PC-Duo
User Manual

Order Number: UM10 : PCDUO.MAN

January 1995

This document contains the user guide, installation and administration information for *PC-Duo*.

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Revision/Update Information: This document supersedes the *PC-Duo* User Manual, Version 1.0.

Software Version: *PC-Duo* v1.02

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January, 1995

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1 What is PC-Duo?

PC-Duo is a fully featured Remote Control package that supports DOS, DOS Graphics, and Windows applications. *PC-Duo* provides access to workstations on both local and remote IPX or NetBIOS networks as well as linking standalone machines over dial-up modem links.

Three components make up the *PC-Duo* product. These are:-

- Control Programs for DOS and Windows
- Slave Programs for DOS and Windows
- Remote Communication Programs

All three components are included with the standard package.

1.1 Package Features

The main features of the *PC-Duo* package are:-

Remote Control

A Control workstation can take control of a Slave. The Control's keyboard and mouse are routed through to the Slave, and the Slave's screen contents are displayed on the Control's screen.

Control Modes

Control, Share, and Watch modes are provided. In Control mode, the Slave keyboard is disabled so that the Control user has almost complete control of the Slave. In Share mode, the Slave accepts both Control and Slave keystrokes. In Watch mode, Control keyboard input is not accepted by the Slave.

The Windows Control and Slave also support mouse input, but the Windows Slave does not support Control mode, so a Control user cannot lock out the Slave's user.

Message

A Control can send a text message for immediate display on single or multiple Slaves. The message can be supplied from a file or by keyboard input.

Chat

Once a Control user has Selected a Slave, either Control or Slave users can start a two way on-screen text dialogue with the other. This applies even if the Control user is using Control Mode.

File Transfer

Control can manage files on the Slave and can transfer files between the Control and the Slave. Files on the Control or the Slave can be deleted, renamed, or viewed. The Windows Control can also edit files.

Print Redirection

Control can capture printer output from the Slave and redirect it to Control's printer.

Show Screen Contents

DOS and Windows Controls can display their screen contents on a single, or multiple DOS or Windows Slaves (respectively). In addition, Broadcast Show to all Slaves is available in the DOS Control only.

Remote Communications

As well as providing links over Local Area and Wide Area Networks, the package can be used over a serial line between the Control workstation and the Slave network. This can take the form of a direct connection between serial ports, a leased line telecommunication link, or a dial-up modem connection. Frequently-used telephone numbers can be stored in the Control's Dial Directory.

A Remote program allows the Control program to access a serial line or modem connected to the Control workstation. A Bridge program running on the remote PC provides access to a Slave running on that PC, or any others that are visible on the remote network.

Configuration Options

In addition to operating over IPX or NetBIOS networks or serial lines, *PC-Duo* provides a wide range of security and configuration options to enable it to be tailored to your exact needs.

1.2 Demonstration Kit

PC-Duo is supplied as a Demonstration Kit. This allows you to try it out before purchase. The Demonstration Kit software is fully functional, apart from the following restrictions:-

- A maximum of five Slaves can be active on the network simultaneously
- Slaves will disconnect five minutes after the initial connection, giving a warning after four minutes
- A Slave that has disconnected automatically can only be re-enabled by unloading and reloading the TSR
- The Demonstration Kit will not load after the kit expiry date has passed

These restrictions are removed once serialisation has been completed. This process, which is described in Appendix F, upgrades the Demonstration Kit into an Evaluation, Short Term, or Indefinite Licence.

1.3 Concepts

Most *PC-Duo* activities are initiated by a user running a Control program. This user, known as a "Control", can scan the network for controllable PCs, known as "Slaves". Once this has been done, Control can perform one or more of the operations described below.

Available Slaves

A Slave is activated by loading the DOS Slave program. This can be done from the DOS prompt or by CALLing the supplied STARTSLV.BAT batch file during the PC's normal startup sequence (e.g. from AUTOEXEC.BAT). Once loaded, the Slave becomes *Available* for access by a Control. Slaves can be configured to require a Control user to specify a password before a connection can be established. They can also be set so that the Slave user has to permit each Control connection.

A Control can connect to one or more Slaves, or it can broadcast Messages or Show its screen contents to all Available Slaves. Individual Slaves can be configured to ignore Broadcast Messages or accept Broadcast Shows from a Control.

Connected Slaves

While it is scanning the network, a Control accumulates a list of up to 100 Available Slaves. One or more of these can be chosen for simultaneous *connection*, subject to the access controls mentioned above. When a connection has been established, Control can send a Message or Show its screen contents to those Slaves only, rather than to all Available Slaves. In addition, Control can *select* one of the connected Slaves for special attention.

Selected Slave

When a Connected Slave is Selected, a "one-to-one" session is established. Control can then send a Message or Show its screen contents to that Slave only. Control can also Control, Share, or Watch the Slave's screen and keyboard.

When Control connects to a Slave, an on-screen indicator informs the Slave user that a Control is accessing their PC. The Windows Slave also shows the name of the Control.

In Control mode, the Slave keyboard is disabled so that the Control user has almost complete control of the Slave. In Share mode, the Slave accepts both Control and Slave keystrokes. In Watch mode, Control keyboard commands are not accepted by the Slave. Slaves can be configured to allow Watch mode only. The Windows Control implements Share mode only, but Control mouse movements and button clicks are also supported.

Either the Control or the Selected Slave can open a two-way "Chat" session, in which text typed by both users is displayed on both screens. This allows a simple dialogue to take place.

The Control can also perform file management operations on the Slave, or transfer files between the Slave and itself. Slaves can be configured to prevent Control file access.

Control can switch between multiple Connected Slaves, making each of them in turn the Selected Slave.

Summary

For Control to be able to take over an individual Slave you must:-

- Load the Remote and Bridge programs on Control and Slave PCs, if required
- Load the DOS Slave on the machine to be controlled
- Start a DOS or Windows Control

- Connect to the Slave
- Select the Slave for a one-to-one session
- Activate Control, Share, or Watch mode

2 Getting Started

PC-Duo contains components for remote control of PCs running DOS, DOS Graphics, or Windows applications. It can be used over IPX and NetBIOS networks, or over serial line connections to remote sites.

These configuration options are selected and installed using either DOS or Windows installation programs. If you have Windows available, we would normally recommend that you use the Windows installation. Software distribution products such as *LANutil for PATHWORKS* can also be used—see Section 2.10—but this chapter concentrates on *PC-Duo's* own installation procedures.

The DOS Slave is required in all cases, but if the PC is used for DOS Text or DOS Graphics applications only, the Windows components are not needed. Similarly, *PC-Duo* supports IPX and NetBIOS networks, but it is unlikely that both of these options will be required simultaneously.

The *PC-Duo* Slave will operate normally with read-only access to the installation area, so it can be installed on a network server for shared use. Package serialisation does require write access to the installation area, however.

If you will use *PC-Duo* with Windows, it is necessary to arrange for the edits to the Windows system files (SYSTEM.INI and WIN.INI) to be completed on all Slave PCs. This will be performed automatically if the Windows installation program is used on the Slave, and Windows support is selected.

When the *PC-Duo* kit has been installed for shared use on a file server, it is still necessary to configure Windows correctly for each Slave PC. The steps required to do this are described in Section A.5.

2.1 Installing DOS and Windows Programs

If you are going to run *PC-Duo* under Windows, then you should use the *PC-Duo* Windows installation procedure. This can install both the DOS and Windows programs. Start Windows, if it is not already running. Place the Installation Disk in Drive A: and run A:SETUP.EXE from the Windows Program Manager File menu.

There is a short delay while Setup initialises itself and displays the *PC-Duo* Setup Screen. Press [Continue] to continue with the installation, or [Cancel] to abandon the installation and return to Windows.

Follow the on-screen prompts to specify the installation directory and the default name for the DOS Slave and Windows Control programs to use. Select the components you require by checking or unchecking the option boxes, and press [Continue].

Setup will then create the installation directory if it doesn't exist already, and will copy the selected components into it. When the copying is complete, Setup will configure Windows for *PC-Duo*. It will create a *PC-Duo* Group if there isn't one already, and it will install the appropriate program icons into it.

The *PC-Duo* Group contains a number of items, including *PC-Duo* Help and Uninstall icons. *PC-Duo* Help provides immediate access to the on-line help, while the Uninstall program can be used to delete the *PC-Duo* Group and reverse any changes that were made during installation.

Further Windows configuration changes are made if the Windows Slave has been installed. These changes are detailed in Section 2.1.1.

The default behaviour for the *PC-Duo* Control and Slave programs is to take their name from the current value of the DOS Machine Name. This is indicated by the use of an asterisk "*" for the Control Name or Slave Name parameter. The Windows Setup program allows the name used by the DOS Slave and Windows Control programs to be changed, if desired. The default behaviour should be satisfactory on most NetBIOS networks. Full details of Slave command syntax and options are contained in Chapter 3, and Chapter 4 provides the same for the Control programs.

Note: The DOS IPX Slave is loaded as a result of an environment variable which is defined in STARTSL1.BAT. This file is written during the Windows installation, and defines variable PCDNW to "IP" for an IPX configuration. If a non-default name is specified, STARTSL1.BAT uses it to define environment variable PCDCMD. See Section 2.5 for further information on the use of STARTSL1.BAT.

The Windows installation defines an environment variable, PCDDIR, at the beginning of the normal DOS startup batch file STARTSLV.BAT. This variable specifies the disk drive and path to the installed files.

2.1.1 Changes Made to Windows Files

If you selected Windows support during installation, Setup will make some changes to your Windows configuration. The Uninstall program in the new *PC-Duo* Group will reverse any changes that were made during installation and deletes the *PC-Duo* Group.

If you selected the Windows Slave during installation, Setup will make the following additions to your Windows SYSTEM.INI file:-

```
[Boot]
; PCD display driver
display.pcd=C:\PCDUO\pcdvga.drv
display.drv=C:\PCDUO\pcdvga.drv
display.old=The current display driver name

[386Enh]
; PCD virtual device driver
device=C:\PCDUO\pcdvxd.386
```

where *C:\PCDUO* represents the installation drive and directory.

The PCDVGA.DRV driver intercepts Windows display commands and passes them on to the driver specified in the display.old line. This allows you to continue using a special display driver if you wish.

The PCDVXD.386 driver provides support for DOS Slaves and Slaves running in a DOS box.

The Windows installation will also increase the NetHeapSize value in the [386Enh] section of SYSTEM.INI if the line is not present or the value is less than 24. This line is used to specify the size of network data buffers that Windows is to allocate in conventional memory. The value is specified in 4K increments, with a default value of 12 KBytes.

```
[386Enh]
   .
   .
   .
NetHeapSize=24
```

This value is the minimum for correct operation of the *PC-Duo* Windows Control and Slave programs. However, if you run other network applications, then you may need to increase this value further.

Windows for Workgroups: If you are running Windows for Workgroups, then you will probably need to increase NetHeapSize (see Appendix B for further information).

If you selected the Windows Slave support during installation, Setup will arrange for Windows to run the Windows Slave when you start Windows. It does this by adding WSLAVE.EXE to the run= line in the [windows] section of your WIN.INI file:-

```
[windows]
run=C:\PCDUO\wslave.exe
```

where *C:\PCDUO* represents the installation drive and directory.

Refer to Chapter 3 for details on loading the DOS Slave TSR, and Chapter 6 for details on using the Control programs. Refer to Appendix B for further details on using *PC-Duo* with Windows for Workgroups.

2.2 Installing the DOS Software Only

If you are not going to use *PC-Duo* with Windows, you can use the DOS installation instead of the Windows installation procedure. This installs the DOS files only, without Windows support.

Note: If you are going to use *PC-Duo* with Windows, you should use the Windows installation procedure, which is described in Section 2.1.

Place the *PC-Duo* Installation Disk in a suitable disk drive, and then run the DOS install program as follows:-

```
C:\>a:install
```

Replace *a:* with the correct disk drive name.

The Install program will prompt you to confirm the installation directory. Press <Enter> to accept the default (C:\PCDUO). Use the <Tab> and cursor arrow keys to move around the screen. Select the *PC-Duo* components you require by entering a <Y> or <N> in the option boxes. When you are ready to continue, enter a <Y> in the Proceed box and press <Enter>.

Install will create the installation directory if it doesn't exist already, and will copy the selected components into it. When the installation is completed, it will display a status box. Press <Enter> or <Escape> to return to the DOS prompt.

Note: If you select the DOS IPX Slave, Install will create a startup configuration file (STARTSL1.BAT) in the installation directory.

This file defines the environment variable PCDNW to "IP". This will cause the normal startup batch file STARTSLV.BAT to load the IPX Slave TSR.

The DOS Install assumes that you will be installing into the C:\PCDUO directory, and STARTSLV.BAT defines an environment variable, PCDDIR, accordingly. If you actually install to a different location, you will have to edit the PCDDIR definition accordingly, or the startup will fail.

Refer to Chapter 3 for details on loading the Slave TSR, Chapter 4 for details on loading the Control program, and Chapter 6 for assistance with using the Control program.

2.3 Completing the Installation

NetWare: If you are using *PC-Duo* on a NetWare network, please refer to Section 2.7.2 if using the NetWare NetBIOS, or to Section 2.7.1 if using *PC-Duo* directly on an IPX stack. It is necessary to perform extra setup operations in these environments.

Windows for Workgroups: If you are using *PC-Duo* on a Windows for Workgroups network, please refer to Appendix B for further instructions.

The Windows and DOS installations will not actually start the DOS Slave program. This must be running on a PC before a Control can connect to it. It is necessary for you to complete the installation by arranging for the DOS Slave to be loaded during the PC's normal boot sequence. This can be achieved by including a CALL to the Slave startup batch file (STARTSLV.BAT) in the PC's AUTOEXEC.BAT file. It cannot be loaded until after the network has been started. A suitable command is shown below:-

```
if exist \pcduo\startslv.bat call \pcduo\startslv.bat
```

Running STARTSLV from a Non-Default Drive

The examples above assume that *PC-Duo* is installed on the current disk drive (e.g. drive C:). If you installed *PC-Duo* in a different location, for example on a file server, and want to run STARTSLV from that drive, then specify the drive as well. For instance:-

```
if exist m:\pcduo\startslv.bat call m:\pcduo\startslv.bat
```

STARTSLV.BAT defines the installation location using environment variable PCDDIR. This definition must match the installation location.

Further details on file server installations are contained in Appendix A.

Calling STARTSLV from a PATHWORKS v5 Template

If you are running Digital's PATHWORKS v5 for DOS and Windows on the Slave PC, an alternative method of starting the Slave is to place the command in the [User Commands] section of your PATHWORKS template file(s). This can be done using a text editor, the PATHWORKS Workstation Configure Program, or PWSETUP. Select the Customize option, select the template, and then modify the "Additional Startup Commands".

Note: Beware that these PATHWORKS programs can alter other sections of the template, even if you don't explicitly select them for modification.

STARTSLV Recommendations

We recommend that you load the Slave either from your AUTOEXEC.BAT file at boot time, or from the network startup (e.g. the PATHWORKS template [User Commands]). This ensures that the PC can be accessed by a Control PC at any time. If a user is having problems with an application, you will be able to provide instant support from Control without the user exiting the application, loading the Slave, and then trying to recreate the problem.

Note: We recommend that you CALL the STARTSLV.BAT batch file rather than using explicit Slave commands in another batch file. This can make it much easier to change the *PC-Duo* setup at a later time, especially in a large network. A new release of *PC-Duo* might introduce new Slave command options.

The STARTSL1.BAT file normally provides installation-dependent options for STARTSLV.BAT. You can edit STARTSL1.BAT to modify the command options that are used, if you wish. STARTSLV.BAT also includes further error checks and supports more flexibility in the Slave setup. New versions of *PC-Duo* might add more functionality which relies upon the use of STARTSLV.BAT.

You could also use a product such as *LANutil* to distribute updated copies of STARTSLV.BAT, or you could run it from a file server.

File Transfer and SHARE

If the *PC-Duo* Slave is to be used for File Transfer, then it is advisable to load the DOS SHARE program. This can then be used to mediate file access contention on the Slave's local disks, and will protect files from being overwritten while they are in use by another application. Refer to your DOS documentation for further information on SHARE.

If you use SHARE, then it should be loaded before any unloadable software (e.g. the network) is started. This is because SHARE cannot be unloaded. If SHARE is loaded after the network software and this is unloaded (e.g. by running STOPNET.BAT), SHARE will also be "removed". DOS does not expect it to disappear, and the PC will crash when a file lock is requested.

Reboot

If you make the above modification to AUTOEXEC.BAT, you should reboot the Slave PCs before attempting to connect to any of them with a Control PC.

For an initial test, however, you can load the Slave by simply running STARTSLV.BAT interactively:-

```
C:\>\pcduo\startslv
```

2.4 Default STARTSLV Actions

STARTSLV.BAT will load the Slave TSR with the configuration as defined during the installation. Options (such as IPX Slave, and the Slave Name) are specified through the STARTSL1.BAT file. In the absence of STARTSL1.BAT, the default behaviour is for the STARTSLV.BAT to load the NetBIOS Slave, using the PC's DOS Machine Name for its Slave name. (The DOS Machine Name is set by the SETNAME program in PATHWORKS and LAN Manager environments.)

Non-PATHWORKS Networks: In network environments that do not set the DOS Machine Name, such as NetWare and Windows for Workgroups, it is necessary to either use the *PC-Duo* SETMNAME program to set the name, or to use an explicit name to identify the PC correctly. The SETMNAME program is described in Section 2.8; NetWare installation procedures are described in Section 2.7.1 and Section 2.7.2, and the use of *PC-Duo* with Windows for Workgroups is described in Appendix B.

2.5 Customising Slave Startup

Larger sites especially are likely to benefit from standardising on the means of loading the Slave. For this reason, the supplied STARTSLV.BAT allows MS-DOS *environment variables* to be used to modify the Slave command that is used, without having to provide (and maintain) many copies of STARTSLV itself. The main environment variables are PCDCMD and PCDOPTS. PCDCMD is defined in STARTSL1.BAT when a non-default Slave Name was specified during installation. PCDOPTS is not defined by the installation process, and this can be used to provide additional command options for the Slave. For example, it can specify a password (obviously specific to a single PC), or to require user acknowledgement for connection requests to a particular PC.

Environment variables can be set easily in the AUTOEXEC.BAT or STARTSL1.BAT files. For example:-

```
set pcdcmd=eric
set pcdopts=1234567 /k
if exist \pcduo\startslv.bat call \pcduo\startslv.bat
```

This results in Slave being loaded with the command "SLAVE ERIC 1234567 /K". Any extra options that might be specified for *all* PCs can be added to the Slave command in STARTSLV.BAT. See STARTSLV.BAT for further details.

Note: The PCDCMD and PCDNW environment variables may also be defined by STARTSL1.BAT. If present, these definitions will override any that were made before STARTSLV.BAT was called.

Slave command syntax and options are described in Chapter 3.

Advanced Slave Configuration

More advanced configuration is possible by using STARTSL1.BAT and/or STARTSL2.BAT batch files. These will be called before, and after loading the Slave, respectively. As long as those batch files exist when STARTSLV.BAT is called, they will be called as well. Furthermore, if either batch file defines the PCDTIDY environment variable (with SET PCDTIDY=Yes, for instance), then that batch file will be deleted automatically once it has been executed. This can be used to perform one-time configuration of each PC, and is used to provide greater compatibility with packages such as *LANutil*, which can make great use of such easy boot sequence modifications, even allowing new packages to install themselves onto a community of PCs!

Note: If the DOS IPX Slave is installed, the installation procedure will create a STARTSL1.BAT which defines the PCDNW environment variable to "IP". If a non-default Slave Name is specified, the Windows Setup program will also use it to define the PCDCMD environment variable in STARTSL1.BAT.

2.6 Running PC-Duo Over PATHWORKS

Digital's PATHWORKS is an example of a PC package that provides a NetBIOS-compatible network. PATHWORKS v5 provides DECnet, NetBEUI, and TCP/IP transports, all of which provide a NetBIOS interface which is compatible with *PC-Duo*.

Apart from a few minor configuration issues, it is normally possible to use *PC-Duo* "out of the box" on a PATHWORKS network.

2.6.1 Running PC-Duo over DECnet

DECnet is a very stable protocol that has been in existence for many years. It provides a NetBIOS emulation on DOS which gives very good performance. In PATHWORKS v4.x, the DECnet NetBIOS is provided by programs such as DNNETH.EXE (DECnet Network program for Ethernet). DNNETH.EXE versions earlier than 4.1.125 are not sufficiently reliable for *PC-Duo* operation, however.

The PATHWORKS v5.x DECnet NetBIOS is provided by DNP.EXE. All versions of this program tested have been found to be satisfactory for *PC-Duo*.

The following sections describe DECnet configuration options.

2.6.2 Handling the DECnet Session Limit

If you wish to have several Slaves Connected to a Control at once, or if you have several DECnet applications active on the PC, it is quite likely that you will reach the limit on the number of simultaneous connections, or *sessions*, that the PC's DECnet is configured to allow. This can occur when trying to Connect to an Available Slave, or when using any other DECnet application, and is signalled by a "Session Table Full" or "No Listen Outstanding" error, sometimes reported as "NetBIOS error 11 in command *nn*", or "NetBIOS error 12 in command *nn*". This can be corrected, using either an NCP command or a DECnet program command line option to change the number of connections, or *links*, that the DECnet stack will support.

2.6.3 Using NCP to Change the Session Limit

Execute the following command to see the current setting of the Maximum Links parameter:-

```
C:\>ncp show executor characteristics
```

Read off the *Maximum Links* setting, increase it, perhaps by 10, and then use the result in the following command:

```
C:\>ncp define executor maximum links nn
```

Where *nn* is the new number of links you wish to configure.

Then, reboot the PC, and try again. It is not possible to increase the number of DECnet links without stopping and restarting the network, or rebooting the PC. Please refer to the PATHWORKS DECnet Network Management Guide for further details on DECnet configuration.

2.6.4 Using DECnet Network Program Options

Since NCP is restricted in its capabilities, you may find that it is more convenient to use DECnet program command line options instead. Both PATHWORKS v4 and v5 DECnet network programs (DNNETH.EXE and DNP.EXE respectively) support the use of command line options for configuration control.

- /CMD:*nn* varies the maximum number of NetBIOS Commands that can be outstanding at once
- /LCN:*nn* sets the size of the NetBIOS Local Name Table
- /MAX:*nn* sets the maximum number of DECnet Links
- /REM:*nn* sets the size of the Remote Adapter Name Table
- /SES:*nn* sets the maximum number of NetBIOS Sessions.

In each case, the *nn* represents a decimal integer value. Refer to your PATHWORKS Client Commands Reference for further details on the default values and ranges permitted.

In PATHWORKS v4, the DECnet configuration can be changed using NETSETUP or by editing the PATHWORKS startup batch file, STARTNET.BAT. PATHWORKS v5 is significantly different in that the majority of the network startup is controlled using template files (e.g. CFG0001.TPL). If the SELECT utility is used to choose between multiple templates, then STARTNET.BAT will be partly overwritten with information from the selected template. Consequently, any changes that are made to STARTNET.BAT may be lost the next time SELECT runs.

Template files can be edited using a text editor such as DOS Edit or Windows Notepad. However, PATHWORKS v5 provides DOS and Windows versions of the Workstation Configure Program (PWSETUP) to assist with configuring workstations, and these are the official tools to use for this purpose. The DOS version of PWSETUP is normally run from the system file service. The Windows version is activated by double-clicking on the Configure icon in the PATHWORKS Windows Applications Group.

The DNP command is located in the [Network] section of the template file. This is normally the last section in the template, and it can be viewed or modified by selecting the Network Startup option in PWSETUP or Configure.

