or setup CONFIG.SYS as described below. Instead, consult the user manual for the third-party memory manager, and setup CONFIG.SYS as directed by the manual. Use the substitutes for HIMEM.SYS and EMM386.EXE that will come with the memory manager, and delete (or comment out) all of the CONFIG.SYS lines for the DOS memory managers used below if they are already present.*

The following three lines must appear in CONFIG.SYS in the specified sequence to use upper memory blocks (UMBs) *(NOTE: The lines below are numbered only for easy reference to the explanations below. Do not use line numbers in the actual CONFIG.SYS.)*

```
1  DEVICE=C:\DOS\HIMEM.SYS
2  DEVICE=C:\DOS\EMM386.EXE NOEMS
3  DOS=UMB
```

To access the CONFIG.SYS file, do the following:

- 1) Access the MS DOS prompt:
  - a) Choose the 'Start' button to display the Windows 'Start' menu.
  - b) Select 'Programs'.
  - c) Select 'MS-DOS Prompt'.
- 2) Access the CONFIG.SYS file:
  - a) Enter the following at the prompt:  
EDIT C:\CONFIG.SYS
  - b) Press ENTER.

### EXPLANATION OF CONFIG.SYS LINES REQUIRED TO USE UMBS

- 1) HIMEM.SYS is an EXTENDED memory manager. It must load in CONFIG.SYS to provide access to both extended memory and the high memory area (or HMA) To use UMBS, HIMEM.SYS must load BEFORE EMM386.

- 2) EMM386.EXE, the DOS expanded and upper memory manager, runs only on 386 and above computers and can be used to load programs (TSRs) and/or device drivers in the upper memory area (UMA) EMM386 MUST load after HIMEM.SYS, and one of the following two EMM386 parameters MUST be used to load TSRs and/or device drivers high:

- a) NOEMS: The 'NOEMS' parameter provides access to UMBs (permitting use of DEVICEHIGH and LOADHIGH) but does not setup a 64K page frame to simulate expanded memory using extended memory. To use the NOEMS parameter, use the following line in CONFIG.SYS after the HIMEM.SYS line:

```
DEVICE=C:\DOS\EMM386.EXE NOEMS
```

- b) RAM: The RAM parameter provides access to UMBs. It also uses extended memory to simulate expanded memory. The computer must have available extended memory (more than 1MB of total memory) to use this parameter. To use EMM386 with upper memory and expanded memory access, put the following line in CONFIG.SYS:

```
DEVICE=C:\DOS\EMM386.EXE RAM
```

*(NOTE: With no parameters, EMM386 will simulate expanded memory using extended memory. It will NOT provide access to upper memory.)*

- 3) The DOS=UMB or DOS=HIGH, UMB commands provide DOS access to UMBs. To use upper memory blocks to load TSRs and device drivers, the 'DOS=UMB' command MUST be used in CONFIG.SYS. If extended memory is available (i.e., more than 1MB of memory) using the 'DOS=HIGH, UMB' command will save additional conventional memory by loading part of DOS into the HMA (the first 64K (minus 16 bytes) of extended memory)

*NOTE: It is also possible to use the LOADHIGH (or LH) command from the DOS command line, after loading the two required memory managers and using the 'DOS=UMB' command.*



## Example of the output from the MEM/CLASSIFY command:.

Modules using memory below 1 MB:

Name	Total	=	Conventional	+	Upper Memory
-----	-----		-----		-----
MSDOS	17,277 (17K)		17,277 (17K)	0	(0K)
HIMEM	1,168 (1K)		1,168 (1K)	0	(0K)
EMM386	4,144 (4K)		4,144 (4K)	0	(0K)
COMMAND	2,928 (3K)		2,928 (3K)	0	(0K)
win386	100,752 (98K)		4,368 (4K)	96,384	(94K)
APPEND	9,040 (9K)		9,040 (9K)	0	(0K)
MOUSE	24,592 (24K)		24,592 (24K)	0	(0K)
WIN	2,048 (2K)		2,048 (2K)	0	(0K)
COMMAND	3,184 (3K)		3,184 (3K)	0	(0K)
SETVER	512 (1K)		0 (0K)	512	(1K)
IFSHLP	3,904 (4K)		0 (0K)	3,904	(4K)
SMARTDRV	29,024 (28K)		0 (0K)	29,024	(28K)
DOSKEY	4,144 (4K)		0 (0K)	4,144	(4K)
Free	586,368 (573K)		586,368 (573K)	0	(0K)

Memory Summary:

Type of Memory	Total	=	Used	+	Free
-----	-----		-----		-----
Conventional	655,360		68,992		586,368
Upper	133,968		133,968		0
Reserved	393,216		393,216		0
Extended (XMS)	11,400,368		10,351,792		1,048,576
-----	-----		-----		-----

Total memory	12,582,912	10,947,968	1,634,944
--------------	------------	------------	-----------

Total under 1 MB	789,328	202,960	5 86,368
------------------	---------	---------	----------

Largest executable program size	586,352	(573K)
---------------------------------	---------	--------

Largest free upper memory block	0	(0K)
---------------------------------	---	------

MS-DOS is resident in the high memory area.



## Check keyboard.

Check the keyboard by swapping it with another computer that uses a similar keyboard.

1) Test another keyboard on this computer:

- a) Save work and exit program(s) on both computers.
- b) Turn the computers off.
- c) Trace keyboard cable to back of computer and carefully pull keyboard plug straight out.
- d) Obtain the other keyboard.
- e) Locate an arrow or notch on the outer surface of keyboard plug.  
This notch should line up at the top of socket on back of computer.  
*(NOTE: If there is no notch, match the pin configuration on the plug with the pinhole pattern on the socket.)*

- f) Orient the plug to match the socket and carefully insert it into the socket on the back of the computer.

*NOTE: If socket is a PS/2 style connector, ensure the keyboard socket is used (not the mouse socket.)*

**CAUTION:** Do not force the plug into the socket. This could damage the pins on the plug or the socket.

- g) Turn the computer on.
- h) Watch the power on the self test (POST). (If keyboard is not properly switched or connected, the POST will generate a keyboard error.)
- i) Open a word processor.
- j) Type, using most of the keys on the keyboard.
- k) Determine if keyboard is working properly.

2) Test this keyboard on another computer.

- a) Take this keyboard to the other computer.
- b) Locate an arrow or notch on the outer surface of keyboard plug.  
This notch should line up at the top of socket on back of computer.  
*(NOTE: If there is no notch, match the pin configuration on the plug with the pinhole pattern on the socket.)*
- c) Orient the plug to match the socket and carefully insert it into the socket on the back of the computer.

*NOTE: If socket is a PS/2 style connector, ensure the keyboard socket is used (not the mouse socket.)*

**CAUTION:** *Do not force the plug into the socket. This could damage the pins on the plug or the socket.*

- d) Turn the computer on.
- e) Watch the power on self test (POST). (If keyboard is not properly switched or connected, the POST will generate a keyboard error.)
- f) Open a word processor.
- g) Type, using most of the keys on the keyboard.
- h) Determine if the keyboard is working properly.



## Reseat adapter card.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

1) Remove base unit cover:

- a) Turn the power off on computer and all peripherals.
- b) Switch the surge protector off and unplug the power cable from the wall socket.  
  
**WARNING:** *Ensure all components are turned off and power cable is disconnected.*
- c) Pull the base unit out slightly so that the back of the base unit is accessible.
- d) Carefully remove all cables from back of base unit.
  - 1] Check each cable for screw or finger-screw connections. Unscrew connectors.
  - 2] Note the location and orientation of each connector during removal. (If necessary, draw a wiring diagram or tag the end of each cable noting its destination.
  - 3] Gently remove each cable. Do not force or bend connectors to avoid costly damage to the connector or pins.
- e) Remove screws from the top and sides of the back edge of the base unit. Store them together in a safe location.
- f) Grasp the cover along the sides with two hands. SLOWLY and GENTLY slide the cover forward and off. Set it aside.

**CAUTION:** *Watch carefully to ensure parts of cover DO NOT catch on power or ribbon cables inside the base unit.*

- g) Ground yourself by touching the metal side of the base unit encasement with a finger.

2) Locate the adapter card that is not working.

3) Touch the metal encasement of the base unit to ground any static and, grasping the adapter card by its edges.

- a) Press straight down firmly and evenly to ensure card is fully seated in bus slot.
- b) Avoid side-to-side movements (circuit boards crack easily).

4) Reconnect the power cables.

5) Turn on the computer.

6) Run a program that uses adapter card.

- 7) If adapter card appears not to work, reseal adapter card:
- a) Turn off computer and disconnect power and data cables.
  - b) Ensure any cables connected to non-working adapter card are disconnected.
  - c) Remove the screw from the top notch of the mounting bracket on the card.
  - d) Touch the metal encasement to ground any static.
  - e) Grasp the adapter card by its edges.
  - f) Remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily)
  - g) Grasping the adapter card by its edges, reinsert the card bottom (part with the gold-striped bars) into the same slot.
  - h) Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily)
  - i) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - j) Reconnect any cables to the adapter card socket on the back of the adapter card. Secure connector with attached screws.
  - k) Ensure no parts or tools remain in base unit encasement.
  - l) Replace necessary cables (power, keyboard, mouse, etc.).
  - m) Plug the power cable into surge protector or wall outlet.
  - n) Turn on the computer.
  - o) Run program that uses the adapter card and determine if adapter card is operational.





## Recheck DIP switches and jumpers.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

- 1) Remove base unit cover.
- 2) Remove the adapter card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the metal encasement to ground any static.
  - c) Grasp the adapter card by its edges.
  - d) Remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily)
  - e) Lay the adapter card on a static-free surface.
  - f) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
  - g) Read the expansion card manual and verify whether the jumpers or DIP switches are set properly.
  - h) Move Jumpers and/or change DIP Switches, if necessary.
  - i) Touch the metal encasement to ground any static.
  - j) Grasp the expansion card by its edges.
  - k) Insert the card bottom (part with the gold-striped bars) into the free slot.
  - l) Press down firmly until card is completely seated (especially if it is an EISA card) Avoid side-to-side movements when positioning the card (circuit boards crack easily)
  - m) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
- 3) Reconnect power cables.
- 4) Turn on the computer.
- 5) Run a program that uses adapter card.