Refer to the PATHWORKS v5 Client Installation and Configuration Guide and the Client Commands Reference for further details.

2.6.5 Running PC-Duo Over a DECnet Wide Area Network

The *PC-Duo* Control programs use NetBIOS datagrams to search the local network for Slaves. These broadcasts are normally filtered out by inter-network routers, so a Control cannot detect a Slave on a different network segment. The Control can also use the "Manual Connect" method, which eliminates the datagram exchange (see Section 6.4.2 for further details). For this method to operate through a router, the Control PC's DECnet must be told the correct DECnet address for the target Slave.

The NCP SET REMOTE-ADAPTER-NAME and DEFINE REMOTE-ADAPTER-NAME commands are used to associate a name with a remote DECnet address. In this case, the Slave Name and DECnet address of the target PC have to be defined. The *PC-Duo* Slave Name is zero-filled, so it is necessary to use the hexadecimal form of these commands. The Slave Name must be converted to UPPER CASE ASCII codes, and the hexadecimal byte values entered as follows:-

```
C:\>ncp set remote/hex 53-4c-41-56-45-0-0-0-0-0-0-0-0-0-0 node 2.55
```

The NCP SET REMOTE-ADAPTER-NAME command defines the name in the volatile DECnet database. In this example, "53-4c-41-56-45" are the hexadecimal values for "SLAVE", though you should replace them with the values appropriate for your Slave Name(s). This case needs eleven "-0"s to pad the name up to sixteen characters, which is the standard size for a NetBIOS name. The "2.55" should be replaced by the correct DECnet address for your remote Slave(s).

When you attempt to connect to the remote Slave, DECnet looks up the name in the volatile database, finds 2.55 in this case, and transmits a DECnet connect message to this address. The network bridge or router may have to be configured to pass DECnet messages through to this destination.

Names in the DECnet volatile database will be lost when the network is stopped or the PC is switched off. Once you have tested the connection to the remote Slave, you can define the name in the permanent DECnet database. This is done using the NCP DEFINE REMOTE-ADAPTER-NAME command:-

```
C:\>ncp define remote/hex 53-4c-41-56-45-0-0-0-0-0-0-0-0-0-0 node 2.55
```

Note: The use of the DECnet *address* (i.e. "node 2.55") form of these commands eliminates the need to define the DECnet node *name* for the Slave PC. This can only be done in the permanent DECnet database, and changes would need a network stop and restart, or a reboot on the Control PC to take effect.

You can check the values that have been defined in the volatile DECnet database using the NCP SHOW KNOWN REMOTE-ADAPTER-NAMES command. Similarly, you can check the values that are defined in the permanent DECnet database using the NCP LIST KNOWN REMOTE-ADAPTER-NAMES command.

If you need to define a large number of remote Slave addresses, it is likely that you will have to increase the size of the Remote Adapter Name Table. The NCP commands to do this are described in Section 2.6.6. The DNNETH or DNP command line option to do the same thing is listed in Section 2.6.4.

Please refer to the PATHWORKS DECnet Network Management Guide for further details on DECnet configuration.

2.6.6 Using NCP to Change the Remote Adapter Name Table Size

Execute the following command to see the current size of the DECnet Remote Adapter Name Table:-

```
C:\>ncp show executor characteristics
```

Read off the *Remote adapter names* setting. Increase it using the following command:

```
C:\>ncp define executor remote-names nn
```

Where *nn* is the new Remote Adapter Name Table size. Then, reboot the PC. It is not possible to change the Remote Adapter Name Table size without stopping and restarting the network, or rebooting the PC.

Please refer to the PATHWORKS DECnet Network Management Guide for further details on DECnet configuration.

2.6.7 Running PC-Duo over PATHWORKS TCP/IP

TCP/IP is a collection of protocols that have been in existence for many years. The operation of NetBIOS on TCP/IP is specified by standards documents known as RFC 1001 and RFC 1002 (RFC stands for "Request For Comment"). Unfortunately, these "standards" are not well specified, and frequently cause misunderstandings between implementors and hence incompatibilities.

PATHWORKS v4.x TCP/IP (actually PATHWORKS for DOS (TCP/IP) V2.x), was supplied to Digital by 3-Com Corporation. This is a good quality implementation, and should not cause any problems to *PC-Duo*.

PATHWORKS v5.x TCP/IP has been re-written by Digital. This is still in its early days, and is not yet sufficiently reliable for normal *PC-Duo* operation. It does not implement the NetBIOS datagrams which the *PC-Duo* Control programs use to find Available Slaves. Also, the Manual Connect mechanism, which is used in place of Connect, does not work unless the Slaves' NetBIOS names have been added to the TCP/IP NetBIOS Name Table. The procedure for doing this is described in Section 2.6.11.

PATHWORKS 5: We have found problems with all versions of PATHWORKS 5 TCP/IP tested to date. PATHWORKS 5.0 will not work at all, and 5.1 only with some difficulty using Manual Connect only, after even *local* Slaves have been defined in the NetBIOS Name Table.

As a result of these problems, we do not officially support the use of *PC-Duo* on PATHWORKS 5.x TCP/IP. However, these instructions are provided to assist PATHWORKS 5 TCP/IP users to set up for *PC-Duo*, in the hope that the TCP/IP NetBIOS and utilities will be fixed soon.

Mixing PATHWORKS 4 and 5 TCP/IP: It is not safe to mix PATHWORKS v4 and v5 TCP/IPs on the same network. There are incompatibilities between the two implementations which can cause PCs to hang.

The following sections describe PATHWORKS TCP/IP configuration options.

2.6.8 Setting the TCP/IP Domain Name

PATHWORKS 4.x and 5.x implement the TCP/IP Domain Name mechanism to define network scopes for individual nodes. If a Domain Name has been defined, you should ensure that the same name is used for all PCs.

In PATHWORKS 4.x, the Domain Name is defined in the PROTOCOL.INI file, [DNR] section. For example:

```
[DNR]
DRIVERNAME = DNR$
BINDINGS = TCPLITE
NAMESERVER0 =
DOMAIN = "vecnet.com"
```

In PATHWORKS 5.x, the Domain Name is defined in the template file. The default value is undefined, but it can be defined by adding a line to the [Keywords] section. For example:

```
[Keywords]
   .
   .
   .
   TCPIPDOMAINNAME = vecnet.com
```

The value is transferred from the template to the configuration file PWTCP.INI by SELECT.EXE when the template is selected during network startup. If SELECT is not used, then the value must be defined by editing the following line in the [DNR] section of PWTCP.INI:

```
[DNR]
Domain = vecnet.com     ; Name of local domain. No default.
```

2.6.9 Setting the TCP/IP SUBNETMASK

The Subnet Mask is used by all TCP/IP implementations to determine the correct address to use for broadcast or multicast transmissions. *PC-Duo* uses NetBIOS datagrams when the Control is looking for Available Slaves, and these are controlled by the Subnet Mask. The Subnet Mask must be identical on all Control and Slave PCs for correct operation. A Control will only be able to find Slaves with the same Subnet Mask.

In PATHWORKS 4.x, the Subnet Mask is defined in the PROTOCOL.INI file, [TCPLITE] section. For example:

```
[TCPLITE]
DRIVERNAME = TCPLITE$
BINDINGS = EWRK3.DOS
SNAP = NO
IP.ADDRESS = 90 0 0 14
IP.SUBNET.MASK = 255 0 0 0
```

PATHWORKS 4: The PATHWORKS 4 TCP/IP delimits the address fields in the IP.ADDRESS and IP.SUBNET.MASK with space characters. PATHWORKS 5, and many other TCP/IP implementations, use dots instead (e.g. 255.0.0.0).

In PATHWORKS 5, the Subnet Mask is defined in the [Keywords] section of the template file. For example:

```
[Keywords]
   .
   .
   .
   TCPIPSUBNETMASK = 255.0.0.0
```

The value is transferred from the template to the configuration file PWTCP.INI by SELECT.EXE when the template is selected during network startup. If SELECT is not used, then the value must be defined by editing the [TCPIP] section of PWTCP.INI:

```
[TCPIP]
IPAddress=90.0.0.14
SubnetMask=255.0.0.0
```

2.6.10 Setting the TCP/IP NetBIOS Scope

All NetBIOS names in a TCP/IP environment are qualified by a NetBIOS Name Scope. When one has been defined, all NetBIOS name-related operations are affected. All PCs should use the same NetBIOS Name Scope. Conventionally, the NetBIOS Name Scope is set to the same value as the Domain Name (see Section 2.6.8).

In PATHWORKS 4.x, the NetBIOS Name Scope is defined in the PROTOCOL.INI file, [TINYRFC] section. For example:

```
[TINYRFC]
   .
   .
   .
SCOPE = "vecnet.com"
```

In PATHWORKS 5.x, the NetBIOS Name Scope is defined in the template file. The default value is undefined, but it can be defined by adding a line to the [Keywords] section. For example:

```
[Keywords]
   .
   .
   .
   TCPIPNBSCOPE = vecnet.com
```

The value is transferred from the template to the configuration file PWTCP.INI by SELECT.EXE, when the template is selected during network startup. If SELECT is not used, then the value must be defined by editing the following line in the [NETBIOS] section of PWTCP.INI:

```
[NETBIOS]
   .
   .
   .
ScopeID         =   vecnet.com  ; Scope ID
```

2.6.11 Defining a Remote TCP/IP NetBIOS Name

In a similar manner to PATHWORKS DECnet, PATHWORKS TCP/IP has a mechanism for translating NetBIOS Names into IP Addresses. This allows the Manual Connect method to establish a NetBIOS session between a *PC-Duo* Control and a Slave on a remote network. Name translation is performed using a name table that is maintained by the loaded TCP/IP NetBIOS on the Control PC. This table is initialised from a data file (normally NBHOSTS.) when the TCP/IP NetBIOS starts up, but names can also be defined while the NetBIOS is running. The current name table contents can also be saved to a file (e.g. NBHOSTS. again).

The INETNAME utility is used for maintaining the NetBIOS name table. In order to add an address translation for a *PC-Duo* Slave running on a PC called DEC15 at IP Address 90.0.0.15, you should use the following command:

```
C:\>inetname dec15 /fill \00 /end \00 90.0.0.15
```

Here, the /end and /fill options specify the end and fill character values as 00. These are necessary for Slave NetBIOS Names. Unfortunately, the INETNAME utility from PATHWORKS 5.0 and 5.1 TCP/IP does not support the /fill option. You should use the following command instead:

```
C:\>inetname DEC15\00\00\00\00\00\00\00\00\00\00\00 /end:00 90.0.0.15
```

Here, the Slave Name, DEC15, has been zero-filled to a length of 16 characters. The /end:00 option is required to prevent INETNAME from replacing the final character with a space. It should also disable the automatic addition of a 03-terminated "User Name" variant.

PATHWORKS 5: When the PATHWORKS 5 INETNAME is used to add a Slave name, it actually adds zero-terminated and 03-terminated names to the name table. These names cannot be deleted, so they rapidly clutter up the name table.

Names can also be defined in the NBHOSTS. file and loaded using the INETNAME /load *filename* (PATHWORKS 4) or /load:*filename* (PATHWORKS 5) options. An example of a Slave name defined using this method is as follows:

```
90.0.0.15   DEC15\00\00\00\00\00\00\00\00\00\00\00
```

PATHWORKS 5: The PATHWORKS 5 INETNAME is not able to add the zero-filled Slave names from the NBHOSTS. file. Any Slave names added this way will be corrupted.

2.6.12 Increasing the TCP/IP NetBIOS Name Table Size

When a large number of Slave names have to be defined simultaneously, it will be necessary to increase the size of the NetBIOS Name Table. On PATHWORKS 4, the size of the table is controlled using two values in the PROTOCOL.INI file. For example:

```
[TINYRFC]
   .
   .
   .
NUMNAMES = 16
INTERNETNAMES = 4
```

Here, NUMNAMES allows for up to 16 NetBIOS names in the Name Table. Of these, up to 4 can be added using INETNAME. Note that the NUMNAMES value must always be equal to or greater than the INTERNETNAMES value.

On PATHWORKS 5, the sizes of the local and remote NetBIOS Name Tables are controlled by the following lines in the PWTCP.INI file:

```
[NETBIOS]
NumLocalNames   =   16      ; Size of local NetBIOS name table
NumRemoteNames  =    6      ; Size of remote NetBIOS name table
```

The NumLocalNames line controls the size of the local NetBIOS Name Table. The NumRemoteNames line must be edited to increase the size of remote NetBIOS Name Table to allow for more INETNAME definitions.

2.7 Running PC-Duo Over Non-PATHWORKS Networks

Networks other than PATHWORKS often have similarities in the extra setup that they require in order to use *PC-Duo*. Some networks require additional configuration to allow *PC-Duo* operation, several benefit from setting the DOS Machine Name, and using *PC-Duo* on a NetWare IPX stack requires one extra setup command. These steps are described in the following sections.

2.7.1 Running PC-Duo Over IPX

PC-Duo can be used over a native NetWare IPX transport. For the best reliability and performance, the modern IPXODI should be used with an ODI card driver (MLID), in preference to the older monolithic IPX stack.

The most significant difference between Novell networks and most NetBIOS networks is that NetWare (IPX) does not use the DOS Machine Name. The Workstation Shell (e.g. NETX) provides a different name mechanism. However, the Shell may not be loaded when the *PC-Duo* Slave is started, so an independent naming mechanism is advisable. In fact, if the DOS Machine Name is set before the Slave is started, then *PC-Duo* can use that name, in the same manner as the NetBIOS version of the package components. We recommend that you set the DOS Machine Name prior to using *PC-Duo* in IPX environments. Please refer to Section 2.8 for further details.

Since the IPX stack has a completely different software interface from NetBIOS stacks, it is also necessary to use the IPX-specific version of the *PC-Duo* Slave TSR, IPSLAVE.EXE, rather than the NetBIOS version, SLAVE.EXE. This is accomplished, without requiring STARTSLV.BAT edits, by setting the PCDNW environment variable before STARTSLV actually loads the Slave. This is normally performed by STARTSL1.BAT, which is created in the installation directory when *PC-Duo* is installed.

PCDNW is used to specify a prefix to the “SLAVE” program name in STARTSLV.BAT. It is normally left undefined in NetBIOS environments, which has the effect of using the NetBIOS SLAVE.EXE. If it is defined to be “IP”, STARTSLV will load IPSLAVE.EXE instead.

Note: PCDNW should either be undefined, or it should be set to “IP”—no other settings are supported.

Refer to Section 2.5 for further Slave customisation options.

2.7.2 Running PC-Duo Over the NetWare NetBIOS

The NetBIOS version of *PC-Duo* can be used over the NetWare NetBIOS. This is slow and inefficient, and requires additional memory when compared with the native IPX version, but it can be used if required, perhaps for compatibility reasons. The following line should be added to the NetWare NET.CFG or SHELL.CFG files.

```
NETBIOS COMMANDS = 25
```

This ensures that the NetWare NetBIOS is configured to allow sufficient simultaneous NetBIOS requests for *PC-Duo*.

You should then arrange for the PC's DOS Machine Name to be set for subsequent boots (described in Section 2.8), and then reboot. Refer to Section 2.5 for further Slave customisation options.

It is normally preferable to run *PC-Duo* over the native NetWare IPX transport. This is described in Section 2.7.1.

2.7.3 Running PC-Duo Over Windows for Workgroups

Although Windows for Workgroups (WFW) is a NetBIOS-based LAN, it doesn't set the DOS Machine Name, and it doesn't normally have any transport accessible outside Windows. *PC-Duo* can be used with WFW, provided that a *real-mode* network can be loaded. PATHWORKS DECnet, TCP/IP, and NetBEUI, and Novell IPX transports are all real-mode networks.

WFW's "Windows Network", or NetBEUI, can be used in both real-mode and protected mode. In real-mode, it is compatible with the *PC-Duo* DOS Slave TSR. Please refer to Appendix B for further details on WFW NetBEUI configuration.

The new Microsoft 32-bit TCP/IP for WFW (code name Wolverine) is a protected mode network only, and so the *PC-Duo* DOS Slave TSR cannot be loaded when this is the only transport configured. However, the *PC-Duo* Windows Control can be used over the Wolverine TCP/IP, provided that any Slaves are on PCs running a compatible real-mode TCP/IP NetBIOS transport.

Please refer to Appendix B for details of the extra setup required for *PC-Duo* to be used in a WFW environment.

2.7.4 Running PC-Duo Over Another NetBIOS Transport

PC-Duo is a demanding NetBIOS application, and may well find holes in NetBIOS implementations. The normal "Connect" process requires NetBIOS datagrams to be handled correctly, and delivered to any Slaves present on the local network. If a "Connect" does not find any Available Slaves, then the NetBIOS implementation may well be responsible.

The "Manual Connect" process is less demanding, but may still tax the NetBIOS Name Lookup or mapping processes. When a connection has been established, *PC-Duo* can transfer large amounts of data, either screen contents or files, with several asynchronous operations being active simultaneously. This may stretch or exhaust the network transport's capacity to handle commands or use up all of the data buffers.

If you are running *PC-Duo* over a *LANlink* transport, or over other network software, there may be a limit on the number of simultaneous NetBIOS sessions that the PC network software will allow.

If you are using *PC-Duo* with a *LANbridge* package, it is very likely that you will have to request extra NetBIOS sessions or buffers on the bridging machine itself. Please refer to the documentation with your *LANlink* or *LANbridge* package for further details.

2.8 Setting the DOS Machine Name

If your network is not already configured to set the DOS Machine Name then you must arrange for it to be set if you wish to use this mechanism to provide default names for *PC-Duo's* DOS Slave and Windows Control programs. This is recommended for improved ease of use.

This can be done with the SETMNAME program provided with *PC-Duo*.

Note: SETMNAME should be run from the DOS prompt (outside Windows), before running STARTSLV.

To check if your network already sets a DOS Machine Name:-

1 Change to the *PC-Duo* directory

2 Type SETMNAME ? and press <Enter>

3 If a name has already been set you will see a message such as:-

```
'Machinename set to SALES'
```

If the DOS Machine Name has already been set, you should generally not change it with SETMNAME. Indeed, changing it can cause some network software to fail (such as the Microsoft Enhanced Redirector). If it is already set, that name will be used by Slave and Control '*' commands. If you *need* to use a different name for *PC-Duo*, and can't reconfigure the network software that set the Machine Name, then you can specify it with the PCDCMD environment variable in STARTSL1.BAT or before CALLing STARTSLV—see Section 2.5 for more details.

Alternatively, if the name is not set, you can use SETMNAME to set it, as follows:-

1 Type SETMNAME followed by the name that you want. For example: SETMNAME FRED

2 You will then see the message 'Machinename set to FRED'

UPPER CASE: It is important that you specify the machine name in UPPER CASE.

You should use a name which is no more than 15 characters long, and composed of characters from A-Z, 0-9, and '_'—do not use any spaces, or other characters in the name that you specify.

Note: Be careful when setting the DOS Machine Name manually that you do not cause a conflict with other network requirements. For example, Windows for Workgroups sets the Machine Name from the ComputerName in SYSTEM.INI. You should specify the same name (in UPPER CASE) in the SETMNAME command in WFW environments.

The SETMNAME command should be added to your AUTOEXEC.BAT so that it is set automatically on each system boot. The following insert in AUTOEXEC.BAT could be appropriate when using *PC-Duo* in a pure *LANlink* environment:-

```
REM Load the LANlink transport

call \lanlink\startnb

REM Set the DOS Machine Name to "FRED"
REM - Note that this must be UPPER CASE

\pcduo\setmname FRED
```

```
REM And start the PC-Duo NetBIOS SLAVE
call \pcduo\startslv
```

2.9 Changing the Default Installation Options

The default installation configuration is controlled by a user-editable file, DEFAULTS.INC, on the Demonstration Disk. This allows *PC-Duo* installation defaults to be changed, and this can be useful when installing *PC-Duo* on many nodes, when the standard configuration is not ideal. Aspects of the installation that can be changed include the modules that are to be installed (e.g. NetBIOS Slave TSR and Windows Slave), and the installation directory. Please refer to Appendix A for further details.

2.10 Automatic Installation of PC-Duo

Vector Networks' *LANutil for PATHWORKS* product can be very useful when distributing *PC-Duo* (and many other applications) throughout a network. The *PC-Duo* installation disks contain scripts that can be used with *LANutil*. Further detail is contained in Section A.6, and in the documentation accompanying the *LANutil* package.

2.11 Installation Problems

Appendix H contains descriptions of the symptoms, and suggested solutions, for a wide range of problems that may occur with *PC-Duo* installation and use.

3 Loading the Slave Programs

3.1 Overview

The DOS Slave program must be loaded before a machine can be accessed by a Control. This applies whether the PC is running DOS or Windows. The Slave can be loaded from the DOS prompt, or by CALLing the supplied STARTSLV.BAT batch file during the PC's normal startup sequence (e.g. from AUTOEXEC.BAT).

Different Slave programs are required for IPX and NetBIOS networks. However, a single Windows Slave provides mouse support and handles Windows displays for both networks. These are shown in Table 3–1.

Table 3–1 Slave Versions for IPX and NetBIOS

Slave Program	Description
IPSLAVE.EXE	DOS Slave for IPX networks
SLAVE.EXE	DOS Slave for NetBIOS networks
WSLAVE.EXE	Windows Slave for both networks

Command syntax for IPSLAVE.EXE and SLAVE.EXE is identical. The appropriate Slave (IPX or NetBIOS) is loaded during startup by STARTSLV.BAT. This is controlled by the PCDNW environment variable, with the NetBIOS SLAVE.EXE being the default. Please refer to Section 2.7.1 for further details on *PC-Duo* setup for IPX, and Chapter 2 for further details on STARTSLV.BAT.

The Windows Slave program WSLAVE.EXE is loaded automatically during Windows startup, and does not normally need command options.

The Slave is normally loaded after the network software has started. At this stage, on NetBIOS and LAN Manager networks, the PC's DOS Machine Name has normally been defined, and this can be used to provide a name for the Slave that will be unique on the local network. If your network software does not define the DOS Machine Name, then you can use the SETMNAME program to set the DOS Machine Name before calling STARTSLV.BAT. STARTSLV.BAT defaults to using the PC's DOS Machine Name, regardless of the network type.

See Section 2.8 for further information on setting the DOS Machine Name.

Alternatively, the PCDCMD environment variable mechanism can be used to change STARTSLV.BAT's behaviour (see Section 2.5). Whichever method is used, it is necessary for you to provide the Slave with a unique name. We recommend that you do not edit STARTSLV.BAT itself, unless it is unavoidable. Future releases of *PC-Duo* will over-write any existing STARTSLV.BAT when they are installed, and any customisations will be lost.

See also Chapter 7 for additional information when a Slave is required on a standalone PC.

Note: You *can* use the PCDCMD environment variable to provide a Slave name to STARTSLV.BAT, but this does not provide a default for the Control name (and STARTSLV deletes the PCDCMD environment variable, to release space, before it exits). The only reliable way to provide a single default value for both Slave and Control to use is to set the DOS Machine Name.

There is no need to change a DOS Machine Name if it is already set, indeed, it can be dangerous to change it. Changing the name can cause some network software (e.g. the Microsoft Enhanced Redirector) to fail.