## Replace toner cartridge in laser printer.

- 1) Turn the laser printer off.
- 2) Open the top of the laser printer by pressing the button to release the latch. *NOTE: Some printers require removing the paper tray first.*  
*CAUTION: If laser printer has been on for an extended time period, several internal components are extremely HOT! Either let printer cool for 15 minutes or be extremely careful not to get burned.*
- 3) Remove the old cartridge:
  - a) Grasp the cartridge and lift it straight out.
  - b) (Optional) Clean dust, dirt and toner from visible parts inside the printer. Consult owner manual for specific locations and instructions on cleaning materials and techniques.
- 4) (Optional) Consider extending the usable life of the old cartridge by several hundred pages prior to discarding or recycling it and installing a new one as follows:
  - a) Grasp the cartridge in the center with one hand and hold it out at full arms-length away from the body over the floor (this minimizes the chances of getting toner dust on clothes and documents).
  - b) Gently tip the cartridge back and forth from side to side (about 45 degrees each way) about 6 times to redistribute the toner evenly throughout the length of the cartridge.
  - c) Reinsert the old cartridge back into the printer gently:
  - d) Close the door of the printer.
  - e) Turn the printer on.
  - f) Run several test prints. If quality problems continue after page 5, repeat this procedure again. If problems do not clear up, recycle or discard the old cartridge and install a new one by proceeding to step 5.
- 5) Install the new cartridge:
  - a) Remove toner cartridge from container.
  - b) Carefully remove all packing material.
  - c) Orient toner cartridge (refer to diagram) and carefully insert it into the opening below the printer door until it is firmly seated.  
*CAUTION: Do not force or jam cartridge. It will fit properly one way.*
  - d) Locate the plastic tab used to seal the cartridge during shipment.

- e) Hold the cartridge in place with one hand and grasp the tap with the other hand pull the long plastic film strip straight and steady away from the cartridge (this uncovers the opening to the toner)
- f) Discard the plastic strip.
- g) Make sure the toner cartridge is fully seated.
- h) Close the lid until the latch clicks.

***CAUTION:** Do not force lid closed. If lid will not close, toner cartridge is NOT seated properly.*

- 6) Refill and reinstall the paper tray(s).
- 7) Turn the laser printer on and watch the POST. Normally this concludes with the printer generating a sample print page with the manufacturer's logo.
- 8) Print several pages (5) of a document before judging the print quality substandard.
- 9) Recycle or discard the old toner cartridge (following local disposal instructions).



## Update or add device to Windows.

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

*NOTE: Be sure to install device drivers for certain devices (e.g., CD-ROM, mouse) in DOS first. This updates the AUTOEXEC.BAT and/or CONFIG.SYS with the necessary driver commands (See device manual for details) Then execute the following steps to update Windows 95 with the new device.*

- 1) Choose the 'Start' button to display the Windows 'Start' menu.
- 2) Select 'Settings'.
- 3) Select 'Control Panel'.
- 4) Select 'Add New Hardware'. (The 'Add New Hardware Wizard' box appears.)
- 5) Follow the directions given by the Wizard.
- 6) Do one of the following:
  - a) Scroll through the list and select the item that matches the device just installed.
  - b) If the item is not listed, choose the 'Have Disk' button. (A disk or several disks should be provided with the new hardware.)
    - 1] Insert the driver diskette accompanying the new device into Drive A and press ENTER (or Drive B--and change 'A:\' to 'B:\').
    - 2] Choose 'Restart Windows' when prompted (this will reboot the computer and restart Windows using the new Windows 95 device driver.
- 7) Try using the new device or run a Windows program that uses the device.
- 8) If device does not work properly do one of the following:
  - a) Check the settings for the device in Windows.
  - b) Review AUTOEXEC.BAT and CONFIG.SYS to ensure required device drivers are correctly installed (See device manual for specifics)



## Update or add device to OS/2.

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

*NOTE: Be sure to install device drivers for certain devices (e.g., CD-ROM, mouse) in DOS first. This updates the AUTOEXEC.BAT and/or CONFIG.SYS with the necessary driver commands (See device manual for details) Then execute the following steps to update OS/2 with the new device.*

- 1) Boot into OS/2.
- 2) Open 'System Setup Folder' under 'OS/2 System'.
- 3) Do one of the following:
  - a) To install an updated driver:
    - 1] Open 'Device Driver Install'.
    - 2] Do one of the following:
      - a] Insert driver diskette in Drive A.
      - b] Insert driver diskette in Drive B and change 'Source Directory' to 'B:\'.
    - 3] Enter the destination drive and directory in the 'Destination Directory' box.
    - 4] Press 'Install'.
  - b) To install a printer:
    - 1] Create a new printer object for the new printer:
      - a] Open 'Templates' under 'OS/2 System'.
      - b] Use mouse button 2 to pick up the 'Printer' icon. Drag it onto the 'Desktop' and drop it (release mouse button). (The 'Create Another Printer' window will open.)
      - c] Check the proper 'Output Port' (e.g., LPT1)
      - d] Press 'Create Another'.
      - e] (Optional) Press 'Yes' in the message window labeled 'Printer' to also load the equivalent Windows printer driver.
      - f] Insert the printer diskettes when prompted.
      - g] Select the printer driver to match the newly installed printer.
      - h] Follow remaining screen instructions to complete object

creation.

- 2] Open the settings notebook for printer object.
  - 3] Select 'Printer Driver' tab.
  - 4] Insert the OS/2 'Printer Disk 1' installation disk in Drive A and double-click on the Drive A icon.
  - 5] Select the appropriate printer driver and drag it onto the desktop.
  - 6] Open the 'Printer Driver' icon to the 'Job Properties' page. Select appropriate settings.
  - 7] Select the 'Output' tab and check appropriate port (e.g., LPT1, COM1)
  - 8] Select the 'Queue Options' page and check the appropriate queue driver.
  - 9] Choose 'Close' when completed.
- c) To install other devices, utilities, fonts and OS/2 system features:
- 1] Open 'Selective Install'.
  - 2] Press 'OK' in the 'System Configuration Window'.
  - 3] Check the box for each feature to be installed.
  - 4] (Optional) Press the feature 'More' button to select a subset of that feature.
  - 5] Press 'OK'.
  - 6] Insert installation diskettes into Drive A as prompted.



## Running DRAM setup.

Setup is a utility for changing hardware-related information that is stored in the CMOS chip. This information tells the operating system and other applications what kind of hardware/devices are available for use.

This system-related configuration information is stored on the CMOS chip. Batteries provide the power to maintain this information even while the computer is turned off.

Using Setup, the user can change the number and type of hard disk drives and floppy drives as well as video type and date, and time of day.

To run Setup:

- 1) Do one of the following, depending on computer model:
  - a) All Pentiums, 486s, 386s, most 286s, PS/2 Model 30 and PS/1. Press a specific keystroke combination while computer is booting up.  
*(NOTE: Look for instructions on screen while computer is booting up.) Often this keystroke combination is CTRL-ALT-ESC, CTRL-ALT-ENTER or CTRL-ALT-S.*
  - b) Early 286s and all PS/2 MCA computers (except PS/2 Model 30 and PS/1) Insert the Boot Reference Diskette into Drive A and press CTRL-ALT-DEL. (Computer will boot into setup utility.)
- 2) Carefully read and follow instructions on the Setup screen for navigating, setting and changing various items.
- 3) The Setup screen usually contains items such as the following:

BIOS SETUP PROGRAM

Date (mm/date/year) Mon, August 1, 1994

Time (hour/min/sec) 10:30:01

Base memory:640KB

Extended memory:2816

Expanded memory:0

Cyln

Head

Wpcom	Lzone	Sect	Size	
Hard disk 0:	Type 40	820	6	820
820	17	41 MB		
Hard disk 1:None				

Floppy drive A:1.2 MB, 5 1/4

Floppy drive B:1.44 MB, 3 1/2

Primary Display: VGA/EGA

Keyboard: Installed

ESC: Exit      Arrow keys to select/edit    F5 to Save/Exit/Reboot

**CAUTION:** Beware of changing the definition of a hard disk type. Changing this is dangerous because entering the wrong type can cause the primary hard disk (e.g., C:\) to seem to disappear.

RECOMMENDATION: Use a utility to make a copy of the computer's CMOS setup information (and the EISA configuration, if applicable) and store it on the System Rescue Diskette in a safe place.





## Check for bad mouse.

Check the mouse by swapping it with another computer that uses a similar mouse.

1) Test another mouse on this computer:

- a) Save work and exit program(s) on the computer.
- b) Shutdown the computer.
  - 1] Choose the 'Start' button to display the Windows 'Start' menu.
  - 2] Select 'Shut down the computer?'.
  - 3] Choose 'Yes'.
- c) Trace mouse cable to back of computer and carefully pull mouse plug straight out.
- d) Obtain the other mouse.
- e) Locate an arrow or notch on the outer surface of mouse plug. This notch should line up at the top of socket on back of computer. *(NOTE: If there is no notch, match the pin configuration on the plug with the pinhole pattern on the socket.)*
- f) Orient the plug to match the socket and carefully insert it into the socket on the back of the computer.

*NOTE: If socket is a PS/2 style connector, ensure the mouse socket is used (not the keyboard socket.)*

**CAUTION:** Do not force the plug into the socket. This could damage the pins on the plug or the socket.
- g) Turn the computer on.
- h) Watch for a message about loading mouse driver during bootup process.
- i) Load the application that uses the mouse.
- j) Attempt to use the mouse.
- k) Determine if mouse is working properly. If this mouse is working correctly, the original mouse used is in need of repair or is defective.

2) Test the mouse on another computer.