3.2 Slave Command Syntax

The full DOS command line for loading a Slave is:-

```
[IP]SLAVE { * | name } [password] [[option[value]] ...]

Options:   /0           Don't Send Colour Palette And DAC Registers
           /A[n]        Use Alternate NetBIOS Adapter
           /B           Accept Broadcast Show
           /E           Load in EMS (Not compatible with Windows)
           /F           Disable File Transfer
           /Gnn         Super VGA (800 x 600) Video Mode

           /Hnnnn       Bitmap Cache Size
           /I           Ignore Broadcast Messages
           /K           User Acknowledgement Required
           /Ln          Maximum Slave Lookup Delay
           /Mnn         Delay Before Erasing Messages
           /Nn          Number of Buffers
           /rnnnnnnnnn  Reboot Vector
           /R           Reboot Slave when Control Disconnects
           /Tnn         Inactivity Timeout
           /U           Unload Slave from Memory
           /Vnn         Software Interrupt Vector
           /W           Allow Watch Only
           /X           Load in XMS
           /Yfilename   Log Slave Activity to a File
```

The above information can be obtained by running a Slave with a /? help option. After displaying the usage message, it will return to the DOS prompt.

Slave command options are used to tailor access, performance, and security to your exact needs. They are described in the following sections.

Note: IPSLAVE is used on IPX (NetWare) networks. SLAVE is used on NetBIOS networks. The command syntax is identical for both.

3.2.1 Changing the Windows Slave Command Options

The Windows Slave is normally run by Windows executing the run= line in the [windows] section of the WIN.INI file. However, when this method is used, it is not possible to specify any command line options for the Slave. If this is required, for example to increase the Windows Slave's Bitmap Cache Size (see Section 3.4.7), then the Slave cannot be run this way.

Instead, open up the *PC-Duo* Group Window, and click once on the *PC-Duo* Slave icon to select it. The icon name will be highlighted to show that it has been selected. Pull down the Program Manager File Menu, and select the Copy option. Program Manager will prompt you to confirm that you want to copy the *PC-Duo* Slave from the *PC-Duo* Group, and to specify which group you want to copy it to. Use the Scroll Down button to work down the group list, until you find the Startup Group, click once on it to select it, and then press [OK].

Next, open up the Startup Group Window, and select the new *PC-Duo* Slave icon by single-clicking on it. The icon name will be highlighted to show that it has been selected. Pull down the Program Manager File Menu again, and select the Properties... option. This will display a dialog box entitled Program Item Properties. This box contains the Description, Command Line, Working Directory, Shortcut Key, and icon.

The cursor will be positioned at the end of the description "PC-Duo Slave". Press <Tab>, or click on the Command Line field. Press the <End> key to move the cursor to the end of the command line. You can then add new options by typing them in, or remove them with the <Backspace> or <Delete> keys.

When you have finished making changes, click on the [OK] button to save the changes, or on [Cancel] to quit without making changes.

Note: You should not change the C:\PCDUO\WSLAVE.EXE part of the command line, or Program Manager will not be able to run the Windows Slave!

It is necessary to remove *C:\PCDUO*\WSLAVE.EXE (where *C:\PCDUO*\ is the *PC-Duo* installation directory), from the run= line in the WIN.INI file. This can be done with a text editor such as Notepad or DOS Edit. If WSLAVE.EXE is the only item in the line, it can be commented out by inserting a semi-colon at the left margin. If WSLAVE.EXE is not the only item in the line, then it will be necessary to remove WSLAVE.EXE while still leaving the other item(s) in place. It is a good idea to copy the full run= line before you make the change. Comment out the copy with a leading semi-colon. Then, it will be simple to replace WSLAVE.EXE at a later date.

Stop and restart Windows. Check to make sure that the Windows Slave program loads correctly.

Note: Anything which causes a delay between Windows starting and the Windows Slave loading can cause problems for a viewing Windows Control. Starting Windows will cause the "Slave is in graphics mode xxh" message to be displayed on the Control. Any Windows pop-ups which appear before WSLAVE starts will prevent WSLAVE from loading until they have been dismissed. The viewing Control will see the "If starting Windows, please wait..." message until WSLAVE is running.

3.3 Slave Command Parameters

The Slave has only one required command parameter. This is the name by which it is to be known on the network. This can be followed by an optional password. The password can be used to restrict access to authorised Control users only.

3.3.1 Slave Name

The Slave name must be unique on the local network. If it is not unique, the Slave will exit with an error. Usually, the best approach is for the Slave to use the DOS Machine Name as the default for its name. This can be achieved by using an asterisk '*' in place of the actual name. This has the added advantage of making the STARTSLV.BAT batch file shareable between many Slaves. The default STARTSLV.BAT uses this technique, and can potentially be run from a network file server, with all Slaves sharing the same copy of STARTSLV.BAT (and, in fact, the whole *PC-Duo* area).

The DOS Machine Name is normally defined during the network startup process.

NetWare: NetWare networks typically use a different mechanism to name workstations, and do not set the DOS Machine Name. However, it may be convenient to use the SETMNAME program supplied with *PC-Duo* to set the DOS Machine Name before calling STARTSLV.BAT or running a Slave. Please refer to Section 2.7.1 and Section 2.7.2 for further details of *PC-Duo* setup for NetWare.

Windows for Workgroups: Even though it is a NetBIOS-based network, Windows for Workgroups does not set the DOS Machine Name. Please refer to Appendix B for details on using *PC-Duo* in such environments.

If your network software does not define the DOS Machine Name, or you wish to use a different name, then the following rules must be obeyed:-

Rules for a Slave Name

- The Slave name must be one word (i.e. no embedded spaces)
- The maximum length of a Slave name is 15 characters
- It cannot contain reserved DOS characters, such as \, *, ? or |.

The Slave will convert the name you supply into UPPER CASE, and will null-fill it to sixteen characters. On NetBIOS networks, this name is registered as a Unique Name on the appropriate NetBIOS adapter. This takes a few seconds, depending on the network version. The use of a Unique Name prevents two Slaves from using the same Slave Name. During this time, the Slave displays an "Initialising..." message.

If registration fails, the Slave will report the error before it exits. Name registration will fail when the name is not unique, or when there is insufficient space in the NetBIOS name table.

Note: The Slave also registers a Group Name "PCD-SLAVE". Group Names do not have to be unique on the network. Controls use this name to find the Available Slaves.

Examples:

```
C:\PCDUO\>slave *
```

or

```
C:\PCDUO\>slave john
```

Once the Slave has loaded successfully, it will be available for Connection or Selection. It will also be able to receive Broadcast Messages. If the "*" parameter is used, the Slave will deduce its name automatically from the DOS Machine Name.

Note: Use of the "*" parameter is recommended on most networks as it minimises the configuration required on each PC.

NetWare: NetWare workstations will commonly *not* have the DOS Machine Name set, so you must use the SETMNAME program to set it before loading the Slave, *or* you can use the PCDCMD environment variable to specify the Slave name explicitly—see Section 2.8 and Section 2.5 for further details.

3.3.2 Password

A password can be used to prevent unauthorised Control users from accessing the Slave machine. If used, this feature will prevent a Control user who does not know the password from performing all functions except Broadcast Show or Broadcast Message.

If this feature is required, the password must be encrypted using the CALCPSW program. The encrypted password can then be added to the SLAVE command line. Any Control users wanting to access this Slave must enter the *unencrypted* password. It is not possible to deduce the unencrypted password from the encrypted version that is used on the Slave command. A malicious Control user will therefore not benefit from seeing the Slave command, such as if it is present in a batch file.

Note: See Appendix E for instructions on how to encrypt a password.

Examples:

```
C:\PCDUO\>slave * 11216687
```

or

```
C:\PCDUO\>slave john 10031757
```

The Control user will be required to enter the corresponding *unencrypted* password before obtaining access to the Slave. The first example will auto-name; the second example uses an explicit name of "JOHN".

Note: See Appendix E for details on how to encrypt a password.

3.4 Slave Command Options

Command options follow any required or optional parameters. They are distinguished by a leading <Slash> character. This is followed by a single character which identifies the option (e.g. /A). The option character may also be followed by an option value (e.g. /A9).

Note: There should not be any other characters between the option letter and the start of the value. "/A:9", for instance, would be invalid.

3.4.1 Don't Send Colour Palette and DAC Registers

When a Slave is Selected by a Control, it normally sends its current colour palette and display Digital to Analog Converter (DAC) registers to enable the Control to display the on-screen colours correctly. With some applications or display adapters, this may cause the Control to display the wrong colours, or even to produce an invisible display if the background and foreground colours are apparently the same.

/0—Don't Send Colour Palette And DAC Registers

This option does not require a value.

Example:

```
C:\PCDUO\>slave * /0
```

Note: This option is /0—using the digit 0, not the letter o.

This disables the colour palette send. The Control will use its local display (colour) setup instead.

Use this option if:

The Control does not display the Slave's screen contents properly. It is also advisable when the Slave's display is monochrome, but the Control has a colour display.

Note: This option is not needed for Windows Controls and Slaves.

3.4.2 Alternate NetBIOS Adapter

Most machines will be used with a single NetBIOS transport. In this case, the default NetBIOS adapter number, 0, will be correct. However, when more than one NetBIOS transport has been loaded (e.g. PATHWORKS and TCP/IP, or NetBEUI and PATHWORKS), then it may be necessary for you to use this option to specify which NetBIOS *adapter* should be used.

/A[*n*]—Alternate NetBIOS Adapter

The adapter number should be specified as a decimal number in the range 0 to 9. The default adapter number is zero, but if /A alone is specified, this changes to adapter 1.

Examples:

```
C:\PCDUO\>slave * /a
```

or

```
C:\PCDUO\>slave john /a2
```

In the first example, the Slave will use NetBIOS adapter 1. In the second, an explicit adapter number has been specified, so NetBIOS adapter 2 will be used.

Use this option if:

You have multiple NetBIOS transports available and do not wish to use the default (i.e. adapter number 0).

Note: This option is not relevant for non-NetBIOS networks (such as IPX).

3.4.3 Accept Broadcast Show

A DOS Control can broadcast its screen contents (i.e. a Broadcast Show) to all Available Slaves. This can be useful in training situations, but will interfere with any Slaves that are not taking part in the training session. The default behaviour is for the Slave to ignore Broadcast Shows, and this option is used to enable Broadcast Shows.

/B—Accept Broadcast Show

This option does not require a value.

Example:

```
C:\PCDUO\>slave * /b
```

This will allow the Slave to receive an incoming Broadcast Show even when it has not been Connected or Selected by any Control.

Use this option if:

You want to enable the Slave to receive Broadcast Shows.

Note: You should not enable this option on a machine which will be used as a Control to perform a Broadcast Show. Control cannot tell that the local Slave has this option enabled, and display contention can hang the PC.

3.4.4 Load in EMS

It is possible to load the Slave into EMS (Expanded Memory), if a suitable memory manager has been loaded and memory is available. This reduces the Slave's conventional memory requirement from 22 KBytes to 8 KBytes.

/E—Load in EMS

This option does not require a value.

Example:

```
C:\PCDUO\>slave * /e
```

The Slave will be loaded into EMS memory (if available).

Use this option if:

You are low on conventional memory and you have an EMS driver loaded.

Note: You cannot load a Slave into EMS on a machine that will be running Windows.

It is generally more useful to load the Slave into Upper Memory using the DOS LOADHIGH command.

3.4.5 Disable File Transfer

The default behaviour is for the Slave to allow a connected Control to manage its local files, including transferring files back and forth between Slave and Control. The /F option can be used to disable this feature. It also has the effect of reducing the Slave's running memory requirement by approximately 1.5 KBytes.

/F—Disable File Transfer

This option does not require a value.

Example:

```
C:\PCDUO\>slave * /f
```

Control will be prevented from transferring files to and from the Slave. Approximately 1.5 KBytes of memory will be saved.

Use this option if:

You wish to prevent file transfer, you are low on memory, or you have an alternative way to perform file management—such as *LANutil*!

3.4.6 Super VGA (800 x 600) Video Mode

Super VGA display modes are not well standardised. In some cases, it will be necessary for the Slave to be provided with the correct display mode number for DOS Graphics displays using 800 x 600 resolution x 16 colours. It will then be able to recognise Super VGA, and will be able to set a connected Control to the correct display resolution.

/G*nn*—Super VGA (800 x 600) Video Mode

The display mode corresponding to Super VGA is specified as a two-digit hexadecimal number. This should be determined from your display adapter manual.

Example:

```
C:\PCDUO\>slave * /g7a
```

If the display is set into mode 7A (hexadecimal), a Connected Control will be informed that the display is now in Super VGA mode (800 x 600 x 16 colours).

Use this option if:

You want to Control DOS Slaves in Super VGA mode.

Note: *nn* (hexadecimal) is the video mode used for Super VGA. Refer to the Super VGA card manual to determine the correct mode, or note the error message when Control is trying to connect.

This switch is not required for Windows Slaves using Windows or DOS text programs. It is only relevant for DOS Graphics applications.

3.4.7 Set the Bitmap Cache Size

The Windows Control and Slave cache the most recently used bitmaps to improve performance. Both Slave and Control initialise their caches when the initial connection is made. Then, while the Control is viewing the Slave's screen, and this changes, the cache is checked to see if the bitmap is already present. If so, the Slave can send a simpler command to the Control. Otherwise, the bitmap image must be sent first.

The larger the cache is, the greater the chance that the cache contains the necessary data, and therefore the better the performance should be. This is particularly noticeable with bitmap-intensive applications such as Powerpoint and Solitaire.

/H*nnnn*—Bitmap Cache Size

This option is used to control the size of the Windows Slave's bitmap cache. The cache size is specified in kilobytes, in the range 256 to 1024. The default value is 256 kilobytes. The actual cache size used will be minimised with the value used by a connected Control.

Example:

```
C:\PCDUO\>wslave /h512
```

Use this option if:

You want to improve the performance with Windows applications which make extensive use of bitmaps.

See Section 4.4.8 for information on setting the Control Bitmap Cache Size. See Section 3.2.1 for details on how to set command options for the Windows Slave.

Note: This option applies to the Windows Slave only.

The default Bitmap Cache Size is sufficient to hold all of the bitmaps used by Solitaire!

The Control intialises its Bitmap Cache when it connects to the Slave.

3.4.8 Ignore Broadcast Messages

A Control can send a Broadcast Message to all Available Slaves. If a Slave receives one of these messages, it will display the message on-screen. The display will remain on-screen until it is cleared, or until the message timeout expires. A DOS Slave will not be able to do anything else while the message is displayed.

/I—Ignore Broadcast Messages

This option does not require a value.

Example:

```
C:\PCDUO\>slave * /i
```

This option allows the Slave to ignore Broadcast Messages.

Use this option if:

You wish to prevent Broadcast Messages interrupting work on the Slave.

Note: The default Message Timeout is 30 minutes. Refer to Section 3.4.11 for details on changing the Message Timeout.

3.4.9 User Acknowledgement Required

If this option is enabled, the Slave user will be prompted for approval when any Control attempts to connect to their PC. This feature can be used to ensure that there is always a user present at the Slave, but it will also prevent all functions except Broadcast Show or Broadcast Message when the Slave PC is unattended.

/K—User Acknowledgement Required

This option does not require a value.

Examples:

```
C:\PCDUO\>slave * /k
```

or

```
C:\PCDUO\>slave name 123553 /k
```

When this option is used, the Slave user will be prompted to accept the connection attempt from the named Control, and must press either <Enter> or 'Y' keys (DOS Slave) or press an [Accept] button (Windows Slave) before access is granted. The connection can be refused by the user pressing the 'N' key or clicking on the [Reject] button.

The first example will auto-name using the DOS Machine Name. The second example uses an explicit Slave Name, but has an encrypted password.

Note: Use of this feature will prevent a Control from performing background file management operations unless there is a user present at the Slave PC.

3.4.10 Maximum Slave Lookup Delay

On a network with a large number of Available Slaves, a significant network load can be produced when a Control looks for all of the Slaves. This option can be used to introduce a delay between the Slave's receipt of the Control's enquiry message and the Slave's response.

/L*n*—Maximum Slave Lookup Delay

The delay should be specified as a decimal number of seconds. The value should be in the range 1 to 5.

Example:

```
C:\PCDUO\>slave * /l2
```

In this example, the Slave will delay for up to two seconds before it responds to a Control lookup enquiry.

Use this option if:

You have a lot of Available Slaves, often use the Control "Look for all Available Slaves" option, and experience network problems when the Slaves respond with no delay.

Note: You can restrict the number of Slaves which are eligible to respond to a Control lookup by specifying the start of the Slave names that are of interest. For instance, specifying "JO" could get responses from Slaves called "JOHN", "JOANNE", and "JOE", but would not

get responses from any others, even in a network containing thousands of Available Slaves.

3.4.11 Delay Before Erasing Messages

A Control can send a Broadcast Message to all Available Slaves. When a Slave receives a message, it displays the message and waits for the user to acknowledge receipt. The message will be erased automatically if the Message Timeout expires before the user acknowledges. While it is waiting, a DOS Slave cannot continue with any other work that it was doing.

The default Message Timeout is 30 minutes, but it can be reduced or disabled using this option.

/M*nn*—Delay Before Erasing Messages

The Message Timeout can be specified as a one or two digit decimal number. The value should be in the range 0 to 30 minutes. A value of zero disables the timeout feature, forcing user acknowledgement before Slave processing resumes.

Examples:

```
C:\PCDUO\>slave * /m0
```

or

```
C:\PCDUO\>slave * /m5
```

The first example disables the Message Timeout feature. In this case, any message will be displayed indefinitely. The second example reduces the default timeout from 30 minutes to 5, so the Slave PC will not be held up for long if there is no user present to acknowledge the message.

Use this option if:

You wish to allow the Slave to resume normal work in less (or more) than 30 minutes of receiving a Broadcast Message.

3.4.12 Number of Buffers

Communications between Slave and Control are monitored to ensure that all packets are received correctly. With the default number of buffers (2), the Slave can send two packets before it has to request confirmation of successful receipt at Control. No more data is sent until Control acknowledges. Increasing the number of Transmit Buffers allows the Slave to send more information before requesting confirmation. This can improve performance.

/N*n*—Number of Buffers

The number of buffers should be specified as a decimal number in the range 1 to 3. The default number is two. Reducing this to one will reduce the Slave's running memory requirement by approximately 900 bytes. Conversely, increasing the number of buffers to three will increase the requirement by 900 bytes.

Example:

```
C:\PCDUO\>slave * /n3
```

Use this option if:

You wish to tune the Slave for higher or more reliable performance (increase the number of Buffers to 3), or if you are low on memory (reduce the number of Buffers to 1).

Note: The default is 2 Buffers.

The minimum number of Buffers is 1 and the maximum is 3.

Each Buffer takes approximately 900 bytes of memory.

3.4.13 Reboot Vector

Some PC configurations have a non-standard PC reboot vector. This option allows the correct value to be used when the Slave is asked to reboot the PC.

/r*nnnnnnnn*—Set the Reboot Vector

The reboot vector is specified as an eight digit hexadecimal number.

Example:

```
C:\PCDUO\>slave * /rF000E05B
```

This example shows how to specify the reboot vector for PS/2 systems.

Use this option if:

Your system software has changed the reboot vector from the default value of F000FFF0, and you need to be able to reboot Slaves using Control.

Note: Don't confuse this option with /R—Reboot Slave when Control Disconnects. This option uses /r, with a lower-case 'r'. You may need to use *both* options to enable Reboot on Disconnect and also to set the Reboot Vector.

Be wary of rebooting Slaves in an unknown state as data loss or corruption may result.

Take extreme care when resetting reboot vectors to avoid corruption. Incorrect values will crash the Slave system.

PS/2 systems use the F000E05B vector; you should use this value if you wish to reboot PS/2s, as shown in the example above.

3.4.14 Reboot Slave when Control Disconnects

If a sensitive application is run on a single PC, then this option can be used to ensure that any resources that were in use on that PC are disconnected automatically when the Control disconnects.

/R—Reboot Slave when Control Disconnects

The default reboot vector is F000FFF0, but some programs and operating system software move the normal PC reboot vector to a different location. See Section 3.4.13 for details on how to change the Slave's reboot vector.

Example:

```
C:\PCDUO\>slave * /r
```

This example simply enables the reboot on Control disconnect option.

Use this option if:

You wish to reset Slaves Connected in unattended mode and you are satisfied that rebooting will not result in data loss or corruption.

You are unable to use the standard Control Reboot mechanism.

Note: Don't confuse this option with /r—Set the Reboot Vector. This option uses /R, with an UPPER-CASE 'R'. You may need to use *both* options to enable Reboot on Disconnect and also to set the Reboot Vector.

If you enable this option, then Slave will reboot even if Control disconnects accidentally.

Be wary of rebooting Slaves in an unknown state as data loss or corruption may result.

Rebooting from the option in Control may be preferable—see Section 6.5.8.

3.4.15 Inactivity Timeout

The default Slave configuration allows a single Control to connect, but not do anything. This monopolises the Slave, preventing any other Control users from accessing it. This option allows a timeout value to be applied such that if no keyboard, mouse, or message activity is seen before the timeout expires, the Slave will disconnect from the Control.

/T*nn*—Inactivity Timeout

The timeout value is expressed in minutes. The value specified should be in the range 0 to 30 minutes. The default value, 0, disables the timeout.

Example:

```
C:\PCDUO\>slave /t10
```

This example sets a 10 minute timeout. If a Control connects but doesn't do anything for 10 minutes, the Slave will disconnect.

Use this option if:

You are using *PC-Duo* to access a resource on a particular Slave, and you want to prevent a single Control user from monopolising it without actually using it.

3.4.16 Unload Slave from Memory

A running Slave can be unloaded from memory using this option. This can be done simply to recover the Slave's memory, to prevent access, or to allow the Slave to be reloaded with a different configuration.

/U—Unload Slave from Memory

Example:

```
C:\PCDUO\>slave /u
```

Unloads the Slave TSR from memory.

Use this option if:

You wish to unload a Slave, to disable it, recover memory, or reload it in a different configuration (e.g. after re-keying).

Note: This must be run from the DOS Command line and any TSRs that were loaded after Slave must be unloaded first.

It is not necessary for the Slave *name* to be specified.

If this command is given by a connected Control, it will be disconnected, and will not be able to reconnect until another Slave has been loaded.

3.4.17 Software Interrupt Vector

When a Slave is started, it attempts to allocate one of the DOS User Program software interrupt vectors. This vector is used by the Windows Slave to communicate with the DOS Slave TSR. There are normally several vectors available, but some BIOSs mark them as allocated to System ROM instead of being available for program use. If this is the case, then this option can be used to force the Slave to use a specific vector.

/V*nn*—Software Interrupt Vector

The vector value is specified as a two digit hexadecimal number. This is normally in the range 60 to 66 (hex).

Example:

```
C:\PCDUO\>slave * /v66
```

In this case, User Program vector 66 (hex) is marked as allocated, but the Slave should use it regardless.

Use this option if:

The Slave reports that it is unable to allocate a software interrupt vector.

Note: You will need to establish that the vector you choose is not being used by another program. When this problem affects one program (e.g. the Slave), it may also affect other programs which need software interrupt vectors.

3.4.18 Allow Watch Only

The default Slave configuration allows a Control user to access the Slave PC in any one of Control, Share, or Watch access modes. While this is often desirable, it may be necessary to disable Control keyboard input on particular PCs. This option prevents a Control from sending any keyboard input to the Slave, while still allowing the Control to Watch the Slave's screen contents.

/W—Allow Watch Only

This option does not require a value.

Example:

```
C:\PCDUO\>slave * /w
```

This example restricts Control's access to Watch only.

Use this option if:

You wish to restrict the Control operator's access to Watch only; Control is prevented from actually controlling the Slave.

Note: Use the /F switch to prevent File Transfer as well—see Section 3.4.5.

3.4.19 Load in XMS

It is possible to load the Slave into the High Memory Area (HMA) if a suitable XMS (Extended Memory) memory manager has been loaded and the HMA is available. This reduces the Slave's conventional memory requirement from 22 KBytes to 8 KBytes.

/X—Load in XMS

This option does not require a value.

Example:

```
C:\PCDUO\>slave * /x
```

The Slave will be loaded into XMS memory (if available).

Use this option if:

You are low on low memory, have an XMS driver loaded, and the High Memory Area is not already in use.

Note: This command option loads the Slave into the High Memory Area. This is the first 64 KBytes above 1 MByte. If you have DOS=HIGH in your CONFIG.SYS, then the High Memory Area will be occupied already.

It is generally more useful to load the Slave into Upper Memory using the DOS LOADHIGH command.

3.4.20 Log Slave Activity to a File

This option can be used to enable Slave activity logging. Whenever the Slave is loaded or unloaded, or a Control makes a connection or disconnects, this is logged in the Log File.

/Y*filename*—Log Slave Activity to a File

The full path to the Log File should be specified. This file can be on the local hard disk, or it can be on a file server. In the latter case, the same Log File can be shared between several Slaves.

Example:

```
C:\PCDUO\>slave * /yc:\pcduo\slave.log
```

The Slave will log its activity in the specified Log File. Each entry includes the date, time, Slave Name, the operation (e.g. LOAD, CONNECT) and the Control Name, when this is appropriate.

Use this option if:

You want to keep a log of the activity of one or more Slaves.

Note: The Log File can be on the local hard disk or on a file server resource.

Several Slaves can share the same Log File.

4 Loading the Control Programs

4.1 Overview

A Control program is run on the workstation that will be used for controlling or accessing Slaves. Different Control programs are required for DOS and Windows, and also for IPX and NetBIOS networks. These are shown in Table 4–1.

Table 4–1 Control Versions

Control Program	Description
CONTROL.EXE	DOS Control for NetBIOS networks
IPCONTRL.EXE	DOS Control for IPX networks
WCONTROL.EXE	Windows Control for NetBIOS networks
WIPCNTRL.EXE	Windows Control for IPX networks

Command syntax for the Control programs is largely identical, even for the Windows Control programs.

All Controls can control DOS or Windows Slaves and provide mouse support for Windows Slaves. In addition, the Windows Controls have substantially improved performance when they are controlling Windows Slaves.

Controls and Slaves are dependent upon the network type. If you have different network types (i.e. IPX and NetBIOS), then you must run a matching Control and Slave pair. A NetBIOS Control cannot communicate with an IPX Slave, and vice versa.

See also Chapter 7 for additional information when a Control is required on a standalone PC.

The Control is not normally run until after the network software has been started. At this stage, on NetBIOS and LAN Manager networks, the PC's DOS Machine Name will normally have been defined, and this can be used to provide a default name for the Control that will be unique on the local network. If your network software does not define the DOS Machine Name, then you can use the SETMNAME program to set the DOS Machine Name before running the Control. If SETMNAME is run after a reboot, it can set the DOS Machine Name and provide default names for both Slave and Control.

See Section 2.8 for further details on the use of SETMNAME.

Note: You *can* use the PCDCMD environment variable to provide a Slave name to STARTSLV.BAT, but this does not provide a default for the Control name (and STARTSLV deletes the PCDCMD environment variable, to release space, before it exits). The only reliable way to provide a single default value for both Slave and Control to use is to set the DOS Machine Name.

There is no need to change a DOS Machine Name if it is already set, indeed, it can be dangerous to change it. Changing the name can cause some network software (e.g. the Microsoft Enhanced Redirector) to fail.

4.2 CONTROL Command Syntax

Both DOS and Windows Control programs support command line parameters and options. The command syntax for loading a DOS Control is:-

```
CONTROL [{* | name}] [[option[value]] ...]

Options:   /0           Don't send colour palette and DAC registers
           /1           Force Monochrome Operation
           /A[n]        Alternate Network Adapter
           /B[A]        Allow Broadcast Show [to all NetWare LANs]
           /Cname       Immediate Connect to Slave name
           /D[number]   Dial Phone Number
           /Gnn         Super VGA (800 x 600) Video Mode
           /Hnnnn       Bitmap Cache Size
           /L           Send Broadcast Messages to the Local Network only
           /Mfilename   Send a Message
           /P[filename] Capture Print Output [to a file]
           /Snn         Maximum Number of Connected Slaves
```

The above information can be obtained by running Control with a /? help option. After displaying the usage message, it will return to the DOS prompt.

Note: IPCONTRL and WIPCNTRL are used on IPX (NetWare) networks. CONTROL and WCONTROL are used on NetBIOS networks for DOS and Windows Slaves, respectively.

Most command options are supported by both Windows and DOS Control programs. These options are described in the following sections. The DOS Control options can be specified simply by typing them on the command line. Examples are given for the DOS Control. Windows Control options are similar, but in this case, they must be specified by altering the command line associated with the Windows Control program item, as described in Section 4.2.1.

4.2.1 Changing the Windows Control Command Options

The Windows Control is run by the Program Manager when you double-click on its icon. When Program Manager does this, it uses the command line and default directory that are stored in the PCDUO.GRP Group File. The default directory should reflect the *PC-Duo* installation directory, and should not be changed. However, it may be necessary to change the command line occasionally.

To do this, open the *PC-Duo* Group window, and select the *PC-Duo* Control by single-clicking on its icon. The icon name will be highlighted to show that it has been selected. Pull down the Program Manager File Menu, and click on the Properties... option. This will display a dialogue box entitled Program Item Properties. This box contains the Description, Command Line, Working Directory, Shortcut Key, and icon.

The cursor will be positioned at the end of the description "PC-Duo Control". Press <Tab>, or Click on the Command Line field. Press the <End> key to move the cursor to the end of the command line. You can add new options by typing them in, or remove them with the <Backspace> or <Delete> keys.

When you have finished making changes, click on the <OK> button to save the changes, or on <Cancel> to quit without making changes.

Note: You should not change the C:\PCDUO\WCONTROL.EXE (or WIPCNTRL.EXE) part of the command line, or Program Manager will not be able to find the Control program!

4.2.2 Creating new Windows Control Icons

When you want to have more than one Windows Control configuration readily accessible, the simplest way to achieve this is to create one or more new Control Icons.

To do this, open the *PC-Duo* window, and select the *PC-Duo* Control by single-clicking on its icon. The icon name will be highlighted to show that it has been selected. Pull down the Program Manager File Menu, and click on the Copy option. Program manager will ask you which Group you want to copy *PC-Duo Control* to. Open up the scrolled list of Groups, and select the *PC-Duo* Group. Click on <OK>, and Program manager will create a new icon in this Group. Follow the instructions in the Section 4.2.1 to configure the new Control.

Note: It is a good idea to change the Program Description to reflect the different configuration.

4.3 Control Command Parameters

Control has one optional command parameter. This is the name by which it is to be known on the network. This parameter is described in Section 4.3.1.

4.3.1 Control Name

The Control Name is an optional parameter. If specified, the name must be unique on the local network. If it is not specified, the name "OPERATOR" is used. This will prevent any other Controls from being used with this name.

We recommend the use of the DOS Machine Name as the default for the Control Name. In a similar manner to the Slave name, this is achieved by using an asterisk '*' in place of the actual name. This is the default behaviour for the *PC-Duo* Windows Setup program, when it creates the new *PC-Duo* Group.

If the name is not unique, Control's initialisation will fail and it will report a NetBIOS error before it exits back to Windows or the DOS prompt.

The DOS Machine Name is normally defined during the network startup process. If your network software does not define the DOS Machine Name, and you do not wish to define it (see Section 2.8), or if you wish to use a different name, then the following rules must be obeyed:-

Rules for a Control Name

- The name must be one word (i.e. no embedded spaces)
- The maximum length of the name is 11 characters
- It cannot contain reserved DOS characters, such as \, *, ? or |.

Control converts the name you supply into UPPER CASE, prefixes it with "PC-" and null-fills it to sixteen characters. This will be registered as a Unique Name on the appropriate NetBIOS adapter. This takes a few seconds, depending on the network version. During this time, Control displays an "Initialising..." message.

If registration fails, Control will report the error before it exits. Name registration will fail when the name is not unique, or when there is insufficient space in the NetBIOS name table.

Note: A Control Name will *not* clash with a Slave on the same machine, even if they are both told to use the DOS Machine Name. This is because the Control prefixes the Control Name with "PC-".

Examples:

```
C:\PCDUO\>control
```

or

```
C:\PCDUO\>control *
```

or

```
C:\PCDUO\>control john
```

In the first case, Control uses the default name of OPERATOR. In the second case, it takes its name from the current DOS Machine Name setting. This will fail if the Machine Name has not been set. In the third case, the Control name is explicitly set to "JOHN".

Note: When it is connected to a Windows Slave, the Control Name is displayed in the Slave icon.

NetWare: NetWare workstations will commonly *not* have the DOS Machine Name set. If you are using an IPX Control, or using the NetBIOS Control over the NetWare NetBIOS, you are likely to need to specify the Control name explicitly. You can avoid this, and use the DOS Machine Name to provide a default Control Name, by using the SETMNAME program to set the DOS Machine Name before you start the Control. See Section 2.8 for more details.

Windows for Workgroups: Unlike most other NetBIOS-based networks, Windows for Workgroups does not set the DOS Machine Name. Please refer to Appendix B for more details on using *PC-Duo* in a Windows for Workgroups network.

4.4 CONTROL Command Options

Command options follow any required or optional parameters. They are distinguished by a leading slash (/) character. This is followed by a single character which identifies the option (e.g. /A). The option character may also be followed by an option value (e.g. /A9).

Note: There should not be any other characters between the option letter and the start of the value. "/A:9", for instance, would be invalid.

4.4.1 Don't Send Colour Palette and DAC Registers

When a Control starts a Show operation to a Slave, it normally sends its current colour palette and display Digital to Analog Converter (DAC) registers to enable the Slave to display the on-screen colours correctly. With some applications or display adapters, this may cause the Slave to display the wrong colours, or even to produce an invisible display if the background and foreground colours are apparently the same.

/0—Don't Send Colour Palette And DAC Registers

This option does not require a value.

Example:

```
C:\PCDUO\>control * /0
```

Note: This option is /0—using the digit '0', not the letter 'o'.

This disables the colour palette send. The Slave will use its local display (colour) setup instead.

Use this option if:

The Slave does not display the Control's screen contents properly. It is also advisable when the Control's display is monochrome, but the Slave has a colour display.

See also Section 3.4.1.

Note: This option is not needed for Windows Controls (which don't implement a Show option) or Slaves.

4.4.2 Force Monochrome Operation

This option can be used to improve the visibility of the Control Menu when a DOS Control is running on a monochrome VGA monitor.

/1—Force Monochrome Operation

This option does not require a value.

Example:

```
C:\PCDUO\>control * /1
```

Use this option if:

You are using a monochrome display and find the screen difficult to read.

4.4.3 Alternate NetBIOS Adapter

PC-Duo is most commonly used with a single transport. In the case of a NetBIOS network, the default NetBIOS adapter number, 0, will be correct. However, when more than one NetBIOS transport has been loaded (e.g. PATHWORKS and TCP/IP, or NetBEUI and PATHWORKS), then it may be necessary for you to use this option to specify which NetBIOS *adapter* should be used.

/A[*n*]—Use Alternate NetBIOS Adapter

The adapter number should be specified as a decimal number in the range 0 to 9. The default adapter number is zero, but if /A alone is specified, this changes to adapter 1.

Examples:

```
C:\PCDUO\>control * /a
```

or

```
C:\PCDUO\>control john /a2
```

In the first example, Control will use NetBIOS adapter 1. In the second, an explicit adapter number has been specified, so NetBIOS adapter 2 will be used.

Use this option if:

You have multiple NetBIOS transports available and do not wish to use the first (i.e. adapter number 0).

Note: This option is not relevant for non-NetBIOS networks (such as IPX).

4.4.4 Allow Broadcast Show

A DOS Control can broadcast its screen contents (i.e. a Broadcast Show) to all Available Slaves. This can be useful in training situations, but will interfere with any Slaves that have been started with the /B option. The default Control behaviour is not to enable Broadcast Shows, and the Broadcast Show option on the Slaves menu is "greyed-out". This option is used to enable Control's Broadcast Show feature.

/B—Allow Broadcast Show

This option does not require a value.

Example:

```
C:\PCDUO\>control * /b
```

This will allow the Control to send a Broadcast Show to all Slaves which have been loaded with the /B option.

Use this option if:

You want to use Broadcast Shows.

Note: The Slaves must be running DOS, or be in a DOS box under Windows to receive a Show.

If the Slave is running Windows, use the "Receive Show" icon in the *PC-Duo* Group to start a DOS session under Windows. Exit from the DOS session by pressing any key on the Slave keyboard.

You should ensure that any Slave loaded on the Control PC does *not* have Broadcast Show enabled. Control cannot tell that the local Slave has this option enabled, and display contention can hang the PC.

On an IPX network, Broadcast Shows are sent to the local network only. If you want to send a Broadcast Show to all NetWare LANs, use the /BA option:-

/BA—Allow Broadcast Show to All NetWare LANs

Example:

```
C:\PCDUO\>control * /ba
```

This option is supported by the IPX Controls only. It uses the NetWare File Server(s) as bridges to forward the Broadcast Show traffic to other network segments.

Note: This can place a significant load on the network. Use it with care.

The /B option restricts the Show to the local network.

4.4.5 Connect to Slave

This option is used to bypass the normal menu display and connect immediately to the Slave specified on the command line.

/C*name*—Connect to Slave

The Slave Name should be specified immediately after the /C.

Example:

```
C:\PCDUO\>control * /cjohn
```

Here, Control will initialise and then will attempt to connect to Slave JOHN. When it disconnects, Control will exit to DOS or Windows.

Use this option if:

You need to be able to connect to a few individual Slaves more frequently than most, or if you want to use *PC-Duo* from a batch file or menu facility.

This option can also be used if you want to send a ready-prepared text message to a single Slave, to several Slaves, or to all Available Slaves. Refer to Section 4.4.10 for further details.

If the Slave is on a remote network, you can use the /D—Dial Phone Number to make a fast connection to the Slave. See Section 4.4.6 for further details.

You can use a wildcard Slave Name to select the first free Slave in a group.

Example:

```
C:\PCDUO\>control * /cjo*
```

Note: In Windows, you will probably need to create new Control icons so that you have a number of alternatives available. Refer to Section 4.2.2 and Section 4.2.1 for assistance.

4.4.6 Dial Phone Number

This option is used to activate a connection to a remote Slave.

/D[*number*]—Dial Phone Number

If a number is specified, Control will activate the Remote communications module and dial the number specified, bypassing the Communications Menu.

Example:

```
C:\PCDUO\>control * /cslave /d082767333
```

This example uses the /C option to specify a specific Slave on the remote network. This Slave is accessed through a Bridge communications module on the phone number.

Use this option if:

You want to connect to a particular remote Bridge or Slave quickly.

Note: If no *number* is specified, Control assumes that the remote Slave can be accessed through a direct connection on the serial port that was specified when the Remote module was loaded (e.g. COM1).

See Chapter 7 for further information on the Remote Communications modules provided with *PC-Duo*.

4.4.7 Super VGA (800 x 600) Video Mode

Super VGA display modes are not well standardised. In some cases, it will be necessary for the Control to be provided with the correct display mode number for DOS Graphics displays using 800 x 600 resolution x 16 colours. It will then be able to set the correct display mode for a Slave using Super VGA.

/G*nn*—Super VGA (800 x 600) Video Mode

The display mode corresponding to Super VGA is specified as a two-digit hexadecimal number. This should be determined from your display adapter manual.

Example:

```
C:\PCDUO\>control * /g7a
```

Control will use mode 7A when the Slave display is in Super VGA mode (800 x 600 x 16 colours).

Use this option if:

You want a DOS Control to watch DOS Slaves in Super VGA mode.

Note: *nn* (hexadecimal) is the video mode to use for Super VGA. Refer to the Super VGA card manual to determine the correct mode, or note the error message when Control is trying to connect.

If this option is not specified, Control assumes that mode 6A (hexadecimal) is the correct one to use for Super VGA mode (800 x 600 x 16 colours).

This option is required by the DOS Control when a DOS Slave is running a DOS Graphics application in Super VGA mode. It is *not* required by the Windows Control, or by the DOS Control when Slaves are running Windows or DOS text mode programs.

This option is not required for the Windows Control.

4.4.8 Set the Bitmap Cache Size

The Windows Control and Slave cache the most recently used bitmaps to improve performance. Both Slave and Control initialise their caches when the initial connection is made. Then, while the Control is viewing the Slave's screen, and this changes, the cache is checked to see if the bitmap is already present. If so, the Slave can send a simpler command to the Control. Otherwise, the bitmap image must be sent first.

The larger the cache is, the greater the chance that the cache contains the necessary data, and therefore the better the performance should be. This is particularly noticeable with bitmap-intensive applications such as Powerpoint and Solitaire.

/H*nnnn*—Bitmap Cache Size

This option is used to control the size of the Windows Control's Bitmap Cache. The cache size is specified in kilobytes, in the range 256 to 1024. The default value is 1024 kilobytes. The actual cache size used by the Windows Control is minimised with the value used by the Windows Slave.

Example:

```
Command Line: wcontrol * /h512
```

Use this option if:

You want to improve the performance with Windows applications which make extensive use of bitmaps; or you want to reduce the amount of memory that the Windows Control needs to run.

See Section 3.4.7 for information on setting the Windows Slave Bitmap Cache Size. See Section 4.2.1 for details on how to set Windows Control command options.

Note: The default Bitmap Cache Size is sufficient to hold all of the bitmaps used by Solitaire!

The Control intialises its Bitmap Cache when it connects to the Slave.

4.4.9 Send Broadcast Messages to the Local Network Only

Unlike Broadcast Shows, Broadcast Messages on IPX networks are sent through NetWare File Server(s) to all accessible networks. This can produce unnecessary traffic, so this option is provided so that these messages can be restricted to the local network only.

/L—Send Broadcast Messages to the Local Network only

This option does not require a value.

Example:

```
C:\PCDUO>control * /l
```

Use this option if:

You don't want broadcast messages to be retransmitted to all NetWare networks.

Note: This option is only relevant when using the NetWare IPX version of Control.

4.4.10 Send a Message

Control can send a message to one or all Available Slaves using this option. The message is created in a text file, and Control is activated to send it.

/M*filename*—Send a Message

The message file should not contain more than four lines of text. It will be displayed on the screen of the Slave specified by the /C*name* option. An asterisk wildcard '*' can be used in the name to select a group of Slaves or even all Available Slaves if /C* is used.

Examples:

```
C:\PCDUO\>control * /cgeorge /mdiskfull.txt
```

or

```
C:\PCDUO\>control * /cacc* /mcheckrun.txt
```

or

```
C:\PCDUO\>control * /c* /mshutdown.txt
```

These examples show a message being sent to a single user (George, perhaps when his local hard disk is nearly full), to a group of users (perhaps the Accounts department, where their Slaves are all named ACCsomething), or to all users (perhaps when the file server is about to be shut down).

Use this option if:

You want to send messages regularly to one or all users. The actual sending process can be controlled from a DOS batch file.

Note: The messages will remain visible on the Slaves until they are cancelled by the local user, or until the message timeout expires. See Section 3.4.11 for details on setting the Slave Message Timeout.

Any DOS Slaves will stop any work until the message is acknowledged or the timeout expires. This will interrupt any work that they are doing. Windows Slaves display the message but they are not forced to acknowledge it before continuing with their work.

4.4.11 Capture Print Output

This option can be used to enable Control's capture of a Selected Slave's printer output.

/P[*filename*]—Capture Print Output [to a file]

If a *filename* is specified, printer output is captured to that file. Alternatively, print output is written to device PRN.

Examples:

```
C:\PCDUO\>control * /p
```

or

```
C:\PCDUO\>control * /cmike /pmike.prt
```

The first example enables printer capture, but simply directs it to PRN. The second example, which also uses the /C to connect to Slave MIKE, captures the printer output to a local file.

Use this option if:

You need to be able to see a Slave's printer output.

Note: Windows normally prints direct to LPT1 or LPT2. In this configuration, the Slave is not able to capture the printer output for redirection to the Control. However, changing the printer to LPT1.DOS or LPT2.DOS (respectively) allows Slave to capture the data.

The Slave's printer setup can be changed using Windows Control Panel, and selecting Printers. Click on the <Connect> button to open up the Connect dialogue box. Scroll down the list of printers until you reach LPT1.DOS or LPT2.DOS. Highlight whichever one you want to capture and press the <OK> button, then the <Close> button of the Printers dialogue box. Lastly, close the Control Panel.

The printer can generally be left set to LPT*n*.DOS—the Slave PC user will be able to print normally with this setting.

4.4.12 Maximum Number of Connected Slaves

While Control will accumulate a list of up to 100 Available Slaves when the "Search for all Available Slaves" option is used, it will allow only 12 Slaves to be Connected. If you want to be able to connect to more Slaves, then this option can be used to increase this number up to a maximum of 30.

/S*nn*—Maximum Number of Connected Slaves

The number of Slaves should be specified as a decimal integer in the range 1 to 30.

Example:

```
C:\PCDUO\>control * /s30
```

This example increases the number of Slaves that can be connected up to the maximum allowed value of 30.

Use this option if:

You need to be able to connect to more than 12 Slaves, or need to reduce the memory requirement for the Control program.

Note: Reducing the number of Slaves will reduce Control's memory requirements.

5 Using the Slave

The DOS and Windows Slave programs provide an indication that a Control user has made a connection. The indicator differs, depending upon whether the Slave is running in DOS or Windows, and whether the Control user has requested Watch, Share, or Control mode.

The DOS Slave indicator appears in the top-right corner of the screen. A flashing white arrow on a red background appears when the Slave is Selected. A two-headed arrow indicates a Share mode connection; a single-headed arrow pointing left at the Slave (up at the Control) indicates a Control mode connection; and a single-headed arrow pointing right at the Slave (down at the Control) indicates a Watch mode connection.

When a Control selects a Windows Slave, the Slave beeps and its icon shows the name of the connected Control. The Slave's screen is normally repainted when the Control starts to view it.

5.1 Slave Activities

Most *PC-Duo* activities are initiated by a Control user. However, there are some actions that are performed by the Slave user. These actions are described in the following sections.

5.1.1 Control Connection Acknowledgement

If the Slave has been loaded with acknowledgement then the Slave user will be prompted to accept or reject a Control connection. This is achieved by simply typing either <Enter>, or 'Y' for yes, to accept the connection, or 'N' for no, to reject it.

5.1.2 Initiating a Chat Session

A DOS Slave user can request a Chat session with the connected Control by pressing <CTRL-ALT-T>. A Windows Slave can perform the same function by clicking on the active Slave icon, and choosing Chat from the Commands menu.

5.1.3 Sending an Alert to a Control

DOS Slave users can sound a beep on the connected Control PC by typing <Control-G> whilst a Chat session is active. This can be used to attract attention if the Slave has opened the Chat but has not had a response from the Control user. A Windows Slave user is not able to do anything other than make his local PC beep!

5.1.4 Closing a Chat Session

Either the Control or Slave user can terminate a Chat session by pressing <Escape>.

5.1.5 Clearing a Message

A DOS Slave user can clear a received message by pressing <Control-Enter>. A Windows Slave user clicks on the Cancel button to remove the displayed message. The message can clear itself automatically if the Slave was loaded with the Message Timeout option—see Section 3.4.11.

5.2 Receiving a Show

While each Slave is receiving a Show, that PC is completely taken over by Control; the Slave keyboard is effectively disabled until Control releases it, even while the Show is Suspended by the Control user. The Slave user is therefore unable to affect Show operation.