- a) Take this mouse to the other computer.
- b) Save work and exit program(s) on the computer.
- c) Shutdown the computer.

- 1] Choose the 'Start' button to display the Windows 'Start' menu.
  - 2] Select 'Shut down the computer?'.
  - 3] Choose 'Yes'.
- d) Locate an arrow or notch on the outer surface of mouse plug. This notch should line up at the top of socket on back of computer. *(NOTE: If there is no notch, match the pin configuration on the plug with the pinhole pattern on the socket.)*
  - e) Orient the plug to match the socket and carefully insert it into the socket on the back of the computer.  
*NOTE: If socket is a PS/2 style connector, ensure the mouse socket is used (not the mouse socket.)*  
*CAUTION: Do not force the plug into the socket. This could damage the pins on the plug or the socket.*
  - f) Turn the computer on.
  - g) Watch for message about loading mouse driver during bootup process.
  - h) Load the application that uses the mouse.
  - i) Attempt to use the mouse.
  - j) Determine if mouse is working properly.



## Locate file.

This section explains how to locate one or more files using a choice of the following tools:

- Windows 95
- DOS 'DIR /B /S' command

Windows 95.

- 1) Choose the 'Start' button to display the Windows 'Start' menu.
- 2) Select 'Find'.
- 3) Select 'Files or Folders'.
  - a) Enter the name of the file in the 'Named:' box.  
*(NOTE: Use wildcards, if appropriate (e.g., test?.bmp or \*.tmp))*
  - b) Select the drive the file is in by clicking on the down arrow in the 'Look in' drop down list box.
- 4) Choose the 'Find now' button.

DOS 'FIND' COMMAND

- 1) Choose the 'Start' button to display the Windows 'Start' menu .
- 2) Select 'Programs'.
- 3) Select 'MS DOS Prompt'.
- 4) Enter CD\ to change directories to the root directory.
- 5) Enter the following command at the DOS prompt:  
DIR /B /S <filename>  
(Where <filename> represents the name of the file to locate.)  
*(NOTE 1: Use wildcards, if appropriate (e.g., test?.bmp or \*.tmp))*  
*(NOTE 2: Leave out the /B parameter to view file size, date and time of file(s) i.e., DIR /S <filename>).*



## **Adjust mouse control settings in Windows.**

- 1) Adjust mouse control settings in Windows 95:
  - a) Change settings for mouse movement and click rate:
    - 1] Choose the 'Start' button to display the Windows 'Start' menu.
    - 2] Select 'Settings'.
    - 3] Select 'Control Panel'.
    - 4] Select the 'Mouse' icon.
    - 5] Change the settings for mouse movement:
      - a] Select the 'Motion' tab. Adjust the horizontal and vertical slider bars to change the rate at which mouse movement moves the cursor on the screen.
    - 6] Change the settings for the mouse click rate:
      - a] Select the 'Buttons' tab. Adjust the double-click speed using the slider bar. Practice setting in the trial box provided. Readjust double-click speed if necessary.
    - 7] Choose 'OK' when done.
  - 2) Try using the mouse to navigate around the screen and open and close several objects. Readjust settings as necessary.



## **DIP switches.**

DIP (Dual In-line Package) switches consist of a bank of 8 switches in a small plastic block mounted on the surface of a board. DIP switches either slide or rock to the on or off position.



## Changing DIP switches.

DIP (Dual In-line Package) switches consist of a bank of 8 switches in a small plastic block mounted on the surface of a board. DIP switches either slide or rock to the on or off position.

- 1) Locate the DIP switch(s) on the board (refer to diagram in manual if necessary)
- 2) Determine the current DIP switch setting and record it on paper (to return to later if necessary)
- 3) Refer to the table or diagram in the manual to determine required setting for the new situation. Write the new setting down for clarity.
- 4) Using a pen tip or small screwdriver, slide or flip the switch to be changed. Move it towards 'ON' to turn in on; away from 'ON' to turn it off.
- 5) Repeat Step 4 for each additional switch that requires changing.



## Computer viruses.

These computer routines are called viruses because their behavior mimics that of biological viruses that infect humans. Computer viruses infect a program and then make the computer behave as if it is sick. Computer viruses may be passed from one program/computer to another via exchanged floppy diskettes, modem transmissions from electronic bulletin boards or network connections.

Some computer viruses are harmless, while others reek massive destruction by crippling computer operations and deleting all data on hard disk. Computer viruses are not anything to play around with; if one is suspected, turn off computer and call for an expert computer technician immediately.



## Test display unit on another computer and video card on this computer.

- 1) Unplug the display unit's power cable from surge protector or wall socket.
- 2) Use a small flat-tip screwdriver to loosen screws that hold the monitor cable onto the connector on back of the base unit. (**TIP:** Trace video data cable from back of display unit to back of base unit.)
- 3) Grasp video cable plug and pull it straight out of socket (**CAUTION:** *Forcing it could damage connector pins or socket; ensure screws are completely loosened.*) Note orientation of the plug to the socket.
- 4) Move the display unit (monitor) out of the way.
- 5) Carry the display unit carefully to another computer with an identical or similar display unit.
- 6) Repeat Steps 1-4 with the other display unit.
- 7) Position the display unit to be tested right-side up near the base unit (make sure the cables will reach)
- 8) Connect the monitor cable to the monitor socket on the back of the base unit.
  - a) Locate the same 15-pin socket the monitor cable was removed from.
  - b) Orient the plug so that it matches the socket.
  - c) Insert the plug into the video card socket until it is firmly seated. **CAUTION:** *Do NOT force it.* If plug does not fit, check plug orientation (it fits only one way) and ensure the correct socket is being used.)
  - d) Do not tighten the securing screws.
  - e) If monitor cable is not permanently attached to display unit, attach it securely.
- 9) Plug the monitor power cable into both the display unit and the surge protector or wall outlet.
- 10) Position the display unit so the screen is visible (leave plenty of slack in cables for minor adjustments)
- 11) Turn on the display unit. Make sure the operation light on the display unit comes on. (If light does not come on, check power cable connections.)
- 12) Turn on the computer.
- 13) Watch the display unit for familiar information and images during bootup.



- 14) If display looks normal here, the display unit is likely OK and the problem is probably elsewhere. If display images are not normal, the display unit is likely faulty (there may also be additional problems)
- 15) Repeat Steps 7-13 with the other display unit on the faulty computer to test the video card in the faulty system.
- 16) If other display unit does not work on faulty system, the video card is likely bad. If it does work, the video card appears to be OK.
- 17) Repeat Steps 1-13 to disconnect the test display unit and replace the other one.



## Replace display adapter (video) card.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

**1) Remove the old video card:**

- a)** Remove the screw from the top notch of the mounting bracket on the card.
- b)** Touch the metal encasement of the base unit to ground any static.
- c)** Grasp the video card by its edges.
- d)** Remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily)
- e)** Place the card in a static-resistant envelope.
- f)** If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.

**2) Install new video card:**

- a)** Remove the video card from its box and from the protective static envelope.
- b)** Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
- c)** Read the video card manual and identify which, if any, settings need to be changed on the card to use the COM port and interrupt chosen in Step 1.
- d)** Move Jumpers and/or change DIP Switches, if necessary.
- e)** Identify an appropriate size expansion slot for the type of video card to be installed. Identify the required slot type by examining the row of connector pins along the bottom of the card. An older adapter may fit an 8-bit slot. Most ISA-based video cards require a 16-bit slot while a VESA Local Bus card requires an even longer slot. Choose an appropriate slot by matching the length and gaps in this row of connector pins with slots on the mainboard within the base unit.
- f)** Remove the rear metal expansion plate cover.
- g)** Touch the metal encasement of the base unit to ground any static.
- h)** Grasp the video card by its edges.
- i)** Insert the card bottom (part with the gold-striped bars) into the free slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily)
- j)** Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw

- hole and tighten it securely.
- k)** (Optional) If installing 2 video cards for a 2-display setup:
    - 1]** Attach the VGA pass-through cable to the pin connector or edge-style connector along the top of the video card.
    - 2]** Make sure the switches are set properly to enable pass-through.
  - 3)** Connect the video cable from the display unit to the socket on the back of the video card.
    - 4)** Secure connector with attached screws.
  - 5)** Check the display unit for a Analog/TTL switch.
  - 6)** Make sure it is set to 'Analog' (unless it is an old digital display)

***CAUTION:** Setting this switch in the wrong position could damage the display unit.*
  - 7)** (Optional) Some high-end video cards and displays ship with BNC connectors (twist on/off) labeled RGB (Red, Green, Blue). If supplied, they should be used because they provide better color separation and screen appearance. 2 types are available:
    - a)** If RGB, connect the red cable to the color input socket marked 'Red' and so on for the others.
    - b)** If composite (Ext. sync) connect the white or gray cable to 'Horizontal' and the black cable to 'Vertical'.
  - 8)** Install the new video driver.
  - 9)** Test the new configuration:
    - a)** Make sure no parts or tools remain in encasement of the base unit.
    - b)** Replace all necessary cables (power, keyboard, mouse, etc.).
    - c)** Plug power cable into surge protector or wall outlet.
    - d)** Turn on the computer and related peripherals one at a time. (System should boot normally, assuming there are no memory or address conflicts.)
    - e)** Access the MS DOS prompt:
      - 1]** Choose the 'Start' button to display the Windows 'Start' menu.
      - 2]** Select 'Programs'.
      - 3]** Select 'MS-DOS Prompt'.
    - f)** Insert the video driver diskette that came with the video card into Drive A and enter the following:

A:
    - g)** Press ENTER.
    - h)** Enter the following at the A:> prompt:

INSTALL or SETUP (Refer to program instructions) **i)** Press ENTER.
    - i)** Follow installation/setup instructions.
    - j)** If a specific memory address was set on card, exclude this area from Windows management by entering the following line in the '386ENH' section of SYSTEM.INI file:

- 1] Enter the following at the C:> prompt:  
EDIT C:\SYSTEM.INI
- 2] Press ENTER. (The SYSTEM.INI file appears.)
- 3] Select the 'Search Menu' and select 'Find'.
- 4] Enter the following in the 'Find What:' box.
- 5] 386ENH
- 6] Choose 'OK'.
- 7] Add the following line to the bottom of the 386ENH section:  
EMMExclude=xxxx-xxxx  
  
(Where xxxx-xxxx is the video card address (e.g., C800-CFFF) (This prevents Windows from using the video portion of memory preventing lockups and crashes.)
- 8] Reboot or restart the computer.
- g) Test the video card, driver installation and the display configuration by running installed programs.
- 7) If display does not work right or a message about address or interrupt (IRQ) conflicts during use or another device (e.g., mouse) fails:
  - a) Turn the computer system off and check seating of the video card and all cable connections.
  - b) Reread the settings instructions and recheck the DIP Switch and the Jumper settings.
  - c) Make sure the proper video driver is selected.
  - d) Run a hardware status program (e.g., Microsoft Diagnostics (MSD) to identify port and interrupt (IRQ) assignments. To run MSD, do the following:
    - 1] Access the MS DOS prompt:
      - a] Choose the 'Start' button to display the Windows 'Start' menu.
      - b] Select 'Programs'.
      - c] Select 'MS-DOS Prompt'.
    - 2] Enter the following command at DOS prompt:  
C:\DOS\MSD
    - 3] Press ENTER.
  - e) Identify interrupt (IRQ) assignments using the IRQ Status screen.
  - f) Contact video card manufacturer for technical support.
  - g) If all else fails:
    - 1] Reinstall the original video card.
    - 2] Reboot from the System Recovery Diskette.
    - 3] Restore the original configuration.
- 8) Replace base unit cover.
- 9) Create/update a System Rescue Diskette that includes necessary drivers, updated AUTOEXEC.BAT, CONFIG.SYS, WINDOWS.INI and SYSTEM.INI files.





## Reseat video card.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

1) Remove base unit cover:

- a) Turn off the computer and all peripherals such as the monitor and printer.
- b) Switch the surge protector off and unplug the power cable from the wall socket.

**WARNING:** *Ensure all components are turned off and power cable is disconnected.*

- c) Pull the base unit out slightly so that the back of the base unit is accessible.
- d) Carefully remove all cables from the back of base unit.
  - 1] Check each cable for screw or finger-screw connections. Unscrew the connectors.
  - 2] Note the location and orientation of each connector during removal. (If necessary, draw a wiring diagram or tag the end of each cable noting its destination.)
  - 3] Gently remove each cable. Do not force or bend connectors to avoid costly damage to the connector or pins.
- e) Remove screws from the top and sides of the back edge of the base unit. Store them together in a safe location.
- f) Grasp the cover along the sides with two hands. SLOWLY and GENTLY slide the cover forward and off. Set it aside.

**CAUTION:** *Watch carefully to ensure parts of cover DO NOT catch on power or ribbon cables inside the base unit.*

- g) Ground yourself by touching the metal encasement of the base unit with your finger.
- 2) Locate video card (card with video cable attached at rear of base unit) Touch the metal encasement of the base unit to ground any static.
- 3) Grasping the video card by its edges. Press straight down firmly and evenly to ensure card is fully seated in bus slot. Avoid side-to-side movements (circuit boards crack easily)
- 4) Reconnect the power cables and turn on the computer.
- 5) If the display image is still not visible, reseat the video card:
- a) Turn off the computer and disconnect power cables.
  - b) Remove the monitor cable from back of video card.

- c)** Remove the screw from the top notch of the mounting bracket on the card.
- d)** Touch the encasement of the base unit to ground any static.
- e)** Grasping the video card by its edges.
- f)** Remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily) Grasp the video card by its edges.
- g)** Reinsert the card bottom (part with the gold-striped bars) into the same slot. Press straight down firmly until card is completely seated. Avoid side-to-side movements when positioning the card (circuit boards crack easily)
- h)** Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
- i)** Reconnect the monitor cable from the display unit (monitor) to the socket on the back of the video card. Secure connector with attached screws.
- j)** Make sure no parts or tools remain in encasement of the base unit.
  - k)** Replace all necessary cables (power, keyboard, mouse, etc.).
  - l)** Plug power cable into surge protector or wall outlet.
  - m)** Turn on the computer.
  - n)** Determine if the display image is visible.



## Moving jumpers.

Jumpers are small box-shaped conducting sleeves that slide on and off small, metal vertical pins on circuit boards. Positioning the jumper on different sets of pins instructs the board or computer to behave differently.

- 1) Locate the jumpers on the board (refer to diagram in the manual if necessary)
- 2) Look on the board at the base of the pins for labels identifying each of the pins (e.g., J1, J2, etc.).
- 3) Determine the current jumper pin setting on the board.
- 4) Refer to table or diagram in the manual to determine required jumper setting for the new situation. (If manual is unavailable, contact the manufacturer for technical support or identify correct setting through trial and error *(NOTE: 'Closed' and 'On' are synonymous, as are 'Off' and 'Open') .*
- 5) To move a jumper:
  - a) Grasp it with tweezers or needle-nose pliers.
  - b) Slide it off gently.
  - c) Carefully align it and slide it down onto the new jumper setting pins. *NOTE: If manual says to remove jumper, DO NOT remove it completely. Simply hang it on a single pin so it will be available for future use.*
- 6) If mainboard jumper has wires attached move it in the same fashion (The red wire always attaches to pin 1)





## **DMA channel.**

Direct Memory Access (DMA) channels are lines of communication that allow selected components or devices to directly access segments of memory without having to go through the CPU. This increases the speed at which these devices can operate.



## UMA or upper memory.

UMA indicates the Upper Memory Area. The components of UMA are sometimes referred to as UMBs, for Upper Memory Blocks.

The memory between 640 KB and 1024 KB (the region between 'Conventional' and 'Extended' memory) is known as 'Upper Memory.' DOS sees memory as being divided into several different types. The first 640 KB of memory is commonly referred to as 'conventional' or 'low' memory. Memory above 1 MB is called 'expanded' or 'extended' memory, depending upon how it is accessed. The Upper Memory Area is usually used to load TSRs (Terminate and Stay Resident) and device drivers. This will conserve conventional memory for use by DOS programs.

*NOTE: Only a PC with an 80286 or better CPU has 'Extended Memory.'*



## **TERMINATE and STAY RESIDENT (TSR) programs or utilities.**

A TSR, or a 'Terminate and Stay Resident' program, is a program that loads (from AUTOEXEC.BAT or the command line) and remains in memory at all times (until explicitly deactivated or the computer is turned off) Some TSRs are 'pop-up' utilities like calculators or task switchers, that load into memory, remain there in the background, and are immediately activated by pressing a special keystroke combination. Other TSRs load into memory and serve as middlemen between programs and the disk (e.g., 'on the fly' disk compression programs like DoubleSpace, Stacker, or SuperStar) For example, when another program tries to write to the disk, the disk compression TSR intercepts the data, compresses it, and writes only the compressed form to the disk. No user action is required for this type of TSR to do its work.



## Creating multiple boot configurations under MS-DOS 6.x.

This section provides further information, and some examples, to help create multiple boot configurations with MS-DOS 6.x.

*NOTE: A COMMON block can be established at the beginning and/or the end of CONFIG.SYS. However, some commands must be loaded first (e.g., the SHELL specification, HIMEM.SYS, EMM386.EXE) Therefore, DO NOT move these commands to the end of CONFIG.SYS. Other common commands will work fine in a common block at the end of CONFIG.SYS.*

- 1) Access the MS DOS prompt:
  - a) Choose the 'Start' button to display the Windows 'Start' menu.
  - b) Select 'Programs'.
  - c) Select 'MS-DOS Prompt'.
- 2) Make a backup copy of the CONFIG.SYS file:
  - a) Enter the following command at the DOS prompt to save the original CONFIG.SYS file:  

```
COPY C:\CONFIG.SYS C:\CONFIG.OLD
```
  - b) Press ENTER.
- 3) Make a backup copy of the AUTOEXEC.BAT file:
  - a) Enter the following command at the DOS prompt to save the original AUTOEXEC.BAT file:  

```
COPY C:\AUTOEXEC.BAT C:\AUTOEXEC.OLD
```
  - b) Press ENTER.
- 4) Print a copy of the CONFIG.SYS file:
  - a) Enter the following at the MS DOS prompt:  

```
EDIT C:\CONFIG.SYS
```
  - b) Press ENTER.
  - c) Select the 'File' menu and select 'Print'.
  - d) Select 'Complete Document'.
  - e) Choose 'OK'.
  - f) Select the 'File menu and select 'Exit'.
- 5) Print a copy of AUTOEXEC.BAT.