Note: Slaves must be running Windows to receive a Show from a Windows Control.

Slaves must be running DOS, or be in a DOS box under Windows to receive a Show or a Broadcast Show from a DOS Control. If the Slave is running Windows, use the "Receive DOS Show" icon in the *PC-Duo* Group to start a DOS session under Windows. Exit from the DOS session by pressing any key on the Slave keyboard.

5.3 Unloading the Slave

The DOS Slave can be unloaded using the /U option (see Section 3.4.16 for further details).

The Windows Slave cannot be unloaded by this method, and it cannot be unloaded by selecting Close... from the Slave Window control button (the top left-hand corner). Instead, double-click on the wallpaper background to bring up the Program Manager Task List. Use the up and down arrow keys or the mouse to highlight *PC-Duo* Slave, and then press the [End Task] button.

6 Using the Control Programs

Most *PC-Duo* activities are initiated by a Control user. The main functions of the Control programs are:-

Message

Control can send a Message to one, a group, or all Available Slave(s).

Show Screen Contents

The DOS and Windows Controls can Show their screen contents to one or more Connected DOS or Windows Slaves (respectively). The DOS Control can also Broadcast Show its screen to all Available Slaves which are configured to accept Broadcast Shows.

Control

The Slave's screen contents are displayed on Control's screen as with Share and Watch modes, but in Control mode, the Slave's keyboard is disabled so that the Control user has almost complete control of the Slave. This mode is not supported by the Windows Slave.

Share

The Slave's screen contents are displayed on Control's screen. In Share mode, both Control and Slave keyboards are active, so both users can share control of the Slave PC. This is the only mode supported by the Windows Slave, but that does support Control's mouse as well as keyboard commands.

Watch

The Slave's screen contents are displayed on Control's screen as with Control and Share modes, but in Watch mode, Control's keyboard is disabled so that the Slave user has complete control of the Slave. This mode is not supported by the Windows Slave.

Chat

Chat mode opens up a two way dialogue box between the Control and a Slave. It can only be activated while the Control is connected to the Slave, but either Control or Slave users can initiate the Chat session.

File Transfer

Control can manage files on a Connected Slave. This includes transferring files back and forth between Control and the Slave as well as renaming and deleting files on Control or Slave PCs.

Remote Communications

The Control can set up a serial line connection to one or more Slaves at a remote site. This requires additional modules to be loaded on Control, Bridge, and Slave PCs. These modules are described fully in Chapter 7. Normal Control functions can be performed, subject to the limitations imposed by the serial line.

6.1 Starting a Control

The command options for DOS and Windows Controls are described in Chapter 4. The following sections assume that any necessary options have been provided.

The usage of both DOS and Windows Controls are described in the following sections. The examples show the use of the NetBIOS CONTROL.EXE and WCONTROL.EXE. For IPX installations, you should use the IPX Control programs (IPCONTRL.EXE and WIPCNTRL.EXE) instead.

Note: The network software and/or any remote communications modules must be loaded before you can start a Control. See Chapter 7 for further details on remote communications support.

The default Control name is "OPERATOR". Typing CONTROL with no *name* parameter will use this name.

There is no limit to the number of Controls active on the network provided that each has a unique name.

Refer to Chapter 4 for descriptions of the use of /C*name* and /M*filename* options for defining the Slave name and a Message filename on the Control command line.

6.1.1 Starting a DOS Control

Example:

```
C:\PCDUO\>control *
```

This starts a DOS Control session, with Control taking the DOS Machine Name as its name.

Use this option if:

You do not have Windows and can't load the Windows Control program, or you want to connect to a DOS Slave running DOS Graphics, or you want to Show the Control's screen contents to DOS or Windows Slaves.

6.1.2 Starting a Windows Control

Run the Windows Control by double-clicking on the *PC-Duo* NetBIOS (or IPX) Control icon while running Windows. This will start a Windows Control session.

Use this option if:

You wish to start a Windows Control session, or you wish to take advantage of improved performance controlling Windows Slaves.

Note: Refer to Section 4.2.1 and Section 4.2.2 for descriptions of how to change the Windows Control command line and how to create a new *PC-Duo* icon respectively.

6.1.3 Starting Multiple Windows Controls

It is possible to run multiple Control sessions under Windows. Furthermore, these could have different setups such that they provide different behaviour, or even such that they run on different networks—one could be the NetBIOS Control, and another could be the IPX version. You can start multiple Control sessions, minimise them, maximise them, and switch between them, like any other Windows application.

This can be very useful in a support environment, where it could be necessary to have simultaneous connections to users on different networks, for instance.

Note: ***PC-Duo*** **Windows Setup will create icons for the NetBIOS and IPX Windows Controls when they are installed. If you want to have multiple Control configurations available (e.g. two or more NetBIOS Controls), then the simplest approach is to create multiple Windows icons, one for each configuration. See Section 4.2.2 for further details.**

6.2 The Communications Options Menu

If the Control is started after a Remote program has been loaded, then it will display the Communications Options Menu instead of the normal Main Menu. The Communications Options Menu is described in Section 6.8.

You can transfer to the Main Menu by selecting the Local LAN option on the Communications Options Menu.

DOS Control: The DOS Control title for this menu is "Communications Commands".

6.3 The Main Menu

Both DOS and Windows Controls have a menu bar with equivalent options.

With the DOS Control, the cursor arrow keys are used to move left and right to select different menu options. The active option is shown highlighted. Its menu can be pulled down by pressing <Enter> or the cursor down key. The cursor up and down arrow keys are used to move the highlighted option, and the left and right arrow keys can be used to switch between different Main Menu options. Select a menu option by highlighting it and then pressing the <Enter> key. You can close a menu and return to the Main Menu by pressing the <Escape> key.

The Windows Control has the same Main Menu bar, but in this case, menus are pulled down using the normal Windows methods—either using the <Alt-> key with the underlined letter key, or by clicking on them with the mouse.

The Windows Control Main Menu screen also has a Toolbar with a number of buttons which can be used for frequently-needed actions—for example: Connecting to and Disconnecting from Slaves; Displaying the Slave's screen; and switching between windowed and full-screen display modes. The Toolbar is just below the Main Menu bar.

6.4 The Slaves Menu

The Slaves Menu contains options for finding, connecting to, disconnecting from, sending messages and showing the screen contents to all Connected Slaves (DOS and Windows Controls) or broadcasting a message or the screen contents to all Available Slaves (DOS Control only).

The Slaves Menu options are described next.

6.4.1 Connect

Purpose

This option displays a list of up to 100 of the Slaves that are Available for Connection (and thereafter Selection) and enables you to Connect to up to 30 of them as a group.

Method

Press the connect button on the Windows Control Toolbar. This is the left-most button. Alternatively, and for the DOS Control, choose Slaves from the Main Menu, then Connect. You will be prompted to enter the first few letters of the Slave names you want to search for. Hit the <Enter> key or click on the [OK] button to display all Available Slaves or type the first few characters to restrict the list to a particular subset. For example, typing "ni" will display available Slaves named NICK, NIGEL, NIKKI, Etc.

An information box will advise you that Control is "**Looking for Slaves...**". This will take a few seconds, after which a list of Available Slaves on the network meeting the criteria will be displayed.

Slaves that you are already connected to are marked with a double chevron (»). Slaves that are connected to another Control are marked with an asterisk (*).

To Connect to a particular Slave, highlight the name and press <Enter>, double-click on the name, or highlight the name and click on the [Connect] button.

To Connect to all of the Slaves listed, click on the [Connect All] button. The actual number that can be connected simultaneously will be limited by the maximum number allowed. Refer to Section 4.4.12 for further details.

Control will then attempt to connect to each of the specified Slaves in turn. If a particular Slave has enabled user acknowledgement, then the Slave user must accept the connect attempt before Control can continue. If the user is not present, then the Slave can be skipped. If the Slave requires a password, you will be prompted for it. You should enter the *unencrypted* password for that Slave.

You can disconnect from a Slave with the Disconnect or Reboot options.

You can get back to the Control Main Menu screen by typing the Control *Hot Key* sequence. This is normally <CTRL-LSHIFT-RSHIFT>, but can be changed using the Configure Menu. See Section 6.6.3.

Note: You must Connect to a Slave before you can Select it for a one-to-one session.

In the default Control configuration, you can Connect up to 12 Slaves simultaneously. For assistance in changing this limit, refer to Section 4.4.12.

Up to 100 Available Slaves will be listed. If there are more Slaves on the network, you can narrow the search down to fewer Slaves by typing the first few characters of the name(s) that you want to see.

Each Connected Slave uses a NetBIOS session. You may need to increase the number of sessions supported by your network software to allow simultaneous Connection to several Slaves.

PATHWORKS: PATHWORKS configuration limits may prevent Control's attempts to connect to the listed Slaves. If a NetBIOS error is reported during the Connect sequence, then you may have to increase the DECnet commands, links, and sessions values. The steps required to do this for PATHWORKS v4 and v5 are described in Section 2.6.2.

6.4.2 Manual Connect

Purpose

This option can be used to set up a direct connection to a particular Slave. It bypasses the "**Looking for Slaves...**" stage, and so is faster, provided you know the name of the Slave.

Method

From the Main Menu choose Slaves, then Manual Connect. Enter the name of the Slave you want to Connect to in the dialogue box and press <Enter> or click on [OK]. If the Slave is Available, the message "**Connection Successful**" will be displayed.

If the Slave has user acknowledgement enabled, then the Slave user will be prompted to accept the connect attempt. If there is no user present, the attempt can be abandoned by pressing <Escape> or pressing the [Cancel] button.

If the Slave has a password, then you will be prompted for the *unencrypted* version.

If the Slave is not Available, the message "Slave *Slavename* not found" will be displayed. Use the Connect option to check the name. Repeat the above steps to Manually Connect to additional named Slaves.

Note: You must Connect to a Slave before you can Select it for a one-to-one session.

You can disconnect from a Slave with the Disconnect or Reboot options.

6.4.3 Disconnect

Purpose

This option allows you to remove one or more Slaves from a previously Connected group.

Method

Press the disconnect button on the Windows Control Toolbar. This is the second button from the left. Alternatively, and for the DOS Control, choose Slaves from the Main Menu, then Disconnect. You will see a list of Connected Slaves. To Disconnect a particular Slave, highlight the name and press <Enter>, double-click on the name, or highlight the name and click on the [Disconnect] button.

To Disconnect from all Slaves click on the [Disconnect All] button.

Note: A Slave must be Connected before you can Disconnect it.

6.4.4 Message

Purpose

Once you have connected to a Slave, or a group of Slaves, this option will enable you to send all of them a Message of up to four lines of text. The Message will remain on the Slave screen until the user clears it, or until the Slave's message timeout clears it automatically.

Method

From the Main Menu, choose Slaves, then Message. In the dialogue box, type the Message to be sent.

Use <Tab> to move to the next line. Press <Enter> or click on [Send] to send the message to all Connected Slaves.

Note: The Message is sent to each Connected Slave in turn. If the message cannot be delivered, you will be alerted by an error message.

A DOS Slave will stop all local work until the Message is cleared by the user, or until the timeout expires. See the Slave /M*nn* option in Section 3.4.11.

6.4.5 Show

Purpose

If you are using a Windows or DOS Control, you can Show your screen contents to all of the Connected Slaves. In order to receive a Show from a Windows Control, the Slave must be running Windows. Similarly, to receive a Show from a DOS Control, the Slave must be running DOS or a DOS box under Windows.

This option is useful for training purposes and also eliminates the need for a video splitter. The Slaves display a continuously updated copy of the Control's screen, until terminated by the Control user.

Method

With the Windows Control, press the Show button on the Windows Control Toolbar. This is the eighth button from the left, showing a projector and screen. Alternatively, from the Main Menu choose Slaves, then Show. Click on [OK] to start the Windows Show.

With the DOS Control, choose Slaves from the Main Menu, then Show. The Control will then "shell out" to DOS and an on-screen prompt will appear. Press the Hot Key <CTRL-LSHIFT-RSHIFT> to bring up the DOS Control Show Fast Track Menu and then select Resume to start the DOS Show.

To suspend the Show, press the Hot Key <CTRL-LSHIFT-RSHIFT> to bring up the Windows Control Main Menu screen or the DOS Control Show status box. The Windows Control automatically suspends the Show. You can resume the Windows Show simply by pressing the Show button, now with an illuminated screen, again. With the DOS Control, you can select Suspend, Resume or Message from the Show Fast Track Menu.

To end a Windows Show, pull down the Slaves Menu, and then select End Show. To stop a DOS Show, type "Exit" at the DOS prompt. The Windows Control releases the Connected Slaves to continue normal operations, while a DOS Control issues a Clear Screen command to all Connected Slaves. Both Controls then return to the Main Menu.

See Section 6.6.3 for instructions on changing the Hot Key combination.

Note: Whilst a Show is in progress, the Slave keyboard and mouse are disabled.

In order to perform a Windows Show, the Windows Slave software must be installed and running on the Control PC.

You can use <CTRL-ALT-R> and <CTRL-ALT-S> Hot Keys to resume and suspend a DOS Show, respectively.

Check the Slaves: It is advisable to make sure that Slaves are set up correctly before starting a DOS or Windows Show. A Windows Show should only be sent to Slaves which are running Windows with the Windows Slave loaded. A DOS Show should only be sent to Slaves running DOS or a full-screen DOS box under Windows. You should not send a Windows Show to DOS Slaves, or a DOS Show to Slaves running Windows, unless they are already running a DOS box. If necessary, you can look at the Slaves' screens to check what they are doing.

Remember to use the *PC-Duo* Receive DOS Show icon on a Windows Slave to activate a DOS box for the duration of a Show fro a DOS Control.

Display Mode: DOS Shows of graphics screens are best done with a low resolution display mode such as VGA. This reduces the volume of data that is required to update the Slave screens, and improves display performance.

Show Performance: The normal Show function sends the Show data to each Slave in turn. This means that performance will deteriorate as the number of Slaves increases. To counteract this degradation, you can increase the number of buffers used by the Slaves (see Section 3.4.12).

Alternatively, you can use the DOS Control's Broadcast Show. This broadcasts the same screen data to all Slaves simultaneously, and so performance will not degrade as the number of Slaves increases. However it is restricted to VGA or SuperVGA resolution Windows displays, and may put a large amount of broadcast traffic onto the network. See Section 6.4.7 for more details.

6.4.6 Broadcast Message

Purpose

This option can be used to broadcast a message to all Available Slaves. It does not require that Control is already connected to the Slaves. Like the Message option described above, the actual Message can be up to four lines long, and it will remain on the Slave screen until the user clears it, or until the Slave's message timeout clears it automatically.

Method

To Broadcast a Message to all Available Slaves choose Slaves from the Main Menu, then Broadcast Message. In the dialogue box, type the Message to be sent.

Use <Tab> to move to the next line. Press <Enter> or click on [Send] to Broadcast the message to all Available Slaves.

Note: The Message is broadcast to all Available Slaves simultaneously. There is no guarantee that the message will be received by a particular Slave.

The Slave /I option prevents it from receiving Broadcast Messages—see Section 3.4.8.

A DOS Slave will stop all local work until the Message is cleared by the user, or until the timeout expires. See the Slave /M*nn* option in Section 3.4.11.

6.4.7 Broadcast Show

DOS Control Only: The Windows Control cannot perform a Broadcast Show.

Purpose

If you are using the DOS Control, you can show your screen contents to all Available Slaves on the network, whether they are DOS or Windows Slaves.

This option is useful for training purposes and also eliminates the need for a video splitter. The Slaves display a continuously updated copy of the Control's screen, until terminated by the Control user.

Method

From the DOS Control Main Menu choose Slaves, then Broadcast Show. Control will then "shell out" to DOS and an on-screen prompt will appear. Press the Hot Key <CTRL-LSHIFT-RSHIFT> to bring up the Show Fast Track Menu. Then select Suspend, Resume or Message.

See Section 6.6.3 for instructions on changing the Hot Key combination).

Note: The Control must be loaded with the /B option to enable the Broadcast Show menu option - see Section 4.4.4 for more details.

Slaves default to ignoring Broadcast Shows, so Slaves on the other PCs must be loaded with the /B option in order for them to receive the Show - see Section 3.4.3.

If there is a Slave loaded on the *Control* PC, then it *must not* have been loaded with the /B option or contention for the local display can cause the PC to hang.

Broadcast Show data is transmitted on the network as broadcast or multicast packets. These may affect all other nodes, which may have to accept the packets only to discard them as soon as they have been checked. It is best to restrict Broadcast activity to an isolated group of PCs, and not to connect them to a larger network.

Broadcast Show ignores the request for a password or acknowledgement at the Slave before commencing the Show.

In a training situation with several Slave PCs, Broadcast Show can give a better screen update performance than a normal Show. This is because the screen contents are broadcast to all Slaves simultaneously, while a normal Show sends the data to each Slave in turn.

To stop a Broadcast Show type "Exit" at the DOS prompt, this will issue a Clear Screen command to all Available Slaves (with Broadcast Show enabled) and will return you to the Control Main Menu.

If you wish to Suspend the Show, press <CTRL-LSHIFT-RSHIFT> then select Suspend from the Fast Track Menu. Alternatively, you can use <CTRL-ALT-R> and <CTRL-ALT-S> Hot Keys to resume and suspend a Show, respectively.

Display Mode: Broadcast Shows of DOS Graphics or Windows screens are best done with a low resolution display mode such as VGA. This reduces the volume of data that is required to update the Slave screens, and improves display performance.

Windows Slaves: You should not send a Broadcast Show to Slaves running Windows, unless they are already running a full-screen DOS box. If necessary, you can look at the Slave screen and use the *PC-Duo* Receive DOS Show icon to activate a suitable DOS box for the duration of the Show.

Windows Control: You cannot perform a Broadcast Show with the Windows Control, but you can run Windows after you have started a Show. If you do this, none of the Hot Keys will work. To suspend the Show, you must first exit from Windows.

NetWare: On an IPX network, Broadcast Shows are sent to the local network only. This behaviour can be changed using the /BA option (see Section 4.4.4. This will send a Broadcast Show to all NetWare LANs.

6.5 The Selected Slave Menu

The Selected Slave Menu provides options that allow operations to be performed on the Selected or Connected Slave(s). These options are described next.

Note: If no Slaves are currently selected, then all of the menu options will be greyed-out.

6.5.1 Select

Purpose

Enables a previously Connected Slave to be selected for a one-to-one session.

Method

First Connect a Slave or group of Slaves. Press the select button on the Windows Control Toolbar. This is the third button from the left. Alternatively, and for the DOS Control, choose Selected Slave from the Main Menu, then Select. Highlight the name of the Slave you want to Select from the list of Connected Slaves and press <Enter>, or double-click on the name, or highlight the name and click on the [OK] button.

Note: Once a Slave is Selected, it can be Watched, Shared, and Controlled, and it also becomes available for Chat, Message, and Show, described below, and also for File Transfer, which is described in Section 6.7.

If only one Slave is Connected, it automatically becomes the Selected Slave.

Only one Slave can be Selected at a time.

6.5.2 Watch

Purpose

Watch Mode displays the currently Selected Slave's screen on the Control. It does not allow Control's keyboard or mouse to be sent to the Slave.

Method

First Select the Slave for a one-to-one session. From the Main Menu choose Selected Slave, then Watch. Press <Enter> or click on [OK] to display the Slave's screen. If you are using a Windows Control you can display the Slave screen in full screen or Windowed mode. See Section 6.6.1 for further details on switching display modes.

Note: The Slave must be Selected first.

To exit Watch and return to the Main Menu, use the Hot Keys, <CTRL-LSHIFT-RSHIFT>.

See Section 6.6.3 for instructions on changing the Hot Key combination.

Windows Control: Pressing the <PAUSE> key will cause the *next* key press to operate on the Control workstation, not the Slave. For example, press <PAUSE> and then <CTRL-ESC> to bring up the Task Manager.

Pressing <PAUSE> followed by <ALT> when working in full screen display mode will cause the drop-down menus to appear at the top of the screen.

6.5.3 Control

Purpose

Control Mode displays the Selected Slave's screen on the Control and enables keyboard and mouse input from the Control user, but disables it from the Slave user.

Method

First Select the Slave for a one-to-one session. From the Main Menu choose Selected Slave, then Control. Press <Enter> or click on [OK] to display the Slave's screen. If you are using a Windows Control you can display the Slave screen in full screen or Windowed mode.

Note: The Slave must be Selected first.

To exit Control and return to the Main Menu, use the Hot Keys, <CTRL-LSHIFT-RSHIFT>.

See Section 6.6.3 for instructions on changing the Hot Key combination.

Windows Control: Pressing the <PAUSE> key will cause the *next* key press to operate on the Control workstation, not the Slave. For example, press <PAUSE> and then <CTRL-ESC> to bring up the Task Manager.

Pressing <PAUSE> followed by <ALT> when working in full screen display mode will cause the drop-down menus to appear at the top of the screen.

Windows Slave: It is not possible to prevent local use of the keyboard when the Slave is running Windows, so Control Mode behaves like Share Mode in this situation.

6.5.4 Share

Purpose

Share Mode displays the Selected Slave's screen on the Control, and enables keyboard and mouse input from both the Slave and Control users.

Method

First Select the Slave for a one-to-one session. Press the Slave button on the Windows Control Toolbar. This is the fourth button from the left. Alternatively, and for the DOS Control, choose Selected Slave from the Main Menu, then Share. Press <Enter> or click on [OK] to display the Slave's screen and to allow keyboard and mouse input to the Slave. If you are using a Windows Control you can display the Slave screen in full screen or Windowed mode.

Note: The Slave must be Selected first.

To exit Share and return to the Main Menu, use the Hot Keys, <CTRL-LSHIFT-RSHIFT>.

See Section 6.6.3 for instructions on changing the Hot Key combination.

Windows Control: Pressing the <PAUSE> key will cause the *next* key press to operate on the Control workstation, not the Slave. For example, press <PAUSE> and then <CTRL-ESC> to bring up the Task Manager.

Pressing <PAUSE> followed by <ALT> when working in full screen display mode will cause the drop-down menus to appear at the top of the screen.

6.5.5 Message

Purpose

Once you have Selected a Slave, this option will enable you to send a Message of up to four lines of text to that Slave only. The Message will remain on the Slave screen until the user clears it, or until the timeout set on the Slave PC clears it automatically.

Method

From the Main Menu choose Selected Slave, then Message. In the dialogue box, type the Message to be sent. Use <Tab> to move to the next line. Press <Enter> or click on [Send], to send the message to all Connected Slaves.

Note: The Message will be sent to the Selected Slave only. The Message and Broadcast Message options on the Slaves Menu allow a Message to be sent to many Slaves. See Section 6.4.4 and Section 6.4.6 for further details.

A DOS Slave will stop all local work until the Message is cleared by the user, or until the timeout expires. See Section 3.4.11 for more details on the Slave /M*nn* option.

6.5.6 Chat

Purpose

Opens up a two way dialogue box between the Control and the Slave. Both ends can type in text which appears on both screens.

Method

First Select the Slave for a one-to-one session. Press the Chat button on the Windows Control Toolbar. This is the fifth button from the left. Alternatively, and for the DOS Control, choose Selected Slave from the Main Menu, then Chat. The Chat dialogue box opens on both machines.

Note: Either user can press <Escape> to terminate the Chat session.

DOS Slave: The Selected DOS Slave user and the DOS Control user can initiate a Chat by typing <CTRL-ALT-T>.

Windows Slave: The Selected Windows Slave user can initiate a Chat by clicking on the Slave icon and selecting Chat from the Command Menu.