- a) Enter the following at the MS DOS prompt:  
EDIT C:\AUTOEXEC.BAT
  - b) Press ENTER.
  - c) Select the 'File' menu and select 'Print'.
  - d) Select 'Complete Document'.
  - e) Choose 'OK'.
  - f) Select the 'File menu and select 'Exit'.
- 6) Review the configuration/installation section of each application's user manual to identify the required CONFIG.SYS and AUTOEXEC.BAT lines to setup an optimal configuration for that application.
  - 7) Write new AUTOEXEC.BAT and CONFIG.SYS files for each application that contain ONLY the commands necessary to support the configuration determined in step 6).
  - 8) Review each CONFIG.SYS file and identify common commands. Add any additional items that should always be available in all configurations (e.g., DOSKEY) to the common command list.
  - 9) Compare all the configuration file sets to determine if any are similar enough to use a single shared one (eliminating the other)
  - 10) Edit CONFIG.SYS and assemble the following parts into a new multi-config CONFIG.SYS file:
    - a) Create a menu with 'menuitems' for each different configuration.  
EXAMPLE:  
[MENU] MENUITEM=Red  
MENUITEM=Green  
MENUITEM=Blue  
SUBMENU=Individual Users  
MENUDEFAULT=RED, 30  
MENUCOLOR=15,1  
NUMLOCK=OFF  
  
*NOTE: This example defines a menu with 4 entries: The first three menuitems start different configurations (defined below) The 4th leads to a submenu with configurations for different users.*  
  
After 30 seconds the configuration will be set to RED as the default. The menu will appear in white (15) on a blue (1) background.
    - b) Create a 'COMMON' block that contains the shared CONFIG.SYS commands for each configuration that MUST be loaded first (see below).
    - c) Create separate blocks containing distinct commands for each menu item, preceded by a block label (see below)
    - d) Create a final 'COMMON' block to contain shared commands added later (e.g., when new applications are installed) (see below). EXAMPLE  
(continued)  
[COMMON] DOS=HIGH  
BUFFERS=30

DEVICE=C:\DOS\HIMEM.SYS

[RED] FILES=40

DEVICE=C:\DOS\EMM386.EXE 1024

[GREEN] FILES=30

DEVICE=C:\NET\NETWORK.SYS

[BLUE] FILES=50

SHELL=C:\DOS\COMMAND.COM /E:1024 /P

DEVICE=C:\CDROM\CDROM.SYS /D:MSCD000

[COMMON]

**11) Save the new CONFIG.SYS file:**

- a)** Select the 'File' menu and select 'Save'.
- b)** Select the 'File' menu and select 'Exit'.

**12) Edit AUTOEXEC.BAT and assemble these components into blocks that execute a different set of commands for each different configuration, as follows:**

- a)** List commands common to all blocks first in the file (see below).
- b)** Enter the following command next:

GOTO %config%

(It tells DOS to find the block matching the value of the environment variable, and to execute only the commands in that block.)

- c)** Create command blocks for each different configuration that contain commands specific to that configuration. End each block with the statement 'GOTO END'. (See below) EXAMPLE

C:\DOS\SMARTDRV.EXE

SET TEMP=C:\TEMP

C:\DOS\MSAV

GOTO %CONFIG%

:RED

PATH=C:\DOS;C:\LOTUS

123

GOTO END

:GREEN

PATH=C:\DOS;C:\DESKPUB

```
C:\DOS\MOUSE.COM
```

```
PUBLISH
```

```
GOTO END
```

```
:BLUE
```

```
PATH=C:\DOS;C:\UTILS;C:\NETWORK
```

```
NET LOGON RICH /Y
```

```
GOTO END
```

```
:END
```

*NOTE: This AUTOEXEC.BAT always loads SmartDrive first, sets TEMP, and starts the MS antivirus program. Then, it moves to the block whose title matches the current value of the environment variable CONFIG, executes those commands (bypassing commands under other named blocks) and goes to the end.*

**13)** Edit the new AUTOEXEC.BAT file:

- a)** Select the 'File' menu and select 'Save'.
- b)** Select the 'File' menu and select 'Exit'.

**14)** Restart the computer.

**15)** Test each configuration to make sure they run properly.

**16)** Create/update a System Rescue Diskette that includes necessary drivers, and updated AUTOEXEC.BAT, CONFIG.SYS, WIN.INI and SYSTEM.INI files.

*NOTE: MemMaker, the DOS program for analyzing AUTOEXEC.BAT and CONFIG.SYS to optimize memory, will not support multiple configuration files. Run MemMaker separately on the files that contain only one configuration at a time. Then, map those optimized results back into the multiple configuration version.*



## DOS 4.x example configurations.

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

*NOTE: The following three configurations are examples of the DOS 4.x setup for different selections from the 'Specify Function and Workspace' menu. After each selection, the CONFIG.SYS and AUTOEXEC.BAT files setup for that selection are given.*

Selection: Minimize DOS and maximize program workspace.

CONFIG.SYS	AUTOEXEC.BAT
----- -----	
BREAK=ON	SET COMSPEC=C:
\DOS\COMMAND.COM	
FILES=8	VERIFY OFF
LASTDRIVE=E	PATH C:\DOS
SHELL=C:\DOS\COMMAND.COM /P /E:256	APPEND /E
PROMPT \$p\$g	
VER	

Selection: Balance DOS and program workspace.

CONFIG.SYS	AUTOEXEC.BAT
----- -----	
BREAK=ON	SET COMSPEC=C:
\DOS\COMMAND.COM	
BUFFERS=20	VERIFY OFF
FILES=20	PATH C:\DOS
LASTDRIVE=E	APPEND /E
SHELL=C:\DOS\COMMAND.COM /P /E:256	APPEND C:\DOS
DEVICE=C:\DOS\ANSI.SYS	PROMPT \$p\$g



INSTALL=C:\DOS\FASTOPEN.EXE c:=(50,25) VER

Selection: Maximize DOS and minimize program workspace.

CONFIG.SYS

AUTOEXEC.BAT

-----  
-----

BREAK=ON  
\DOS\COMMAND.COM

SET COMSPEC=C:

BUFFERS=25,8

VERIFY OFF

FILES=20

PATH C:\DOS

LASTDRIVE=E

APPEND /E

SHELL=C:\DOS\COMMAND.COM /P /E:256

APPEND C:\DOS

DEVICE=C:\DOS\ANSI.SYS /X

PROMPT \$p\$g

INSTALL=C:\DOS\FASTOPEN.EXE c:=(150,150) VER

*NOTE: When one of the 'Specify Function and Workspace' selections is made, the system files are replaced with the CONFIG.SYS and AUTOEXEC.BAT given above.*



## Cache.

A 'cache' is a way to increase the speed of data transfer to and from hard disks or other input/output devices. The computer sets aside a memory region in system RAM or in the memory of the hardware device (e.g., a hard disk or CD-ROM controller) and a 'cache' program uses this memory region to temporarily store data. Later, when the processor has more time available, or specifically needs the data, the cache program transfers the data in the cache to its eventual destination.

For example, a hard disk cache sets up a region in RAM that it uses to temporarily store data that is read from (or perhaps written to) the hard disk. When the computer needs data from the disk, it checks the hard disk cache first; then checks the actual disk. Since memory access is typically much faster than disk access, data in the cache is used more quickly.



## MEMMAKER.INF file default options example:.

...explanatory text from the start of the file has been deleted...

```
;
;
*****
*
;
;  default options
;
; #SPECIFYTSR
; #HIGHSCAN
; #WINDOWSOPT
; #MONOCHROME
; #NOKEEPEMM
; #NOMOVEXBDA  <== The 'NOMOVEXBDA' line.  The semi-colon makes this line
; #EMS          a comment.  When it is removed, the NOMOVEXBDA option
;                is enabled.
;
*****
*
```

...other options below have been deleted from this example...



## Examples of programs that require SETVER.EXE to run:.

The following programs need the file SETVER.EXE in order to run:

PROGRAM NAME	VERSION, CONFIGURATION, OR OTHER NOTES	DOS VERSION EXPECTED
-----		
--		
ACCESS.EXE 4.0	Standard configuration	
(version 1.92 or earlier) 4.0	ArcNet configuration	
(version 1.96 or earlier) 4.0	EtherNet configuration	
(version 1.96 or earlier)		
FOCUS.EXE 4.01		
GEOS.EXE 4.0	America Online	
LOTUS 1-2-3 3.30	version 2.01 of Lotus 1-2-3	
MSCDEX.EXE 4.01	version 2.2	
PCBFAST.EXE 4.01	version 1.25 (Intelligent Devices Corporation)	
PLAYER.EXE 4.0	Chinon CD-ROM Music Player	
PRODIGY.EXE 4.01	Prodigy Services	

TURBO.EXE included with NEC-DOS version 3.3  
3.30

*(NOTE: TURBO.EXE should be copied to the upgraded MS-DOS subdirectory)*

10NET.EXE DCA 10Net networks  
4.0

10NET16.EXE DCA 10Net networks  
4.01



## Tip for finding lines in CONFIG.SYS and/or AUTOEXEC.BAT that were changed.

**WARNING:** Any changes made to these files will seriously affect the performance and operation of your computer.

- 1) To find these lines more easily, check if the application's INSTALL program made a backup of CONFIG.SYS and/or AUTOEXEC.BAT in the root directory:
  - a) Access the MS DOS prompt:
    - 1] Choose the 'Start' button to display the Windows 'Start' menu.
    - 2] Select 'Programs'.
    - 3] Select 'MS-DOS Prompt'.
  - b) Enter the following at the MS-DOS prompt:  
DIR C:\CONFIG.\*  
(A list of CONFIG files appear)
  - c) Determine if there are any other CONFIG files other than CONFIG.SYS.
  - d) Enter the following at the MS-DOS prompt:  
DIR C:\AUTOEXEC.\*  
(A list of AUTOEXEC files appear) **e)** Determine if there are any other AUTOEXEC files other than AUTOEXEC.BAT.
- 2) Compare the backup CONFIG.SYS (e.g., CONFIG.OLD) or the backup AUTOEXEC.BAT (e.g., AUTOEXEC.OLD) to the current files to find where changes were made.

*NOTE: Most applications make a backup copy of CONFIG.SYS and AUTOEXEC.BAT before changing them.*

*NOTE: Print a copy of the old and new AUTOEXEC.BAT and CONFIG.SYS to make the comparison easier.*



## **BIOS.**

BIOS (Basic Input Output System) is a chip containing firmware (program burned into a chip) used to store hardware configuration information, run the Power On Self Test (POST) and interact with the operating system for the computer.



## DOS commands and utilities that do not work with doublespace.

Some DOS commands or other utilities SHOULD NOT be used on a hard disk that has been compressed with DoubleSpace (or DOS 6.22's DriveSpace) A list of many of these commands is given below.

DoubleSpace provides its own utilities to use on compressed drives. Also, most newer file/disk utilities are designed to be compatible with DoubleSpace compressed drives (e.g., MS ScanDisk, Norton Utilities 8.0 for Windows/DOS, and the newer versions of PC Tools) Most of the older versions of these utilities SHOULD NOT be used with DoubleSpace.