DOS Control: A DOS Control can chat to a Windows Slave, and vice versa, but accented characters will not be displayed correctly as DOS and Windows use different character set mappings.

6.5.7 Show

Purpose

If you are using a Windows or DOS Control, you can Show your screen contents to the Slave you have Selected. In order to receive a Show from a Windows Control, the Slave must be running Windows. Similarly, to receive a Show from a DOS Control, the Slave must be running DOS or a DOS box under Windows.

This option is useful for training purposes and also eliminates the need for a video splitter. The Slave displays a continuously updated copy of the Control's screen, until terminated by the Control user.

Method

From the Main Menu choose Selected Slave, then Show. Click on [OK] to start a Windows Show. A DOS Control will "shell out" to DOS and an on-screen prompt will appear. Press the Hot Key <CTRL-LSHIFT-RSHIFT> to bring up the Show Fast Track Menu. Then select either Suspend, Resume or Message.

To Suspend the Show, press the Hot Key <CTRL-LSHIFT-RSHIFT> to bring up the Windows Control Main Menu screen or the DOS Control Show status box. The Windows Control automatically suspends the Show. You can resume the Windows Show simply by selecting Show from the Selected Slave menu.

With the DOS Control, you can select Suspend or Resume from the Show status box. Alternatively, you can use <CTRL-ALT-R> and <CTRL-ALT-S> Hot Keys to resume and suspend a Show, respectively.

To end a Windows Show, pull down the Selected Slave Menu, and then select End Show. To stop a DOS Show type "Exit" at the DOS prompt. The Windows Control releases the Selected Slave to continue normal operations, while a DOS Control issues a Clear Screen command to the Slave. Both Controls then return to the Main Menu.

See Section 6.6.3 for instructions on changing the Hot Key combination.

Note: Whilst the Show is in progress, the Slave keyboard and mouse are disabled.

In order to perform a Windows Show, the Windows Slave software must be installed and running on the Control PC.

You can use <CTRL-ALT-R> and <CTRL-ALT-S> Hot Keys to resume and suspend a DOS Show, respectively.

Check the Slaves: It is advisable to make sure that the Slave is set up correctly before starting a DOS or Windows Show. A Windows Show should only be sent to a Slave which is running Windows with the Windows Slave loaded. A DOS Show should only be sent to a Slave running DOS or a full-screen DOS box under Windows. You should not send a Windows Show to a DOS Slave, or a DOS Show to a Slave running Windows, unless it is already running a DOS box. If necessary, you can look at the Slave's screen to check what it is doing.

Remember to use the *PC-Duo* Receive DOS Show icon on the Slave to activate a suitable DOS box for the duration of a DOS Show.

6.5.8 Reboot

Purpose

Reboots the Slave and disconnects the Control.

Method

From the Main Menu choose Selected Slave, then Reboot. You will then be asked if you wish to continue, press <Y> for Yes, or <N> for No.

Warning: Be wary of data loss on the Slave if you Reboot with applications active. Ideally, you should exit all applications, including Windows, and return to the DOS prompt before Rebooting.

Note: See the Slave /R option (Section 3.4.14), which can be used to cause it to Reboot automatically when the Control user Disconnects.

If the Slave does not reboot correctly, refer to Section 3.4.13 for assistance in checking and changing the Slave's reboot vector.

6.6 The Configure Menu

This menu contains options for changing the Control configuration. The items that can be changed include the screen display format (Windows Control only), Hot Key combination used to activate the local menu, the keyboard interface level, the keyboard layout, and the selected modem type.

The Control programs save their settings in file CONTROL.CFG in the directory from which the Control program was run. This is normally the *PC-Duo* installation directory. If the file cannot be written, for example because the directory or the file itself are read-only, then the Configure Menu options will not have any effect.

If multiple, shared Control configurations are required, such as to handle different Control keyboard types, the CONTROL.* files should be copied to a separate directory for each user or each configuration. Control can then be run from the new directory, and will save its configuration information to CONTROL.CFG in that directory.

If the Control configuration does not need to be changed, CONTROL.CFG can be write-protected.

6.6.1 Full Screen

Windows Control: This option is only relevant for the Windows Control programs.

Purpose

Determines how the Slave screen will be displayed on the Control screen. The Slave screen can either be displayed in an adjustable size window, in which case the Control Main Menu remains visible, or it can occupy the full screen.

If the Slave is being displayed in Full Screen mode, press the <CTRL-LSHIFT-RSHIFT> Hot Key combination to re-display the Control Main Menu. Alternatively, pressing <PAUSE> followed by <ALT> when working in full screen display mode will cause the drop-down menus to appear at the top of the screen.

Method

Press the Screen Mode button on the Toolbar to toggle between Full Screen and Windowed modes. This is the sixth button from the left. The button shows the current setting. If the red arrows point towards the centre of the "screen", then Windowed Mode is enabled. This is also indicated by the size of the light-coloured area in the "screen" shown in the button. If the red arrows point outwards, then Full Screen Mode is enabled. The entire "screen" is light-coloured.

From the Main Menu choose Configure, then click on Full Screen. This toggles between Full Screen (indicated by a tick when enabled) and Windowed mode.

Note: If you are using Full Screen mode to watch a Slave, you use the Hot Key to display the Main Menu. You must then press the Slave Toolbar button, or select Control, Share or Watch to re-display the Slave screen.

The Hot Key combination can be changed through the Configure Menu. See Section 6.6.3 for further details.

6.6.2 Keyboard Interface

Purpose

This option allows either "Low Level" or "BIOS" keyboard interface options to be selected.

The Low Level keyboard interface passes keystrokes to the Slave using hardware emulation. When the BIOS interface is selected, keystrokes are emulated at the BIOS level instead.

Method

Choose Configure from the Main Menu. The current setting is indicated by a tick. With the DOS Control, highlight the appropriate option, and press <Enter>. With the Windows Control, click on the required interface option.

Note: The "Low Level" keyboard interface is the default, and should work correctly in most situations. If you find that keystrokes are not getting through to the Slave, try switching to the BIOS keyboard interface. This normally only applies to applications that run in protected mode.

Control Mode: Before changing the keyboard interface, make sure that you are actually in Share or Control mode, and not just watching!

Slave Mode: Similarly, the Slave disables Control keyboard input if it is loaded with the /W Watch Only option (see Section 3.4.18.

6.6.3 Hot Keys

Purpose

The Hot Key combination is used to switch a Full-Screen mode Windows Control into Windowed mode so that Main Menu or Toolbar buttons can be selected. With the DOS Control, it returns you to the Main Menu

screen. This option allows the Hot Key combination to be changed to avoid conflicts with applications on the Slave that also use Hot Keys.

It also provides support for situations where the Slave is running another Control, and it is necessary to be able to send commands through to a particular Control. This mode of operation is occasionally required when using the Remote Communications modules to control an IPX Slave from a NetBIOS Control (or vice versa).

The default Hot Key combination is <CTRL-LSHIFT-RSHIFT>, where all three of the <Control>, <Left-Shift>, and <Right-Shift> keys must be pressed at once. The Hot Key combination is used to return to the Control Main Menu after starting a Control, Share, or Watch session with a Slave PC. It should be changed if it clashes with the Hot Key combination used by any Slave applications.

Method

From the Main Menu choose Configure, then Hotkeys for Local Menu. Toggle the keys to be used as the Hot Key combination. You can use any combination of <LSHIFT>, <RSHIFT>, <CTRL>, <ALT>.

Note: If no Hot Keys are selected, <LSHIFT> will be used.

The Hot Key combination is stored in the CONTROL.CFG file.

6.6.4 Keyboard Layout

Purpose

This option allows the Control to recognise different keyboard layouts.

Method

From the Main Menu choose Configure, then highlight Keyboard Layout... and press <Enter>. Use the up and down arrow keys to highlight the keyboard layout required and press <Enter> to select the layout, or press <Escape> or [Cancel] to quit without making a change.

The current keyboard layout is indicated by a tick.

Note: You can also edit the CONTROL.KBD file to set up your own keyboard layout if it is not already in the list of recognised keyboard types. The file format is described in Appendix G.

The current keyboard layout is stored in the Control configuration file CONTROL.CFG.

6.6.5 Select Modem

Purpose

This option is used to select a modem configuration to be used during a Remote Communications session. The Windows Control also allows you to edit or delete existing modem configurations or create new ones.

Method

From the Main Menu choose Configure, then highlight Select Modem... and press <Enter>. The Select Modem dialog box will appear. This contains the names of all of the modem configurations in the Control Modem File (CONTROL.MDM), sorted into alphabetic order.

The currently selected Modem is highlighted (indicated by a tick on the DOS Control). Double-click on the correct modem entry to select it and return to the Control Main Menu, or use the cursor up and down arrow keys to highlight the modem name and press [OK] or <Enter> to select it.

Press [Cancel] or <Escape> to quit without making a change.

The current selected modem is stored in the CONTROL.CFG file.

[Edit]

This button allows you to edit the selected modem configuration. A new dialog box containing the selected modem configuration appears. This is described in Section 6.6.5.1.

[Delete]

This button will delete the selected modem configuration. You will be prompted to confirm the deletion. Press [Yes] to delete the modem configuration, or [No] to return to the Select Modem dialog without deleting it.

Note: You cannot delete the "Hayes compatible" modem configuration.

6.6.5.1 Edit Modem Configuration

When the [Edit] button is pressed, a new Modem dialog box opens up. The fields in this dialog are described in Table 6–1.

You can edit the "Hayes compatible" modem configuration using this dialog, but you can only save the new configuration with a new name. The "Hayes compatible" configuration is read-only.If you need to edit this configuration, you must edit the Control Modem File itself (i.e. CONTROL.MDM). See Appendix D for further details.

Table 6–1 Edit Modem Dialog

Field	Example	Contents
Reset	AT&F	Returns the modem to a standard configuration
Response	OK	Indicates that the command completed successfully
Initialise	ATV1E1	Command(s) needed to configure the modem for normal *PC-Duo* operation
Disable Xon/Xoff Flow Control	AT&K3	Command(s) to disable Xon/Xoff or Software Flow Control, if the modem has any
Disable Data Compression	AT&Q0	Command(s) to disable data compression
Dial Prefix	ATDT	This command tells the modem to dial the following number
"Connect" Message	CONNECT	This indicates a successful connection

Table 6–1 (Cont.) Edit Modem Dialog

Field	Example	Contents
Hangup Prefix	+++	This command puts the modem back into command mode during a call
Hangup Suffix	ATH0Z	Hangs up the phone
Comment		Notes for this modem entry

[Save]

Press this button to save the new settings in the Control Modem File (CONTROL.MDM), replacing the original values.

Note: This button is greyed-out for the "Hayes compatible" modem configuration.

[Save As]

This button allows you to save the settings under a new name in the Control Modem File (CONTROL.MDM), leaving the original values unaltered.

Note: You can also edit the CONTROL.MDM file to set up your own modem type if it is not already in the list of recognised modems. The file format is described in Appendix D.

6.7 The Communications Menu

This menu contains options to activate File Transfer mode and also to control Remote Communications options for Dialling a Remote Bridge, Hanging Up a connection to a Remote Bridge, and for maintaining the Dial Directory.

If no Slaves are connected, the File Transfer and Hangup options are greyed out.

The File Transfer option differs between the Windows and DOS Controls so they are described separately in the following sections.

6.7.1 File Transfer (Windows Control)

Purpose

Enables the Control user to manage files on the Selected Slave. The Control can transfer files in either direction between Control and the Slave, and can view, edit, rename, change attributes, and delete files on Control or Slave PCs, and can change, create, and delete directories on either PC.

Method

First Connect and Select a Slave. Press the File Transfer button on the Toolbar, or choose Communications from the Main Menu, then File Transfer. The File Transfer dialogue box is displayed.

The File Transfer button is the seventh one from the left, showing two filing cabinets.

The display shows the current drive, directory, wildcard pattern, the total number and number of matching files, together with the total free space, for both Control and Slave.

The left hand list shows the files in the current directory on Control. The right hand list shows the files in the current directory on the Slave. Select the transfer direction using the <Tab> key, then select the files, and then click on [Copy] to begin the transfer.

Note: Control can access files that are located on the Slave or on any of the Slave's redirected drives. It can also access files that are located on the Control or on any of the Control's redirected drives.

Use the Slave /F option to prevent a Control from accessing files on the Slave - see Section 3.4.5 for more details.

[<<Switch>>] Setting the Active File List

Use the [<<Switch>>] button to make the Control or Slave file list active. You can also switch between Control and Slave by clicking on the appropriate file list.

Only files in the active file list can be selected for transfer, deletion, etc.. Files in the non-active list will be greyed-out and are not available for selection.

[Select] Selecting Files

One or more files on the active file list can be selected for further attention. Once selected (or highlighted), individual files can be copied, deleted, edited, renamed, or viewed. Groups of files can be copied or deleted when they have been selected.

Select a file by double-clicking on the file name or by highlighting the name and pressing the [Select] button. Repeat this until you have selected the files that you want to process. A double chevron (») appears next to the names of all selected files.

Note: You can only select files from the active file list.

[Select All]

To select all of the files in the active list, i.e. all files in the current directory, press the [Select All] button. The [Select All] button changes to a [Deselect All] button.

[Deselect All]

To deselect all of the files in the active list, i.e. all files in the current directory, press the [Deselect All] button.

[Copy>>>] and [<<<Copy]

The [Copy] button is greyed-out until one or more files have been selected. Press the [Copy>>>] button to transfer the selected files, i.e. all files marked with the double chevron (»).

You can use the [Copy One] button to copy the highlighted file only.

Note: Files are transferred in the direction indicated by the chevrons. [Copy>>>] transfers files from the Control on the left to the Slave on the right. [<<<Copy] transfers files from the Slave on the right to the Control on the left.

[Delete]

The [Delete] button is greyed-out until one or more files have been selected. Use the [Delete] button to Delete the selected files, i.e. all files marked with the double chevron (»).

You can use the [Delete One] button to delete the highlighted file only.

[Change Directory]

Use the [Change Directory] button to change the current directory for the active file list. The display changes to a disk and directory list. Click on the desired directory or highlight it using the arrow keys or by typing the first letter of the directory name.

You can open up a directory, showing any subdirectories, by double-clicking on the parent directory or by pressing <Enter>. Press <Escape> or the [Close] button to return to the File Transfer screen.

The [Change Directory] button also enables you to Create and Delete directories. The options available are described in Section 6.7.1.1.

[Wild Card]

The default Wildcard pattern is "*.*", which means that all files in the current directory will be displayed. You can reduce the size of the list by changing the wildcards, such as *.EXE. Only files matching the Wildcard pattern will be displayed.

Type in the new pattern and press [OK] to continue, or [Cancel] to quit without changing the pattern.

Too Many Files: **When there are too many files in the directory for Control to display, use this option to change the Wildcard pattern and thereby reduce the number of matching files.**

[Copy One]

Transfers the highlighted file in the direction indicated by the chevrons on the [Copy] button (either [<<<Copy] or [Copy>>>]).

You will be prompted to confirm the transfer. Press [Yes] to continue, or [No] to quit without copying the file.

If the file already exists in the destination current directory, you will be prompted to confirm that it should be replaced by the new file. Press [Yes] to continue, [No] to skip to the next file, or [Cancel] to quit without copying the file.

[Delete One]

Deletes the highlighted file.

You will be prompted to confirm the deletion. Press [Yes] to delete the file, or [No] to quit without deleting it.

[Rename]

Enables you to rename the highlighted file.

You will be prompted to provide a new name for the file. Type in the new name, and press [OK] to rename the file, or press [Cancel] or <Escape> to quit without renaming it.

Note: You can move a file to a different directory by entering the new path here. The new directory must exist already.

[File Info]

Displays information on the highlighted file, including the file size, revision date and time. If the file is read-only, the "Read Only" box will be checked.

You can change the read-only attribute by checking or unchecking the Read Only box and pressing the [OK] button or the <Enter> key.

Return to the File Transfer window by pressing [OK] or typing <Escape>.

[View]

Displays the contents of the currently highlighted file. The scroll bars show your position in the file, and allow you to scroll the display left, right, up, or down in the file. Alternatively, you can use the <Page Up>, <Page Down> or cursor arrow keys to move around the file.

The [View] button also allows you to use the Windows Clipboard to copy text from this file to another file. The options available are described in Section 6.7.1.2.

[Edit]

This option opens an edit box which allows you to edit the currently highlighted file. The scroll bars show your position in the file, and allow you to scroll the display left, right, up, or down in the file. Alternatively, you can use the <Page Up>, <Page Down> or cursor arrow keys to move around the file.

The [Edit] button also allows you to use the Windows Clipboard to copy text from this file to another file. The options available are described in Section 6.7.1.3.

[Close]

Exits the file transfer session and returns to the Control Main Menu.

6.7.1.1 Change Directory

When the [Change Directory] button is pressed, a new Change Directory window opens up. This displays the drives available, together with the current directory, on the Control or Slave, depending upon which is the current active file list. If there are any subdirectories in the current directory, then they are displayed below the current directory.

Buttons are provided which allow an existing directory to be selected or deleted, or a new directory can be created.

Return to the File Transfer window by pressing the [Close] button or by pressing <Escape>.

[Select]

You can select a different drive or directory by highlighting its name (using the up and down arrow keys) and pressing the [Select] button, or by double-clicking on the name. Select the ".." entry to change to the parent of the current directory.

[Create]

To create a new directory, highlight the *parent* directory and press the [Create] button. You will be prompted to enter the name of the new subdirectory. Enter the name and press [OK] to create the directory, or [Cancel] to quit.

Note: Make sure that you highlight the correct parent directory. To create a new directory in the root directory, make sure that you highlight the root directory (e.g. C:\) before pressing the [Create] button.

[Delete]

To delete an existing directory, highlight it, and press the [Delete] button.

Note: You cannot delete the current selected directory. To delete it, change the current directory to the parent directory, then highlight the subdirectory entry, and press [Delete].

[Close]

When you have selected the correct directory, press the [Close] button to return to the File Transfer window.

6.7.1.2 Viewing a File

The [View] option displays the contents of the currently highlighted file. The scroll bars show your position in the file, and allow you to scroll the display left, right, up, or down in the file. Alternatively, you can use the <Page Up>, <Page Down> or cursor arrow keys to move around the file.

While viewing a file, you can mark a section of the file to be copied to the Windows Clipboard. Do this the normal way (either click on the beginning of the section, and hold the left mouse button down while moving the mouse cursor to the end of the section, or position the text cursor, and then hold down the <Shift> key while using the <Page Up>, <Page Down> or cursor arrow keys to move to the end).

[Copy]

Press the [Copy] button or the <Delete> key to copy the marked section of the file to the Windows Clipboard (on the Control).

Note: This does not change the input file.

[Close]

Close the file and return to the File Transfer window by pressing the [Close] button or the <Escape> key.

6.7.1.3 Editing a File

The [Edit] option starts a simple text editor which displays the contents of the currently highlighted file. The scroll bars show your position in the file, and allow you to scroll the display left, right, up, or down in the file. Alternatively, you can use the <Page Up>, <Page Down> or cursor arrow keys to move around the file.

While editing a file, you can mark a section of the file to be copied or cut to the Windows Clipboard. Do this the normal way (either click on the beginning of the section, and hold the left mouse button down while moving the mouse cursor to the end of the section, or position the text

cursor, and then hold down the <Shift> key while using the <Page Up>, <Page Down> or cursor arrow keys to move to the end).

Although you can only have one file open at once, you can use Clipboard Cut and Paste to copy text between different files, either on the Control or the Slave, or between *PC-Duo* and another application running under Windows on the Control.

Control Only: You cannot use *PC-Duo's* Edit function to cut and paste to or from the Clipboard on the *Slave*.

[Cut]

Press the [Cut] button or the <Delete> key to copy the marked section to the Windows Clipboard (on the Control) and remove it from the file.

Note: This changes the input file.

[Copy]

Press the [Copy] button to copy the marked section to the Windows Clipboard (on the Control).

Note: This does not change the input file.

[Paste]

If the Windows Clipboard is empty, then the [Paste] button will be greyed-out and cannot be pressed. If the Clipboard contains some data, then pressing the [Paste] button will insert that data at the current text cursor location.

Note: This changes the input file.

[Undo]

If you decide that you have made a mistake, and want to return the file to its original, unedited state, press the [Undo] button.

Note: This will lose any changes that have been made to the input file.

[OK]

Press this button when you are happy about the changes made, and wish to save the file. If the file has been changed, then you will be prompted to confirm that the file should be saved. Press [Yes] or <Enter> to save the changes, or press [No] to return to the Edit window without saving the changes.

When the file has been saved, you will be returned to the File Transfer window.

Note: You cannot change the file name while in the editor. There is no "Save As..." option available.

[Cancel]

Press this button if you are not happy about the changes made, and wish to abandon the edit session. If the file has been changed, then you will be prompted to confirm that the edit should be abandoned. Press [Yes] or <Enter> to close the file without saving the changes, and return to the File Transfer window. Press [No] to return to the Edit window.

6.7.2 File Transfer (DOS Control)

Purpose

Enables the Control user to manage files on the Selected Slave. The Control can transfer files in either direction between Control and the Slave, and can view, rename, change attributes, and delete files on Control or Slave PCs, and can change, create, and delete directories on either PC.

Windows Control Only: The DOS Control does not provide an editor. If you want to edit a file while running the DOS Control, copy the file to the Control if it is on the Slave, or "shell out" to DOS and use a DOS file editor (e.g. Edit) to edit the file.

Method

First Connect and Select a Slave. From the Main Menu choose Communications, then File Transfer. The File Transfer dialogue box is displayed.

The display shows the current drive, directory, wildcard pattern, the total number and number of matching files, together with the total free space, for both Control and Slave.

The left hand list shows the files in the current directory on Control. The right hand list shows the files in the current directory on the Slave. Select the transfer direction using the <Tab> key, then select the files with <Space>, and then press <F10> to begin the transfer.

Note: Control can access files that are located on the Slave or on any of the Slave's redirected drives. It can also access files that are located on the Control or on any of the Control's redirected drives.

Use the Slave /F option to prevent a Control from accessing files on the Slave - see Section 3.4.5 for more details.

Setting the Active File List - <Tab>

Use the <Tab> key to make the Control or Slave file list active. Only files in the active file list can be selected for transfer, deletion, etc.. Files in the non-active list are not available for selection.

Selecting Files - <Space> or <Enter>

One or more files on the active file list can be selected for further attention. Once selected (or highlighted), individual files can be copied, deleted, renamed, or viewed. Groups of files can be copied or deleted.

To select a file, use the cursor arrow keys to highlight the name, and press <Space> or <Enter>. A tick appears next to the names of all selected files.

Note: You can only select files from the active file list.

Select All Files - <F3>

To select all of the files in the active list, i.e. all files in the current directory, press the <F3> key.

Deselect All Files - <F4>

To deselect all of the files in the active list, i.e. all files in the current directory, press the <F4> key.

Copy Selected Files - <F10>

Press the <F10> key to transfer the selected files, i.e. all files marked with a tick, in the direction indicated by the arrow in the middle of the screen, with the Control on the left and the Slave on the right.

You can choose whether any existing files in the destination directory should be replaced by new file(s) without a prompt for confirmation. Type <Y> to replace any such files, <N> to prompt for confirmation, or <Escape> to abandon the copy operation.

If you select prompted replacement, and the file already exists, you will be prompted again. Type <Y> to replace the named file, <N> to skip this file and continue copying any other files, or <Escape> to quit without copying the file.

Change Directory - <F8>

Use the <F8> key to change the current directory for the active file list. When this is done, a new Change Directory window opens up. This displays the drives available, together with the current directory, on the Control or Slave, depending upon which is the current active file list. If there are any subdirectories in the current directory, then they are displayed below the current directory.