*NOTE: Some of the commands listed (e.g., CHKDSK) will automatically start the DoubleSpace version to check compressed drives. Check HELP, DOS documentation, or the documentation for the third-party utility for more details.*

COMMAND NOT TO USE	COMMAND TO USE
=====	
=====	
CHKDSK /CHKDSK	DBLSPACE
DEFRAG /DEFRAGMENT	DBLSPACE
DELETE (only if trying to delete an entire volume) /DELETE	DBLSPACE
FASTOPEN (during DoubleSpace INSTALL) FORMAT /FORMAT	DBLSPACE
NDD (Norton Disk Doctor, vers before 7.x) later)	SCANDISK or NDD (vers 7.x or later)
WIPEINFO (The Norton utility)	
Any other file/disk utilities that do not say they are DoubleSpace compatible.	





## Page frame.

Expanded memory is used by addressing memory 'pages' (i.e., 64K) in a 'frame' that is setup in the computer's upper memory area. The memory address of this 'page frame' is setup by the CONFIG.SYS line that loads the memory manager (e.g., EMM386.EXE)

To use 'expanded' memory, the computer uses the 'page frame' to access 64K of memory at a time. For example, if the computer has an expanded memory board with a sixteen banks of 64KB memory chips, the memory manager uses the 'page frame' to access one 64KB bank at a time. The banks of memory chips on the expanded memory board are not assigned permanent memory addresses. When more memory is needed, the expanded memory manager 'swaps' pages of memory --- it uses the 'page frame' to access a different 64KB memory bank.

*NOTE: With MS-DOS's EMM386.EXE, expanded memory is simulated by using extended memory.*



## Industry standard port configurations.

### SERIAL PORTS

Port	Address	Interrupt
COM1	03F8h	IRQ4
COM2	02F8h	IRQ3
COM3 *	03E8h	IRQ4
COM4 *	02E8h	IRQ3

\* Available only with DOS 3.3 and later.

### PARALLEL PORTS

Port	Address	Interrupt
LPT1	3BCh	IRQ7
LPT2	378h	IRQ5
LPT3	278h	None

### NOTES and TIPS:

- 1) There are 4 COM ports, but only 2 can be in use simultaneously. COM1 and COM3 share the same interrupt, as do COM 2 and COM 4.
- 2) Two devices that share an interrupt will conflict with each other.
- 3) If there are NO I/O cards in the base unit, the default addresses and the IRQs will probably work OK.
- 4) If installed devices (e.g., mouse or internal modem card) use IRQs 3, 4, 5, or 7, adjustments will be required on card to prevent interrupt conflicts.
- 5) Make sure mouse is not using an COM port that is sharing an interrupt with another device (e.g., COM 1 and 3 share interrupt 4)
- 6) If both COM1 and COM2 (or COM1 and COM4 or COM2 and COM3) are in use, install an A/B switch on one COM line and manually switch between devices.
- 7) If device x is installed on COM1 and device y is installed on COM2 and they conflict, try reversing the assignments (i.e., device x to COM2 and device y to COM1)
- 8) Change the DIP switches or move jumpers on I/O card to change port addresses and IRQs.
- 9) Make sure the modem and/or the printer Setup in Windows and the

application software are properly set to direct output to the desired port.



## **Jumpers.**

Jumpers are small box-shaped conducting sleeves that slide on and off small, metal vertical pins on circuit boards. Positioning the jumper on different sets of pins instructs the board or computer to behave differently.



## IRQ conflicts involving serial and parallel ports.

An interrupt is a mechanism for a peripheral, such as a printer, mouse or monitor, to communicate with the computer. For example, when a mouse is moved, it sends an interrupt to the computer to tell it to update the location of the mouse pointer on the screen. Device interrupt conflicts occur when two or more devices attempt to use the same interrupt simultaneously.

**CAUTION:** *Microsoft Diagnostics (MSD) (and some other utilities) report standard interrupt (IRQ) assignments for serial ports rather than determining the actual interrupt being used. If non-standard interrupt assignments are suspected, physically check the interrupt settings on the card or device.*

Below is a table listing standard port address and interrupt assignments.

### Suggestions to Resolve IRQ Conflicts

Try one of the following, in sequence, until problem is solved:

- 1) Try assigning one serial device to COM1 (or COM3) and the second to COM 2 (or COM4)
- 2) Assign one conflicting peripheral to IRQ 5 or IRQ 7 (If computer is 286 or higher CPU model)
- 3) Ensure mouse is not using an COM port that is sharing an interrupt with another device (e.g., COM 1 and 3 share interrupt).
- 4) If device x is installed on COM1 and device y is installed on COM2 and they conflict, try reversing the assignments (i.e., device x to COM2 and device y to COM1)
- 5) Use trial and error to find an IRQ that works.

*NOTE: If an IRQ that is in use is inadvertently chosen, no harm is done; the other device simply will not work. Keep trying different IRQs until one works without creating other conflicts.*

### Industry Standard Port Configurations

#### SERIAL PORTS

Port	Address	Interrupt
COM1	03F8h	IRQ4

COM2	02F8h	IRQ3
COM3 *	03E8h	IRQ4
COM4 *	02E8h	IRQ3

\* Available only with DOS 3.3 and later.

#### PARALLEL PORTS

Port	Address	Interrupt
LPT1	3BCh	IRQ7
LPT2	378h	IRQ5
LPT3	278h	None

#### NOTES and TIPS:

- 1) There are 4 COM ports, but only 2 can be in use simultaneously. COM1 and COM3 share the same interrupt, as do COM 2 and COM 4.
- 2) Two devices that share an interrupt will conflict with each other.
- 3) If there are NO I/O cards in base unit, the default addresses and IRQs will probably work OK.
- 4) If installed devices (e.g., mouse or internal modem card) use IRQs 3, 4, 5, or 7, adjustments will be required on card to prevent interrupt conflicts.
- 5) If both COM1 and COM2 (or COM1 and COM4 or COM2 and COM3) are in use, install an A/B switch on one COM line and manually switch between devices.
- 6) Change DIP switches or move jumpers on I/O card to change port addresses and IRQs.
- 7) Ensure modem and/or printer Setup in Windows, OS/2 and application software are properly set to direct output to desired port.



## Compressed disks.

Software compression programs (e.g., DoubleSpace) exist that can store program and data files on disks (hard disks or floppy disks) in a compressed format that takes up only about half the space as the original program or data file. Compressed disks or compressed volumes are created using a program, like DoubleSpace, and once created, behave just like a normal disk volume (e.g., reference, reading, writing and running programs). DoubleSpace creates a special compressed volume file (CVF) that masquerades as a real drive while residing on a host drive. Files maintained on a compressed drive are actually stored in a compressed format inside the CVF by the compression program.



## **File fragmentation.**

DOS attempts to use every empty portion of disk space when writing a file to disk. This means that a single file may be split into many small pieces stored in many locations across the hard disk.

Ordinarily this does not effect the usability of the file. However, it does slow down subsequent read and write actions on this file, since its parts must be gathered from many, often widely separated locations. When many files (especially important ones) become fragmented, hard disk performance suffers.

The remedy is to run a disk defragmenting program that reassembles file parts into a contiguous whole, and rewrites the file to the disk as a contiguous block. When this is done to a badly fragmented disk, dramatic performance enhancements are observable.

Hard disks should be defragmented weekly: more often (daily) if used a lot, and less often (monthly) if used rarely. Also, defragmenting a hard disk before installing new large application packages is recommended, so that the application can be installed in a contiguous space.

Windows 95 has its own defragmenting program. To execute this program, do the following:

- 1) Choose the 'Start' button to display the Windows 'Start' menu.
- 2) Select 'Programs'.
- 3) Select 'Accessories'.
- 4) Select 'System Tools'.
- 5) Select 'Disk Defragmenter'. (The 'Select Drive' dialog box appears.)
- 6) Choose 'OK'.
- 7) The 'Disk Defragmenter' program what percentage of the drive selected is fragmented.
- 8) Choose the 'Start' button to defragment the drive.
- 9) Once 'Disk Defragmenter' is complete, it will ask if you want to defragment another drive. Select the appropriate answer.





## DOS-OS/2 partitioning example.

The following table shows a hypothetical allocation of partitions for a disk that is bootable from both DOS.

Alias	Status	Access	FS Type	Size (MB)	BOOT
MGR	Startable	Primary	Boot Manager	1	
DOS 6.2	Selectable	Primary	FAT 16	20	
OS/2 2.1	Selectable	Primary	FAT 16	32	
Sharable	None	Logical	FAT 16	220	

*NOTE: 'Bootable' means that the partition can be selected to boot from the Boot Manager menu.*



## Select a math coprocessor.

A Math Coprocessor is an auxiliary computational unit that excels at floating-point mathematical calculations (better than general-purpose CPUs). It may be implemented within the CPU chip (e.g., Pentium) or in a separate Chip (e.g., 487).

The following table matches CPU chips with supporting Math Coprocessors:

CPU Chip	Math Coprocessor
286	287
386SX	387SX
386DX	387DX
486DX	Already built in CPU chip
486SX	487
Pentium	Already built in CPU chip



## **Adaptec SCSI host adapters.**

### MODEL TYPES

The Adaptec AHA-1540 and 1542 series adapters are popular SCSI hard disk controllers because they can connect SCSI devices to ISA and EISA type PC buses. The only difference between the AHA-1540 and AHA-1542 models is that the AHA-1542 has a floppy disk controller built into the card.

- The AHA-1540A and 1542A models are obsolete and not supported under Windows NT.
- The AHA-1540B and 1542B models are no longer manufactured but are supported under Windows NT.
- The AHA-1540C and 1542C models are the latest models and are supported under Windows NT.



## Recommended default Adaptec settings.

ADAPTEC 1540B, 1542B, 1540C, and 1542C should be installed using the default settings. This table shows factory default settings for these models with differences between the two models noted. Also, the range of possible settings is included where appropriate:

Setting	Default	Range of Options
-----	-----	-----
SCSI Address	7	0, 1, 2, 3, 4, 5, 6, 7
SCSI Parity	Enabled	
Terminators	Installed (B Series) Enabled (C Series)	
DMA Channel	5	0, 5, 6, 7
Interrupt Channel	11	9, 10, 11, 12, 14, 15
AT Port Address	330h	130h, 134h, 230h, 234h, 330h, 334h
AT BIOS Address	DC000h, Enabled	DC000h, D8000h, D4000h, D0000h, CC000h, C8000h
DMA Transfer Speed	5 MB/second	



## Install/replace I/O card.

**CAUTION:** *The installation, diagnostic or maintenance tasks below should be performed by a qualified computer technician.*

**NOTE:** *If removing an old I/O card is not required, skip to Step 3 for installation steps.*

- 1) Remove base unit cover.
- 2) Remove the old I/O card:
  - a) Remove the screw from the top notch of the mounting bracket on the card.
  - b) Touch the encasement of the base unit to ground any static.
  - c) Grasp the I/O card by its edges.
- d) Remove the card by pulling straight up on it gently but firmly. Avoid side-to-side movements (circuit boards crack easily)
  - e) Place the card in a static-resistant envelope.
  - f) If not inserting a replacement card in this slot, replace the rear metal slot cover and secure it in place with a screw.
- 3) Install new I/O card:
  - a) Remove the I/O card from its box and from the protective static envelope.
  - b) Locate the jumpers or DIP switches on the card and lay the card down on the static envelope with the jumpers/DIP switches in view.
  - c) Read the I/O card manual and identify which, if any, settings need to be changed on the card for this particular computer.
  - d) Move Jumpers and/or change DIP Switches, if necessary.
  - e) Identify a free expansion slot of appropriate size and remove the rear metal slot cover.
  - f) Touch the encasement of the base unit to ground any static.
  - g) Grasp the I/O card by its edges.
- h) Insert the card bottom (part with the gold-striped bars) into the free slot. Press down firmly until card is completely seated (especially if it is an EISA card) Avoid side-to-side movements when positioning the card (circuit boards crack easily)
  - i) Insert the screw, previously removed from the rear metal slot cover, into the top notch of the mounting bracket on the card and the screw hole and tighten it securely.
  - j) If the I/O card attaches to another device, do the following:
    - 1] Connect the two devices using the supplied ribbon cable.

- 2] Check the manual to verify connector orientation.
  - 3] Gently insert the cable connector into the card connection and the other device.
  - k) Attach additional ports to back of base unit in provided 9-pin or 25-pin holes, if desired.
  - l) Connect ribbon cables between appropriate pins on the I/O card and the ports.
  - m) Attach desired peripherals, such as the printer and monitor, to the new ports.
- 4) Test the new configuration:
- a) Make sure no parts or tools remain in encasement of the base unit.
  - b) Replace necessary cables (power, keyboard, video)
  - c) Plug in the power cable.
  - d) Turn on the computer and the related peripherals one at a time.
  - e) Run hardware diagnostic utility (e.g., Microsoft Diagnostics (MSD)):
    - 1] Select 'Serial Ports'.
    - 2] Determine if all ports are active and seen by system.



## Using MemMaker.

MemMaker determines the optimum memory configuration for the computer.

Run it when the computer is first setup, after changing operating systems, and after adding new programs or devices to the system.

To use MemMaker:

- 1) Exit all programs, including Windows and DOS Shell.

2) Enter the following at the C:> DOS prompt:

MEMMAKER

- 3) Select 'Express Setup' (unless very experienced in memory management)
- 4) When asked if any programs require expanded memory (EMS) answer Yes or No (usually No)
- 5) Answer several questions about Windows (e.g., where it is installed).
- 6) Wait for MemMaker to perform, as follows:

- a) MemMaker reboots the PC.
- b) MemMaker analyzes the system to determine optimum memory setup.
- c) MemMaker rewrites the AUTOEXEC.BAT and CONFIG.SYS files.
- d) MemMaker reboots the system again (Press 'Enter' key to proceed).

7) MemMaker asks if system is working properly:

- a) Choose Yes by pressing 'Enter', if no error messages were displayed and system appears to be working properly.
- b) Choose No by pressing 'Spacebar' if system is not functioning properly. Follow instructions on screen to have MemMaker then try some additional setup changes.

*NOTE: To discard MemMaker's changes and return system to previous state, enter the following command at the DOS prompt:*

*MEMMAKER/UNDO*



## Cache memory chips.

SRAM Cache memory is a special memory subsystem used to store frequently used data items for quick access when needed. SRAM (Static Random Access Memory) chips are used for cache memory because they do not require regular refreshing, enabling them to achieve higher performance rates.





## **SRAM cache memory.**

SRAM Cache Memory is a special memory subsystem used to store frequently used data items for quick access when needed. SRAM (Static Random Access Memory) chips are used for cache memory because they do not require regular refreshing, enabling them to achieve higher performance rates. Cache memory is distributed in SIMMs and individual cache memory chips.



## **SIPP.**

SIPP (Single In-line Processor Package) are an older variation of the SIMM module that uses pins along one edge of the chip instead of edge connectors.

.



## **DRAM.**

DRAM (Dynamic Random Access Memory) or RAM is a type of memory chip that requires periodic refreshing (recharging) During refreshing a wait state is imposed, meaning that the contents of the chip cannot be changed.



## **Memory address.**

A memory address is a predetermined location in memory. Many adapter cards require a unique memory address to function properly. This memory address is made by setting DIP switches or jumpers on the card.



## Update mouse configuration in Windows.

Do one or both of the following if applicable:

- 1) If the mouse model differs from the old mouse, update Windows as follows:
  - a) Choose the 'Start' button to display the Windows 'Start' menu.
  - b) Select 'Settings'.
  - c) Select 'Control Panel'.
  - d) Double click on the 'Mouse' icon.
  - e) Choose the 'Device' tab.
  - f) Choose the 'Add Device' button in the 'Device Information' box.
  - g) Follow the instructions of the setup.
- 2) (Optional) Change the settings for mouse movement:
  - a) Select the 'Motion' tab.
  - b) Adjust the horizontal and vertical slider bars to change the rate at which mouse movement moves the cursor on the screen.
- 3) (Optional) Change the settings for the mouse click rate:
  - a) Select the 'Buttons' tab.
  - b) Adjust the double-click speed using the slider bar. Practice setting in the trial box provided. Readjust double-click speed if necessary.
  - c) Choose 'OK' when done.
- 4) Restart the computer.



## **SIMM.**

SIMMs refers to the Single In-Line Memory Module design of memory used on modern system boards. SIMMs come in 30 and 72 card edge connector styles with very important configuration differences between both versions. The 30 card edge connector style must be purchased and installed four at a time. In order to install 4 MB, (quantity) 4 - (type) 30 edge (size) 4 MB SIMMs must be purchased and installed. For the 72 card edge connector type, only (quantity) 1 - (type) 72 edge (size) 4 MB SIMM must be purchased and installed. Adapters are available to change a set of four 30 edge type to a single 72 edge type.



## **Flash BIOS.**

BIOS (Basic Input Output System) is a chip containing firmware (program burned into a chip) used to store hardware configuration information, run the Power On Self Test (POST) and interact with the operating system for the computer. Some BIOS chips may be updated via software obtained from the hardware manufacturer.



## Check for viruses.

**CAUTION:** Computer viruses are very dangerous, can be destructive, and spread very easily.

**1) Perform immediate shutdown:**

- a) Save any open files.
- b) Close all open applications.
- c) Turn computer off.
  - 1] Choose the 'Start' button to display the Windows 'Start' menu.
  - 2] Select 'Shutdown'.
  - 3] Select 'Shutdown the computer?'.
  - 4] Choose the 'Yes' button.

*NOTE: Viruses should be diagnosed and repaired by virus experts using updated virus detection and repair software as follows:*

**2) Detect and eradicate virus(s) Insert a bootable, write-protected diskette in Drive A and turn on the computer.**

*NOTE: 'Bootable' means that the partition can be selected to boot from the Boot Manager menu.*

- b) Insert a write-protected diskette containing a virus detection program in Drive A.

*NOTE: Write protected means that the data on the disk cannot be overwritten. In order to make a disk write-protected, place a tab (tape) on the notch near the corner of the 5¼ inch floppy disk or on the 3½ disk, flip the tab down. The tab is located in the upper left hand corner when the diskette is flipped on its back.*

- c) Scan all memory and connected drives for viruses (i.e., all hard disk drives, all networked drives, all backups and every floppy diskette around. These virus detecting programs can be obtained off of the World Wide Web or purchased at a computer store.
- d) Delete all infected files through detection/disk clean virus program.
- e) If virus has infected the boot sector of hard disk, do the following:
  - 1] Access the MS DOS prompt:
    - a] Choose the 'Start' button to display the Windows 'Start' menu.
    - b] Select 'Programs'.
    - c] Select 'MS-DOS Prompt'.
  - 2] Enter the following command at the DOS prompt:



FDISK /MBR

(The /MBR switch rebuilds the Master Boot Record on the disk.)

- f)** Cold boot the computer (Turn computer off and back on) to delete any lingering viruses from memory.
  - g)** Scan all memory and connected drives for viruses again (some detectors miss viruses on first pass) Use another virus detector program if available.
- 3)** Check surrounding environment and notify appropriate parties:
- a)** Scan all floppy diskettes for viruses (reinfection of computer from other infected diskettes commonly occurs)
  - b)** Notify diskette/transmission providers and receivers. If you have sent any files through electronic mail or a disk, notify the person(s) you sent it to.
- 4)** Call for expert help from virus software providers if required.

*NOTE: For future reference, consider installing a memory resident anti-virus monitor that runs all the time to detect and report suspicious program behavior.*



## **SIMMs.**

A Single Inline Memory Module (SIMM) is an 8-9 chip memory unit that slips into a single socket. SIMMs replaced the individual memory chips that were each installed in a separate socket.