You can select a different drive or directory by highlighting its name (using the up and down arrow keys) and pressing <Enter>. Select the ".." entry to change to the parent of the current directory.

To create a new directory, highlight the *parent* directory and press <F10>. You will be prompted to enter the name of the new subdirectory. Enter the name and press <Enter> to create the directory, or press <Escape> to quit.

Note: Make sure that you highlight the correct parent directory. To create a new directory in the root directory, make sure that you highlight the root directory (e.g. C:\) before pressing <F10>.

You can delete the selected directory by pressing <F9>.

Press <Escape> to return to the File Transfer screen.

Wild Card - <F2>

The default Wildcard pattern is "*.*", which means that all files in the current directory will be displayed. You can reduce the size of the list by changing the wildcards, such as *.EXE. Only files matching the Wildcard pattern will be displayed.

Press <F2> to select a Wild Card pattern. Type in the new pattern and press <Enter> to continue, or <Escape> to quit without changing the pattern.

Too Many Files: When there are too many files in the directory for Control to display, use this option to change the Wildcard pattern and thereby reduce the number of matching files.

Delete Selected Files - <F9>

Press the <F9> key to Delete the selected files, i.e. all files marked with a tick. A prompt is displayed to confirm deletion.

Rename a File - <F7>

Use the arrow keys to highlight a file, and press <F7> to rename it. You will be prompted to provide a new name for the file. Type in the new name, and press <Enter> to rename the file, or <Escape> to quit without renaming it.

Note: You can move a file to a different directory by entering the new path here. The new directory must exist already.

Display File Information - <F5>

Pressing the <F5> key displays information on the highlighted file, such as the file size, creation date, and attributes.

You can change the read-only attribute by pressing the <R> key.

View a File - <F6>

Use the arrow keys to highlight a file, and press the <F6> key to display the file's contents. Use the <Page Up>, <Page Down>, <Home>, or <End> keys to move around the file.

End File Transfer Session - <Escape>

Press the <Escape> key to exit the file transfer session.

6.7.3 Dial

Purpose

If you have loaded a Remote program before starting the Control, this option enables you to enter the Communications Options Menu.

Use this option if:

You are on a network and wish to connect to a workstation on a remote network or a standalone Slave.

Method

From the Main Menu, choose Communications, then Dial.

If you have any Slaves connected, then the connections will be lost if you proceed to the Communications Options Menu. You will be prompted to confirm that you want to continue. Click on [Yes] or press <Enter> to continue. Click on [No] or press <Escape> to return to the Control Main Menu.

If you continue, the Communications Options Menu appears. This is described in Section 6.8.

Note: A Remote program must have been loaded from the DOS prompt, before starting Control or Windows. Refer to Chapter 7 for further details.

Any active local connections will be lost.

6.7.4 Hangup

Purpose

Terminates a Remote Communications session and hangs up the phone.

Use this option if:

You have been using Remote Communications and wish to terminate the call.

Method

From the Main Menu, choose Communications, then Hangup.

Note: You will be returned to the Communications Options Menu. This is described in Section 6.8.

6.7.5 Dial Directory

Purpose

This option displays a directory of remote users and telephone numbers for remote networks and standalone Slaves.

Use this option if:

You want to add or edit entries in the Dial Directory, or you want to connect to a remote Bridge or Slave which already has an entry in the Dial Directory.

Method

From the Main Menu, choose Communications, then Dial Directory.

The current contents of the Dial Directory are displayed. You can select an existing entry and dial it immediately, or you can add new entries, or edit or delete existing entries.

The last dialled number is stored in the CONTROL.CFG file.

Note: You can only actually dial out if a Remote program has already been loaded from the DOS prompt, before starting Control or Windows.

The Dial Directory is stored in file CONTROL.DIR in the *PC-Duo* installation directory. If the file doesn't exist, the Dial Directory will be empty. The file will be created automatically when you add a new entry.

The Control Modem File CONTROL.MDM assumes that you will always use Tone Dialling, and therefore specifies a Dial Prefix of ATDT. If you use Pulse Dialling only, then you should change the Dial Prefix (i.e. the ATDT commands in CONTROL.MDM) to ATDP. If you have to use tone dialling for some numbers, but pulse dialling for others, then you should change the Dial Prefix (i.e. the ATDT commands in CONTROL.MDM) to ATD. Prefix the tone dialled telephone numbers in the Dial Directory with a 'T'. The modem will dial these numbers using Tone Dialling. Prefix the Pulse Dialling numbers with a 'P'.

[Dial] - <Enter>

This option dials the selected number. The progress of the call is displayed on the Control screen.

The last dialled number is stored in the CONTROL.CFG file.

Note: Make sure that the modem is operational and connected correctly before using this option.

[Change] - <F7>

This option allows you to edit an existing Dial Directory entry. A dialogue box is displayed, allowing you to change the name or the associated telephone number.

Press [OK] or <Enter> to save the changes, [Cancel] or <Escape> to quit without making any changes.

[Add] - <F8>

This option allows you to enter a new name and telephone number. A dialogue box is displayed, allowing you to add a name and associated telephone number.

Press [OK] or <Enter> to save the new entry, [Cancel] or <Escape> to quit without saving the new number.

Note: The Dial Directory can hold up to 300 numbers, sorted into ascending alphabetic order on the name field. The combined length of the name and number fields is 40 characters.

[Delete] - <F9>

This option deletes the selected entry from the Dial Directory. You will be prompted to confirm deletion.

Press [Yes] or <Enter> to delete the entry, [No] (or <Escape>—DOS Control) to return to the Dial Directory without deleting the entry.

[Close] - <Escape>

Click on the Close button or press <Escape> to exit from the Dial Directory. If you entered the Dial Directory from the Communications Menu, you will be returned to the Main Menu. If you entered the Dial Directory from the Communications Options Menu, you will return there instead.

Tips

You can include special characters in the phone number. For example, include a "W" to wait for a secondary dial tone if you have to dial an outside line first. Also, you can include a comma "," in the number to insert a short pause, typically four seconds, during the dialling sequence.

Consult your modem manual for further details.

Try to use meaningful names that you will easily recognise rather than codes. Remember that you can also use the /D and /C switches when loading the Control programs to bypass the Main Menu, dial a number, and connect to a named Slave.

6.8 The Communications Options Menu

This menu appears when a Control is started after a Remote program has been loaded. It is displayed in preference to the Main Menu, which is used primarily for operations on the local network. Refer to Chapter 7 for further details on loading Remote programs.

This menu can also be activated from the Communications Menu, by selecting the Dial option. If this method is used, you will be reminded that dialling will disconnect any current connections. Enter "Y" to continue to the Communications Options Menu.

DOS Control: The DOS Control title for this menu is "Communications Commands".

The Communications Options Menu contains options for examining or updating or dialling an entry in the Dial Directory, dialling a number without saving it in the Dial Directory, setting or changing the remote communications configuration, exiting from Communications Options to the Main Menu, shelling out and exiting to DOS (DOS Control only), or exiting to Windows (Windows Control only).

Once a dial-up or serial link has been established, the Control Main Menu is displayed. Operation is exactly the same as on a local network. It will be slower, particularly when running DOS Graphics or Windows applications. Performance will depend largely on the speed and reliability of the serial line.

Both DOS and Windows Controls have equivalent options. These options are described next.

6.8.1 Dial Directory

Purpose

This option displays the contents of the Dial Directory, and allows you to select a particular number for immediate dialling.

Method

Choose Dial Directory. A window will open up, displaying the current contents of the Dial Directory. You can add a new entry, or edit or delete existing entries.

To dial a number, highlight the number, and press [Dial] or <Enter>.

The last dialled number is stored in the CONTROL.CFG file.

Once the link to the Bridge has been established, the Control Main Menu will be displayed. Operation is then exactly the same as for a Local LAN.

The Dial Directory is described in more detail in Section 6.7.5.

Note: You can only actually dial out if a Remote program has already been loaded from the DOS prompt, before starting Control or Windows.

Make sure that the modem is operational and connected correctly before dialling a remote Slave.

If Control cannot establish communications with the Bridge, it will display an error message and return you to the Communications Options Menu.

The Dial Directory is stored in file CONTROL.DIR in the *PC-Duo* installation directory. If the file doesn't exist, the Dial Directory will be empty. The file will be created automatically when you add a new entry.

The Control Modem File CONTROL.MDM assumes that you will always use Tone Dialling, and therefore specifies a Dial Prefix of ATDT. If you use Pulse Dialling only, then you should change the Dial Prefix (i.e. the ATDT commands in CONTROL.MDM) to ATDP. If you have to use tone dialling for some numbers, but pulse dialling for others, then you should change the Dial Prefix (i.e. the ATDT commands in CONTROL.MDM) to ATD. Prefix the tone dialled telephone numbers in the Dial Directory with a 'T'. The modem will dial these numbers using Tone Dialling. Prefix the Pulse Dialling numbers with a 'P'.

6.8.2 Manual Dial

Purpose

You can enter a number for Control to dial using this option.

Use this option if:

You want to dial a remote Bridge, but you don't want to store the number in your Dial Directory.

Method

Select Manual Dial. Enter the number and press [OK] or <Enter> to dial the number.

Press [Cancel] or <Escape> to return to the Communications Options Menu without dialling the number.

The last dialled number is stored in the CONTROL.CFG file.

Once the link to the Bridge has been established, the Control Main Menu will be displayed. Operation is then exactly the same as for a Local LAN.

Note: Make sure that the modem is operational and connected correctly before using this option.

If Control cannot establish communications with the Bridge, it will display an error message and return you to the Communications Options Menu.

Tips

You can include special characters in the phone number. For example, include a "W" to wait for a secondary dial tone if you have to dial an outside line first. Also, you can include a comma "," in the number to insert a short pause, typically four seconds, during the dialling sequence.

Consult your modem manual for further details.

Try to use meaningful names that you will easily recognise rather than codes. Remember that you can also use the /D and /C switches when loading the Control programs to bypass the Main Menu, dial a number, and connect to a named Slave.

Note: The Control Modem File CONTROL.MDM assumes that you will always use Tone Dialling, and therefore specifies a Dial Prefix

of ATDT. If you use Pulse Dialling only, then you should change the Dial Prefix (i.e. the ATDT commands in CONTROL.MDM) to ATDP. If you have to use tone dialling for some numbers, but pulse dialling for others, then you should change the Dial Prefix (i.e. the ATDT commands in CONTROL.MDM) to ATD. Prefix the tone dialled telephone numbers in the Dial Directory with a 'T'. The modem will dial these numbers using Tone Dialling. Prefix the Pulse Dialling numbers with a 'P'.

6.8.3 Serial Link

Purpose

Use this option to set up a remote connection using a direct serial connection, such as a leased line.

Use this option if:

You have a direct serial line connection to a remote Bridge.

Once the link to the Bridge has been established, the Control Main Menu will be displayed. Operation is then exactly the same as for a Local LAN.

Note: If Control cannot establish communications with the Bridge, it will display an error message and return you to the Communications Options Menu.

6.8.4 Local LAN

Purpose

Use this option to exit from the Communications Options Menu and return to the Control Main Menu.

Use this option if:

You have finished communicating with a remote Slave, and wish to connect to a Slave on the local network. Control will display an "Initialising..." message while it initialises on the local network. It will then display the normal Main Menu screen.

Note: Use the Quit Program option to exit to DOS or Windows. See Section 6.8.9.

You can return to the Communications Options Menu through the Dial option on the Communications Menu. See Section 6.7.3 for further information.

6.8.5 Set Baud Rate

Purpose

This option allows you to change the PC-to-modem serial line speed.

Use this option if:

You have to use different Baud rates for different serial lines, or you are experiencing unreliable communications. You can try reducing the PC-to-modem serial line speed.

Method

Select the Set Baud Rate option. The display changes to show the permitted rates. The current Baud rate is highlighted. With the Windows Control, click on the desired new Baud Rate to select it and return to the Communications Options Menu. In the DOS Control, use <Tab> or the cursor arrow keys to highlight the new rate and press <Enter> to select it.

Press [Cancel] or <Escape> to quit without changing the current value.

The Baud rate setting is stored in the CONTROL.CFG file.

Note: You should normally keep the PC-to-modem serial line speed at a higher value than the modem-to-modem speed.

Most XT class PCs are limited to a maximum speed of 2400 Baud for reliable operation.

Windows interrupt latency typically limits serial line speeds to 9600 Baud or less, though a high speed serial port with a suitable Windows driver can exceed this speed.

When using a direct serial connection from Control to Bridge, make sure that the Bridge was started with the same serial line speed.

6.8.6 Select Modem

Purpose

This option is used to select a modem configuration to be used during a Remote Communications session. The Windows Control also allows you to edit or delete existing modem configurations or create new ones.

Use this option if:

You have a different modem to the default (Hayes compatible), or you have changed the Control Modem File (CONTROL.MDM) to suit your own modem.

Method

Select the Select Modem option. The Select Modem dialog box will appear. This contains the names of all of the modem configurations in the Control Modem File (CONTROL.MDM), sorted into alphabetic order.

The currently selected Modem is highlighted (indicated by a tick on the DOS Control). Double-click on the correct modem entry to select it and return to the Communications Options Menu, or use the cursor up and down arrow keys to highlight the new modem name and press [OK] or <Enter> to select it.

Press [Cancel] or <Escape> to quit without making a change.

The current selected modem is stored in the CONTROL.CFG file.

[Edit]

This button allows you to edit the selected modem configuration. A new dialog box containing the selected modem configuration appears. This is described in Section 6.6.5.1. See Appendix D for information on Modem File formats.

[Delete]

This button will delete the selected modem configuration. You will be prompted to confirm the deletion. Press [Yes] to delete the modem configuration, or [No] to return to the Select Modem dialog without deleting it.

Note: You cannot delete the "Hayes compatible" modem configuration.

6.8.7 DOS

DOS Control: This option is implemented in the DOS Control, only.

Purpose

This command will "shell out" to DOS, allowing you to execute DOS commands without exiting from the Control program.

Method

Select the DOS option and press <Enter> to "shell out" to DOS. Type EXIT to return to Control.

Note: Approximately 100 Kilobytes of DOS memory is required for the Control program and the COMMAND.COM DOS Shell.

6.8.8 Exit

Purpose

Exits the Windows Control program and returns to Windows.

Note: Any local or remote connections will be lost.

6.8.9 Quit Program

Purpose

Exits the DOS Control program and returns to DOS.

Note: Any local or remote connections will be lost.

6.9 Fast Track Menus (DOS version only)

Purpose

When the Control is displaying the Slave full-screen, or is performing a function such as a Show, the Hot Key sequence brings up the appropriate Fast Track Menu. This allows you to change the Selected Slave, or the way in which it is being accessed.

Method

Press <CTRL-LSHIFT-RSHIFT> simultaneously to pop up the Fast Track Menu. Use the cursor arrow keys to highlight the required option and press <Enter> to activate it.

Note: The <CTRL-LSHIFT-RSHIFT> Hot Key combination can be changed through the Configure Menu. Refer to Section 6.6.3 for further details.

7 Remote Communications

As well as allowing you to take Control of workstations on the local network, *PC-Duo* also allows you to Control workstations on remote networks and standalone workstations connected via a modem or serial link. This chapter describes the components used to provide this facility.

Wide-Area Networks: Do not confuse *PC-Duo*'s remote communications with alternative wide-area networking mechanisms, such as asynchronous DECnet or TCP/IP. *PC-Duo*'s remote communications requires a dedicated serial line or modem connection which cannot be shared with other traffic. If you already have a serial wide-area network connection, then you can use that with *PC-Duo*, so long as it provides a NetBIOS or IPX interface.

7.1 Overview

The remote communications facility is achieved using an additional "Remote" program on the Control workstation, and a "Bridge" program on a remote PC. Both of these are DOS TSRs which must be loaded before the Control or Slave programs. The Remote program controls the serial line or modem attached to the Control, and the Bridge program controls the serial line or modem attached to the Bridge PC. Between them, the Remote and Bridge programs provide the mechanism that allows the Control to see remote Slaves as if they were on the Control's local network.

The Bridge and Remote programs can reside in memory along with any other application, waiting until they are used. The Bridge PC can be used as a normal workstation, but care should be taken not to crash it or to run programs that use or interfere with the serial port.

7.1.1 Networked Slaves

When the remote workstations are networked, the Bridge program can be loaded on any PC on the *remote* network. Once a Bridge has been loaded on a networked PC, the *local* Control can use it to connect to any Available Slaves on the *remote* network.

The Bridge PC does not have to be a Slave, although it can be, nor does it have to be dedicated although that may be prudent to avoid interference with or from a local user.

7.1.2 Standalone Controls

Both Control and Slave PCs would typically be connected to networks, but this is not necessary. A standalone Control running the Remote program can connect to networked or standalone Slaves. When the remote Slaves are networked, then either IPX or NetBIOS versions of the programs can be used, subject to the requirement that Control, Remote, Bridge, and Slave programs must all be the same version (i.e. all IPX, or all NetBIOS).

7.1.3 Standalone Slaves

The IPX versions of Control, Slave, and Remote Communications programs must be used for connecting to a standalone Slave. A standalone Slave must also run the LOCALIPX module, which provides a dummy IPX network interface for the Bridge program to communicate with the Slave. In other words, IPCONTRL.EXE and IPREMOTE.EXE must be loaded on the Control PC, and LOCALIPX.EXE (for standalone Slaves), IPBRIDGE.EXE and IPSLAVE.EXE must be loaded on the Slave.

Dummy NetBIOS: This release of *PC-Duo* does not contain a dummy NetBIOS. Please contact your supplier if you need a dummy NetBIOS.

7.1.4 Summary

Table 7–1 shows the various remote communications programs.

Table 7–1 Remote Communications Programs

Program	Purpose
LOCALIPX.EXE	Dummy IPX for Standalone Slaves
IPBRIDGE.EXE	Bridge for IPX Networks and Standalone Slaves
IPREMOTE.EXE	Remote for IPX Networks and Standalone Slaves
NBBRIDGE.EXE	Bridge for NetBIOS Networks and Slaves
NBREMOTE.EXE	Remote for NetBIOS Networks and Slaves

7.2 Setting Up

The Slave configuration determines the correct components to load at both ends. For standalone Slaves, use LOCALIPX, the IPX DOS Slave (IPSLAVE.EXE), and the IPX Bridge (IPBRIDGE.EXE). IPX networked Slaves just need IPSLAVE.EXE, and the IPX Bridge (IPBRIDGE.EXE). NetBIOS Slaves need SLAVE.EXE and the NetBIOS Bridge NBBRIDGE.EXE.

The Control programs must match the Slave—either all IPX or all NetBIOS. The IPX Remote IPREMOTE.EXE and Control programs IPCONTRL.EXE or WIPCNTRL.EXE are used to control IPX or standalone Slaves. The NetBIOS Remote NBREMOTE.EXE and Control programs CONTROL.EXE or WCONTROL.EXE are used for NetBIOS Slaves.

7.2.1 Starting the Slave

The Slave is started by following the sequence:-

1 Make sure that the modem or serial link is working

2 Load LOCALIPX (on a standalone Slave)

3 Load the IPX or NetBIOS Bridge program

4 Load the IPX or NetBIOS Slave

The Bridge program initialises the serial port or modem. It must be told which COM*n* port to use, the modem type (if any), and the PC-to-modem line speed. The Bridge Modem File, BRIDGE.MDM, contains the commands required to initialise the modem.

Bridge program command syntax is described in Section 7.3.

7.2.2 Starting the Control

The Control is started by following the sequence:-

1 Make sure that the modem or serial link is working

2 Load the IPX or NetBIOS Remote program

3 Start the IPX or NetBIOS DOS Control

4 or Start Windows

5 Start the IPX or NetBIOS Windows Control

The Remote program initialises the serial port or modem. It must be told which COM*n* port to use, but all other settings are provided by default values saved in the CONTROL.CFG file, or via the Control Communications Options menu. This menu appears automatically when you start a Control after the Remote program has been loaded.

Remote program command syntax is described in Section 7.8. The Control Communications Options menu is described in Section 6.2.

Note: There is no Remote Modem File. The Control program controls the modem using the Control Modem File CONTROL.MDM.

7.3 Bridge Command Syntax

The full DOS command line for a Bridge program is:-

```
{IP|NB}BRIDGE COMn [password] [[option[value]]...]

Options:   /A[n]       Alternate NetBIOS Adapter
           /Bnnnn      Set Baud Rate
           /E          Load in EMS (Not compatible with Windows)
           /Mmodem     Set Modem Type
           /U          Unload Bridge from Memory
           /Vnn        Software Interrupt Vector
           /X          Load in XMS
```

The above information can be obtained by running a Bridge with a /? help option. After displaying the usage message, it will return to the DOS prompt.

Bridge command options are used to tailor access, performance, and security to your exact needs. They are described in the following sections.

Note: IPBRIDGE is used on IPX (NetWare) networks and standalone Slaves. NBBRIDGE is used on NetBIOS networks.

The selected Bridge (IPX or NetBIOS) must be loaded after the network has been started, but before a Slave is loaded on the Bridge PC.

7.4 Bridge Command Parameters

The Bridge programs have only one required command parameter. This is the serial port which they are to use. This can be followed by an optional password. The password can be used to restrict access to authorised Control users only.

7.4.1 Serial Port

The Bridge must be told which serial port it is to use. This must be the port that the serial line or modem is connected to. Legal values are COM1, COM2, COM3, or COM4.

The Bridge will initialise the specified serial port, setting the Baud rate to the value specified in the /B—Set Baud Rate option. If no /M*modem* option was provided, the Bridge assumes that there is a direct connection on the serial port, and it waits for an incoming Control connection. If a /M*modem* option is specified, the Bridge will attempt to communicate with the modem, setting it to auto-answer mode.

Example:

```
C:\PCDUO\>ipbridge com2 /b9600
```

Here, the IPX Bridge is told to use serial port COM2 at 9600 Baud. This is a direct serial connection, as no /M*modem* option has been provided.

Serial Port Redirection: This version of *PC-Duo* is not able to use serial port redirectors such as INT 14, NACS/NASI, or PATHWORKS LATCOM. The serial port must be present at the standard address and interrupt level on the Bridge PC.

7.4.2 Password

A password can be used to prevent unauthorised Control users from accessing the Bridge. If used, this feature will prevent a Control user who does not know the password from performing any remote communications functions through the Bridge.

If this feature is required, the password must be encrypted using the CALCPSW program. The encrypted password can then be added to the Bridge command line. Any Control users wanting to access Slaves through this Bridge must enter the *unencrypted* password. It is not possible to deduce the unencrypted password from the encrypted version that is used on the Bridge command. A malicious Control user will therefore not benefit from seeing the Bridge command, such as if it is present in a batch file.

Example:

```
C:\PCDUO\>nbbridge com2 11216687 /b9600
```

Here, the NetBIOS Bridge is told to use serial port COM2 at 9600 Baud. The Control user will be required to enter the corresponding *unencrypted* password before obtaining access to the Bridge.

Note: Appendix E describes how to encrypt a password.

7.5 Bridge Command Options

Command options follow any required or optional parameters. They are distinguished by a leading slash (/) character. This is followed by a single character which identifies the option (e.g. /A). The option character may also be followed by an option value (e.g. /A9).

Note: There should not be any other characters between the option letter and the start of the value. "/A:9", for instance, would be invalid.

7.5.1 Alternate NetBIOS Adapter

Most machines will be used with a single NetBIOS transport. In this case, the default NetBIOS adapter number, 0, will be correct. However, when more than one NetBIOS transport has been loaded (e.g. PATHWORKS DECnet and TCP/IP, or NetBEUI and DECnet), then it may be necessary for you to use this option to specify which NetBIOS *adapter* should be used.