## Machine codes for himem.sys.

Syntax: `DEVICE=C:\DOS\HIMEM.SYS /MACHINExxxx`

(Where xxxx is one of the following codes, or their equivalent numbers.)

Code	Number	Computer type
AT	1	IBM AT or 100% compatible
PS/2	2	IBM PS/2
PTLCASCADE	3	Phoenix Cascade BIOS
HPVECTRA	4	HP Vectra (A & A+)
ATT6300PLUS	5	AT&T 6300 Plus
ACER1100	6	Acer 1100
TOSHIBA	7	Toshiba 1600 & 1200XE
WYSE	8	Wyse 12.5 MHz 286
TULIP	9	Tulip SX
ZENITH	10	Zenith ZBIOS
AT1	11	IBM PC/AT (alternative delay)
AT2	12	IBM PC/AT (alternative delay)
CSS	12	CSS Labs
AT3	13	IBM PC/AT (alternative delay)
PHILIPS	13	Philips
FASTHP	14	HP Vectra
IBM7552	15	IBM 7552 Industrial Computer
BULLMICRAL	16	Bull Micral 60
DELL	17	Dell XBIOS



## Code pages.

A code page is a 3-digit number referring to a particular foreign character set used by a peripheral device (e.g., 437 United States)



## Using the FDISK program in MS-DOS.

The MS-DOS FDISK program allows a user to create or delete partitions on a hard disk, and assign those partitions to logical drives. DOS allows a maximum of three primary partitions and one extended partition on a hard disk, and a total of twenty four partitions (including both the primary and extended partitions, and all logical drives) Only one primary partition on a hard disk is visible to DOS at a time (the 'active' partition) although, there is probably no reason to create more than one primary partition unless more than one operating system is being used (e.g., DOS and UNIX) Extended partitions will have a drive letter 'higher' than C (e.g., D) and contain many 'logical' drives.

**CAUTION:** *Before using FDISK, be absolutely sure that it is required. All data will be lost on a hard disk partition changed or deleted with FDISK. Usually, FDISK should not be used except after a new hard disk is installed, and it is always a good idea to do a full backup of any disk before using FDISK on it.*

1) Access the MS DOS prompt:

- a) Choose the 'Start' button to display the Windows 'Start' menu.
- b) Select 'Programs'.
- c) Select 'MS-DOS Prompt'.

2) Display existing disk partitions:

- a) Enter the following at the DOS prompt to start FDISK:

FDISK

- b) Press ENTER.
- c) If the computer has more than one hard disk drive, select '5. Change the current fixed disk drive' to view a drive list'.
- d) Choose the appropriate drive by entering its number.

*NOTE: If there are 2 or more hard disk drives installed, FDISK refers to them as Disk 1, Disk 2, etc. (not Disk 0 and Disk 1, as in CMOS Setup)*

- e) Select '4. Display partition information' to view the partition list on the current hard disk drive.

*NOTE: FDISK will display a partition list that contains the drive letter assigned to the partition, the partition status, type, volume label, size, file system, and disk usage.*

3) Delete existing partitions:

**CAUTION:** *Deleting an existing partition will destroy all data on that partition. Use extreme caution when selecting partitions to delete with FDISK.*

- a) Select '3. Delete partition or Logical DOS drive'.
- b) Do one of the following, depending on the partition type that will be deleted:
  - 1] Select '1. Delete Primary DOS Partition' to delete a primary partition on the hard disk (i.e., usually the bootable DOS C drive.)
  - 2] Select '2. Delete Extended DOS Partition' to delete an extended DOS Partition on the hard disk.

*NOTE: All logical drives in an extended partition must be deleted before the extended partition itself can be deleted.*
  - 3] Select '3. Delete Logical DOS Drive(s) in the Extended DOS Partition.' to delete logical drives in an extended DOS partition.
  - 4] Select '4. Delete Non-DOS Partition' to delete a partition that was created by another operating system (e.g., OS/2 HPFS, the High Performance File System) c) Press ESC to return to the main FDISK menu.

4) Partition a disk with FDISK:

*(NOTE: Each hard disk consists of one or more partitions that are either primary partitions or logical drives within an extended partition. At least one primary partition must already exist, for an extended partition with logical drives to be created.)*

- a) Decide how many partitions of what size to install on this hard disk.

*(NOTE: Considerations include disk access speed (smaller multiple partitions increase disk access speed) ease of backups (afforded by separating programs from data) and space restrictions created in each partition by having many of them. DOS 6.2 allows partitions of up to 2GB)*

Enter the following at the DOS prompt:

FDISK

- b) Press ENTER.

*NOTE: If there are 2 or more hard disk drives installed, FDISK refers to them as Disk 1, Disk 2, etc. (not Disk 0 and Disk 1, as in CMOS Setup) Select '5. Change current fixed disk drive' to view a drive list, and choose the appropriate drive by entering its number.*

- c) Create desired partitions:

- 1] Create a primary DOS partition :

Choose '1. Create DOS partition or Logical DOS Drive' and press ENTER.

Choose '1. Create Primary DOS Partition' and press ENTER.

- a] Do one of the following:

- 1} Enter 'Y' for yes when prompted to ' use maximum available size of a Primary DOS Partition and make the partition active? (Y/N) if only one partition that uses the entire

hard disk is desired. FDISK will reboot the computer (make sure DOS boot disk remains in Drive A) Assuming no other hard disks are present, skip to high-level formatting this partition in Step 4, below.

- 2}** Enter 'N' for no, and then enter the size of the desired Primary DOS Partition in MB or as a percentage of the disk space (%). (Example: If total disk size is 150MB and a 30MB partition is desired, enter either 30 or 20%.)

- a}** Press 'ESC' to return to previous menu.

- b}** Choose '2. Create Extended DOS Partition' to assign the remaining space to an Extended DOS partition, and do one of the following:

- 1>** Enter 'Y' for yes when prompted to '... use maximum remaining size for an Extended DOS Partition and make the partition active? (Y/N) if the extended partition should use all of the remaining disk space. FDISK will reboot the computer (make sure a DOS boot disk is in Drive A) Assuming no other hard disks are present, skip to high-level formatting this partition in Step 4, below.

- 2>** Enter 'N' for no, and then enter the desired size of the Extended DOS Partition in MB or percent of the disk space (%). (Example: If total disk size is 150MB with 100MB remaining a two 50MB partitions are desired, enter either 50 or 33%.) Repeat this process for the remaining space.

- d]** (Optional) Choose '3. Create Logical Drive(s) in the Extended DOS Partition' to create additional logical drives in this partition.

- e]** Press 'ESC' twice to return to main menu.

- f]** Choose 2. Set active partition' and designate one of the partitions in the list as active. (This will designate the boot partition.)

- 1} Enter the number of the partition to make active in the box (e.g., 1 or 2) 2}Press ENTER.

- g]** Press 'ESC' to return to the main menu.

- h]** Press 'ESC' to return to DOS.

- i]** Press CTRL+ALT+DEL to reboot the computer (for changes to take effect)

High-level format drive using the operating system.

Format the boot partition (usually Drive C) by entering the following command at the DOS prompt:

RMAT C: /S /V

*NOTE: (In DOS, this will format Drive C and transfer the system files and CMAND.COM, making Drive C bootable.)*

If the disk was partitioned into multiple partitions, format each remaining local drive in order, by entering the following command at the DOS prompt:

RMAT x:

(Where x is the logical name of each remaining drive (e.g., D, E, F, etc.)).

After all logical drives are formatted, remove the boot diskette from Drive A press CTRL+ALT+DEL to reboot the computer. It should now boot fine from the hard disk.

- 6) Test the operation of the hard disk drive and each of its partitions, by running one or more commands that access it.

EXAMPLE: Use the DIR command to get a directory listing; copy, read, and then delete several files; and create some new directories.





## Changing file attributes in DOS.

Each file has several attributes associated with it that control how that file is used or appears. These include READ, SYSTEM, HIDDEN, and ARCHIVE.

Attributes allow files to be protected (for example, Read only prevents a file from being written over or deleted)

**1) Access the MS DOS prompt:**

- a)** Choose the 'Start' button to display the Windows 'Start' menu.
- b)** Select 'Programs'.
- c)** Select 'MS-DOS Prompt'.

**2) Go to the drive prompt that contains the files in question. For example, if the files are located on the C:, enter the following at the prompt and then press ENTER:**

CD\

**3) Enter the following command to change to the directory that contains the file(s) CD\<pathname>**

(where <pathname> is the full pathname to the files (for example, CD\WINWORD\DATA)

**4) Enter the following command on the file(s) in question to determine their current attributes:**

ATTRIB <filename>

(where <filename> is the name of the file(s) in question).

**5) Do one of the following to remove or add file attributes:**

- a)** To remove the Read-only attribute enter one of the following commands:

ATTRIB -R <filename> (to change 1 file) OR

ATTRIB -R \*.\* (to change ALL files)

*NOTE: To ADD the Read-only attribute change the '-' to '+'.*

- b)** To remove the System protection enter one of the following commands:

ATTRIB -S <filename> (to change 1 file) OR

ATTRIB -S \*.\* (to change ALL files)

*NOTE: To ADD the System attribute change the '-' to '+'.*

- c)** To remove the Hidden attribute enter one of the following commands:

ATTRIB -H <filename> (to change 1 file) OR

ATTRIB -H \*.\* (to change ALL files)

*NOTE: To ADD the Hidden attribute change the '-' to '+'.*

- d)** To remove the Archive attribute enter one of the following commands:

ATTRIB -A <filename> (to change 1 file) OR

ATTRIB -A \*.\* (to change ALL files)

*NOTE: To ADD the Archive attribute change the '-' to '+'.*

- e)** To remove ALL attributes enter one of the following commands:

ATTRIB -R-S-H-A <filename> (to change 1 file) OR

ATTRIB -R-S-H-A \*.\* (to change ALL files)

- 6)** Resume earlier activity.