/A[*n*]—Alternate NetBIOS Adapter

The adapter number should be specified as a decimal number in the range 0 to 9. The default adapter number is zero, but if /A alone is specified, this changes to adapter 1.

Examples:

```
C:\PCDUO\>nbbridge com1 /a /b9600
```

or

```
C:\PCDUO\>nbbridge com1 /a2 /b9600
```

In the first example, the NetBIOS Bridge will use NetBIOS adapter 1. In the second, an explicit adapter number has been specified, so NetBIOS adapter 2 will be used.

Use this option if:

You have multiple NetBIOS transports available and do not wish to use the default (i.e. adapter number 0).

NetBIOS Bridge: This option is only relevant for the *PC-Duo* NetBIOS Bridge.

7.5.2 Set Baud Rate

This option is used to set the Baud rate that the Bridge is to use on the specified serial port. It sets the Baud rate between the Bridge PC and a remote Control PC if a direct serial connection is used, or the PC-to-Modem Baud rate if a modem is being used. It does not affect the modem-to-modem data rate, which is negotiated between the modems when the initial connection is established. Most modems use the PC-to-modem speed as a maximum allowed value during the negotiation process, so the PC-to-modem speed should be set higher than the maximum speed supported by the modems.

Legal values for the Baud Rate include:

1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, and 115200

Examples:

```
C:\PCDUO\>nbbridge com1 /b9600
```

or

```
C:\PCDUO\>ipbridge com3 /b115200
```

In the first example, the NetBIOS Bridge sets the serial port to 9600 Baud. In the second, the IPX Bridge is using a high-speed serial port, and can handle the maximum supported value, 115200 Baud.

Note: The maximum Baud rate that you can use will be determined by the performance of local and remote PCs, the modems, the serial line or dial-up connection, and any applications (e.g. Windows) that may be running on Remote and Bridge PCs.

A Bridge PC running Windows or Windows for Workgroups will probably not operate correctly at speeds higher than 9600 Baud unless it is fitted with a 16550 buffered serial port chip or a high speed serial card is used.

The Bridge Modem File, BRIDGE.MDM, can include commands to control the behaviour of the Bridge modem. See Appendix D for further details.

7.5.3 Load in EMS

It is possible to load the Bridge into EMS (Expanded Memory), if a suitable memory manager has been loaded and memory is available. This reduces the Bridge's conventional memory requirement from 22 KBytes (NBBRIDGE) or 23 KBytes (IPBRIDGE) to 8 KBytes.

/E—Load in EMS

This option does not require a value.

Example:

```
C:\PCDUO\>nbbridge com1 /b9600 /e
```

The Bridge will be loaded into EMS memory (if available).

Use this option if:

You are low on conventional memory and you have an EMS driver loaded.

Note: You cannot load a Bridge into EMS on a machine that will be running Windows.

It is generally more useful to load the Bridge into Upper Memory using the DOS LOADHIGH command.

7.5.4 Set Modem Type

This option is used when the Bridge PC is connected to a modem. It specifies the type of modem that is connected, and allows the Bridge to find the correct modem commands in the Bridge Modem File, BRIDGE.MDM.

/M*modem*—Set Modem Type

The *modem* name must be defined in the Bridge Modem File. The modem name is not case sensitive. It can be reduced to the minimum unambiguous abbreviation, but this is not recommended. For improved maintainability, it is better to specify the name completely.

Examples:

```
C:\PCDUO\>ipbridge com2 /b9600 /mhayes
```

or

```
C:\PCDUO\>nbbridge com1 /b2400 /mtemplate
```

The first example specifies a Hayes compatible modem is to be used on COM2 at 9600 Baud. The second example specifies that the user-modified Template modem should be used on COM1 at 2400 Baud.

Use this option if:

You are using a modem, not a direct serial connection.

Note: If a /M*modem* option is specified, the Bridge will attempt to initialise the modem, setting it to auto-answer mode.

If no modem type is specified, the Bridge assumes that there is a direct serial line connection to the Control PC.

7.5.5 Unload Bridge from Memory

A running Bridge can be unloaded from memory using this option. This can be done simply to recover the Bridge's memory, to prevent access, or to allow the Bridge to be reloaded with a different configuration.

/U—Unload Bridge from Memory

This option does not require a value.

Examples:

```
C:\PCDUO\>ipbridge /u
```

or

```
C:\PCDUO\>nbbridge /u
```

The first example unloads the IPX Bridge TSR from memory. The second example unloads the NetBIOS Bridge.

Use this option if:

You wish to unload a Bridge to disable it, recover memory, or reload it in a different configuration (e.g. at a different serial line speed).

Note: This must be run from the DOS Command line, and any TSRs that were loaded after the Bridge must be unloaded first.

You must use the same version Bridge program as is loaded (i.e. IPBRIDGE or NBBRIDGE).

7.5.6 Software Interrupt Vector

When a Bridge is started, it attempts to allocate one of the DOS User Program software interrupt vectors. There are normally several vectors available, but some BIOSs mark them as allocated to System ROM instead of being available for program use. If this is the case, then this option can be used to force the Slave to use a specific vector.

/V*nn*—Software Interrupt Vector

The vector value is specified as a two digit hexadecimal number. This is normally in the range 60 to 66 (hex).

Example:

```
C:\PCDUO\>nbbridge com1 /b9600 /v66
```

In this case, User Program vector 66 (hex) appears to be allocated, but the Bridge should use it regardless.

Use this option if:

The Bridge reports that it is unable to allocate a software interrupt vector.

The Bridge would otherwise use a vector which must be reserved for another program.

Note: You will need to establish that the vector you choose is not being used by another program. When this problem affects one program (e.g. the Bridge), it may also affect other programs (e.g. the Slave) which need software interrupt vectors.

See also the Slave and Remote /V options—Section 3.4.17 and Section 7.10.6 respectively.

7.5.7 Load in XMS

It is possible to load the Bridge into the High Memory Area (HMA) if a suitable XMS (Extended Memory) memory manager has been loaded and the HMA is available. This reduces the Bridge's conventional memory requirement from 22 KBytes (NBBRIDGE) or 23 KBytes (IPBRIDGE) to 8 KBytes.

/X—Load in XMS

This option does not require a value.

Example:

```
C:\PCDUO\>nbbridge com3 /b9600 /x
```

The NetBIOS Bridge will be loaded into XMS memory (if available).

Use this option if:

You are low on conventional memory, have an XMS driver loaded, and the High Memory Area is not already in use.

Note: This command option loads the Bridge into the High Memory Area. This is the first 64 KBytes above 1 MByte. If you have DOS=HIGH in your CONFIG.SYS, then the High Memory Area will be occupied already.

It is generally more useful to load the Bridge into Upper Memory using the DOS LOADHIGH command.

7.6 LOCALIPX Command Syntax

LOCALIPX provides a dummy IPX network interface on a standalone workstation. It has no required or optional parameters, and only one option.

```
LOCALIPX [option]

Options:   /U          Unload LOCALIPX from Memory
```

LOCALIPX does not have any online help or usage message display.

When it is run without the /U—Unload LOCALIPX from Memory option, LOCALIPX will load.

Example:

```
C:\PCDUO\>localipx
```

LOCALIPX signs on and loads, returning you to the DOS prompt.

LOCALIPX must be loaded from the DOS prompt. It cannot be loaded into EMS or XMS memory, but it can be loaded into upper memory using the DOS LOADHIGH command.

Note: LOCALIPX is used on standalone Slaves. It must be loaded before the IPBRIDGE or IPSLAVE programs.

Both LOCALIPX and IPBRIDGE must be loaded before IPSLAVE can be loaded.

You do not need to load LOCALIPX on a Control PC. IPREMOTE can provide the necessary Remote program interface for IPCONTRL.

LOCALIPX can also be used to provide a remote IPX Control with access to a NetBIOS network. In this case, load LOCALIPX, the IPX Bridge and an IPX Slave on a PC which is already running a NetBIOS network. An incoming IPX Control can then run a NetBIOS Control on the Bridge PC.

7.7 LOCALIPX Command Options

Command options follow any required or optional parameters. They are distinguished by a leading <Slash> character. This is followed by a single character which identifies the option (e.g. /U).

7.7.1 Unload LOCALIPX from Memory

A running LOCALIPX can be unloaded from memory using this option. This can be done to recover LOCALIPX's memory or to allow the Bridge or Slave programs to be reloaded with a different configuration.

/U—Unload LOCALIPX from Memory

This option does not require a value.

Example:

```
C:\PCDUO\>localipx /u
```

Unloads the LOCALIPX TSR from memory.

Use this option if:

You wish to unload LOCALIPX to disable it, or recover memory.

Note: The unload command must be run from the DOS Command line and any TSRs that were loaded after the LOCALIPX TSR must be unloaded first.

7.8 Remote Command Syntax

The full DOS command line for a Remote program is:-

```
{IP|NB}REMOTE COMn [[option[value]]...]

Options:   /A[n]       Alternate NetBIOS Adapter
           /Bnnnn      Set Baud Rate
           /E          Load in EMS (Not compatible with Windows)
           /L          Disable Activity Light
           /U          Unload Bridge from Memory
           /Vnn        Software Interrupt Vector
           /X          Load in XMS
```

The above information can be obtained by running Remote with a /? help option. After displaying the usage message, it will return to the DOS prompt.

Remote command options are described in the following sections.

Note: IPREMOTE is used on IPX (NetWare) networks and standalone Slaves. NBREMOTE is used on NetBIOS networks.

The selected Remote (IPX or NetBIOS) should be loaded after the network has been started, but before a Control program or Windows is started.

You do not require the network to be loaded unless you also want to connect to Slaves on the local network.

7.9 Remote Command Parameters

The Remote programs have only one required command parameter. This is the serial port which they are to use.

7.9.1 Serial Port

The Remote program must be told which serial port it is to use. This must be the port that the serial line or modem is connected to. Legal values are COM1, COM2, COM3, or COM4.

The Remote program allocates the specified serial port but doesn't do anything further until the Control program attempts to start a remote connection. The Remote program is not responsible for initialising a modem, if one is used. This is done by the Control.

Example:

```
C:\PCDUO\>ipremote com2 /b9600
```

Here, the IPX Remote is told to use serial port COM2 at 9600 Baud.

Note: The Control programs can set the Baud rate directly, ignoring the /B—Set Baud Rate option specified here.

Serial Port Redirection: This version of *PC-Duo* is not able to use serial port redirectors such as INT 14, NACS/NASI, or PATHWORKS LATCOM. The serial port must be present at the standard address and interrupt level on the Control PC.

7.10 Remote Command Options

Command options follow any required or optional parameters. They are distinguished by a leading <Slash> character. This is followed by a single character which identifies the option (e.g. /A). The option character may also be followed by an option value (e.g. /A9).

Note: There should not be any other characters between the option letter and the start of the value. "/A:9", for instance, would be invalid.

7.10.1 Alternate NetBIOS Adapter

Most machines will be used with a single NetBIOS transport. In this case, the default NetBIOS adapter number, 0, will be correct. However, when more than one NetBIOS transport has been loaded (e.g. PATHWORKS DECnet and TCP/IP, or NetBEUI and DECnet), then it may be necessary for you to use this option to specify which NetBIOS *adapter* should be used.

/A[*n*]—Alternate NetBIOS Adapter

The adapter number should be specified as a decimal number in the range 0 to 9. The default adapter number is zero, but if /A alone is specified, this changes to adapter 1.

Examples:

```
C:\PCDUO\>nbremote com1 /a /b9600
```

or

```
C:\PCDUO\>nbremote com1 /a2 /b9600
```

In the first example, the NetBIOS Bridge will use NetBIOS adapter 1. In the second, an explicit adapter number has been specified, so NetBIOS adapter 2 will be used.

Use this option if:

You have multiple NetBIOS transports available and do not wish to use the default (i.e. adapter number 0).

NetBIOS Remote: This option is only relevant for the *PC-Duo* NetBIOS Remote.

7.10.2 Set Baud Rate

This option can be used to provide a default Baud rate to be used on the specified serial port. It sets the Baud rate between the Control PC and the remote Bridge PC if a direct serial connection is used, or the PC-to-Modem Baud rate if a modem is being used. It does not affect the modem-to-modem data rate, which is negotiated between the modems when the initial connection is established. Most modems use the PC-to-modem speed as a maximum allowed value during the negotiation process, so the PC-to-modem speed should be set higher than the maximum speed supported by the modems.

Legal values for the Baud Rate include:

1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, and 115200

Examples:

```
C:\PCDUO\>nbremote com1 /b9600
```

or

```
C:\PCDUO\>ipremote com3 /b115200
```

In the first example, the NetBIOS Remote sets the default Baud rate for the serial port to 9600 Baud. In the second, the IPX Remote is using a high-speed serial port on COM3, and can handle the maximum supported value, 115200 Baud.

Note: The maximum Baud rate that you can use will be determined by the performance of local and remote PCs, modems, the serial line or dial-up connection, and any applications (e.g. Windows) that may be running on Remote and Bridge PCs.

A Control PC running Windows or Windows for Workgroups will probably not operate correctly at speeds higher than 9600 Baud unless it is fitted with a 16550 buffered serial port chip or a high speed serial card is used.

The Control programs can set the Baud rate directly, ignoring the /B—Set Baud Rate option specified here.

7.10.3 Load in EMS

It is possible to load the Remote program into EMS (Expanded Memory), if a suitable memory manager has been loaded and memory is available. This reduces the conventional memory requirement from 20 KBytes (NBREMOTE) or 24 KBytes (IPREMOTE) to 8 KBytes.

/E—Load in EMS

This option does not require a value.

Example:

```
C:\PCDUO\>nbremote com1 /b9600 /e
```

The Remote program will be loaded into EMS memory (if available).

Use this option if:

You are low on conventional memory and you have an EMS driver loaded.

Note: You cannot load a Remote program into EMS on a machine that will be running Windows.

It is generally more useful to load the Remote program into Upper Memory using the DOS LOADHIGH command.

7.10.4 Disable Activity Light

The Remote program indicates serial line traffic using a flashing character on the screen. This activity light can be disabled using this option.

/L—Disable Activity Light

This option does not require a value.

Example:

```
C:\PCDUO\>nbremote com1 /b9600 /l
```

The Remote program will not indicate serial line activity.

Use this option if:

The flashing character is interfering with the local screen display.

Note: Do not confuse the activity light with the normal Control indicator on the DOS Slave screen. The activity light is at the top left, whereas the DOS Slave connect indicator is at the top right.

7.10.5 Unload Remote from Memory

A running Remote program can be unloaded from memory using this option. This can be done simply to recover the Remote's memory, or to allow the Remote program to be reloaded with a different configuration.

/U—Unload Remote from Memory

This option does not require a value.

Examples:

```
C:\PCDUO\>ipremote /u
```

or

```
C:\PCDUO\>nbremote /u
```

The first example unloads the IPX Remote TSR from memory. The second example unloads the NetBIOS Remote program.

Use this option if:

You wish to unload a Remote program to disable it, recover memory, or reload it in a different configuration (e.g. on a different serial port).

Note: You do not need to unload the Remote program to change the serial line Baud rate. The Control programs can do this themselves.

The unload command must be run from the DOS Command line and any TSRs that were loaded after the Remote program must be unloaded first.

You must use the same version remote program as is loaded (i.e. IPREMOTE or NBREMOTE).

7.10.6 Software Interrupt Vector

When a Remote program is started, it attempts to allocate one of the DOS User Program software interrupt vectors. This vector is used by the Control to communicate with the Remote program. There are normally several vectors available, but some BIOSs mark them as allocated to System ROM instead of being available for program use. If this is the case, then this option can be used to force the Remote program to use a specific vector.

/V*nn*—Software Interrupt Vector

The vector value is specified as a two digit hexadecimal number. This is normally in the range 60 to 66 (hex).

Example:

```
C:\PCDUO\>nbremote com1 /b9600 /v65
```

In this case, User Program vector 65 (hex) appears to be allocated, but the Remote program should use it regardless.

Use this option if:

The Remote program reports that it is unable to allocate a software interrupt vector.

The Remote program would otherwise use a vector which must be reserved for another program.

Note: You will need to establish that the vector you choose is not being used by another program. When this problem affects one program (e.g. the Remote), it may also affect other programs (e.g. a Slave) which need software interrupt vectors.

See also the Slave and Bridge /V options—Section 3.4.17 and Section 7.5.6 respectively.

7.10.7 Load in XMS

It is possible to load the Remote program into the High Memory Area (HMA) if a suitable XMS (Extended Memory) memory manager has been loaded and the HMA is available. This reduces the Remote program's conventional memory requirement from 20 KBytes (NBREMOTE) or 24 KBytes (IPREMOTE) to 8 KBytes.

/X—Load in XMS

This option does not require a value.

Example:

```
C:\PCDUO\>nbremote com3 /b9600 /x
```

The Remote program will be loaded into XMS memory (if available).

Use this option if:

You are low on conventional memory, have an XMS driver loaded, and the High Memory Area is not already in use.

Note: This command option loads the remote program into the High Memory Area. This is the first 64 KBytes above 1 MByte. If you have DOS=HIGH in your CONFIG.SYS, then the High Memory Area will be occupied already.

It is generally more useful to load the Remote program into Upper Memory using the DOS LOADHIGH command.

A Installation Options

The DOS INSTALL program is effectively fixed in its behaviour. It will always attempt to install the DOS NetBIOS Slave, Control, Bridge, and Remote programs into the C:\PCDUO directory on the PC's local hard disk. The Windows Setup program is more flexible, and offers several installation options. These can be used to sense the PC's current configuration, change the default options installed, install the kit from a file server, and even control whether files are copied onto the local PC or not.

See Section A.1 and Section A.2 for further information on sensing the PC configuration and setting the installation defaults.

The steps needed to perform installations from a file server copy of the Demonstration Disk are described in Section A.5.

Similarly, it is possible to run some *PC-Duo* components from a shared file server installation. This is described in Section A.4.

PC-Duo can also be installed using Vector Networks' *LANutil for PATHWORKS* network management package. Sample *LANutil* scripts are included on the *PC-Duo* Demonstration Disk, in directory \LANUTIL. The installation process is described in Section A.6.

Both DOS and Windows installations are controlled through file SETUP.INF on the Demonstration Disk. This file details the files that are copied for the various options that can be selected.

The Windows Setup procedure is controlled by file SETUP.MST.

Note: Do not edit SETUP.INF or SETUP.MST. These files are supplied in compressed form on the Demonstration Disk.

Windows Only: This chapter refers to the *PC-Duo* Windows Setup program. It is not possible to customise the operation of the DOS INSTALL program.

A.1 Setting Defaults for Installation

The default values offered by the *PC-Duo* Windows Setup program are controlled through the file DEFAULTS.INC. You may edit this file as desired for your particular circumstances. Refer to Section A.2 for advanced installation options and detailed examples.

DEFAULTS.INC defines four symbols. They are COPY%, DEST$, MNAME$, and OPTIONS$. COPY% controls whether files are to be copied. DEST$ is used to define the installed software location. MNAME$ provides the default value for the DOS Slave and Windows Control names. OPTIONS$ controls which components will be installed. These symbols are listed in Table A–1.

Table A–1 Installation Symbols

Symbol	Type	Initial Value
COPY%	Integer	1
DEST$	String	MAKEPATH(MID$(GetWindowsDir, 1, 3), DIR$)
MNAME$	String	"*"
OPTIONS$	String	"11111011"

COPY% is initialised to 1. This means that installation will copy the files required for the selected options. If COPY% is set to zero, then the files will not be copied.

DEST$ defines the default *installed* file location. This is normally the drive that Windows is running from (e.g. C:\—the path is returned by function GetWindowsDir ( ) and this is chopped up by MID$), plus the default installation directory name for this package (DIR$ = "PCDUO"), making "C:\PCDUO". This is displayed in the installation location dialogue box.

Note: Changing the installation directory in the dialogue box will force COPY% to be set to 1.

MNAME$ provides the default Control Name value. It is initialised to "*" which tells the Control programs to use the DOS Machine Name.

The OPTIONS$ symbol controls which package components will be installed. The default initial value is "11111011". These characters correspond to options Slave, Control, Windows, DOS, NetBIOS, IPX, Remote, and Bridge. A "1" will install the files required for that option, a "0" (zero) will not. The default value installs all components apart from the IPX Bridge, Control, Remote, and Slave.

To make use of a pre-installed *PC-Duo* kit on a file server, installing the DOS and Windows (NetBIOS) Slave only, see Table A–2.

Table A–2 Example Installation Symbols

Symbol	Value	Meaning
COPY%	0	Do not copy the package files
DEST$	"D:\PCDUO"	Pre-installed kit is in D:\PCDUO
MNAME$	"*"	Use the DOS Machine Name
OPTIONS$	"10111000"	Install DOS and Windows (NetBIOS) Slave

This example will use a pre-installed kit which must be accessible in directory D:\PCDUO. It will not copy the package files, but it will set up Windows for *PC-Duo*, configuring SYSTEM.INI and WIN.INI files appropriately.

A.2 Advanced Installation Options

The files that control the *PC-Duo* Windows Setup procedure, DEFAULTS.INC and SETUP.MST, are written in Setup BASIC or S-Basic. This is similar to Microsoft QBasic, but has a number of extensions which are supplied by the Microsoft Setup Toolkit files which are included on the Demonstration Disk. These extensions allow Setup to test the PC's

configuration, and can be used to make the installation procedure sensitive to this information.

A.2.1 Finding a File Server Installation

When a PATHWORKS PC makes a connection to its system file service, the the name of the disk drive that was used is set in Environment Variable _SYSD. If the PC is being set up to load the *PC-Duo* Slave from that drive, the following code example can be used to initialise the DEST$ string variable.

```
'' Find the System File Service disk drive

DEST$ = GetEnvVariableValue ("_SYSD")

IF DEST$ = "" THEN
    DEST$ = GetWindowsDir ()
END IF

DEST$ = MAKEPATH (MID$ (DEST$, 1, 3), DIR$)
```

The GetEnvVariableValue function returns the value associated with the variable. If it is not defined, an empty string is returned. DIR$ contains "PCDUO", so at the end of this sequence, DEST$ should be "D:\PCDUO" or something similar.

A.2.2 Finding the WFW Computer Name

Windows for Workgroups (WFW) does not set the DOS Machine Name until Windows starts. Then, it is too late to load the DOS Slave TSR. The following code example reads the ComputerName value out of the SYSTEM.INI, [Network] section.

```
'' Set the default Slave name from the ComputerName= line in the SYSTEM.INI,
'' [Network] section, if it is present.

MNAME$ = GetIniKeyString (GetWindowsDir + "SYSTEM.INI", "Network", "ComputerName")

IF MNAME$ = "" THEN
    MNAME$ = "*"
END IF
```

The GetIniKeyString function searches the specified file, in this case SYSTEM.INI in the Windows directory, for a [Network] section, and returns the value from the ComputerName= line. If the section is not found, or the ComputerName= line is missing, it returns an empty string.

Note: The use of the ComputerName value makes the installation specific to this PC. This mechanism should not be used for a shared file server installation.

A.2.3 Checking the Network Configuration

The Setup script can set default installation options based on the Windows network setup. The following code example reads the current SYSTEM.INI, [386Enh], network= line and sets OPTIONS$ according to whether "vipx" or "vnetbios" were found. These are typically found on PC's configured for IPX or NetBIOS networks (respectively).

```
'' Initialise OPTIONS$ to install the Slave and Control programs for DOS and
'' Windows. We add the NetBIOS, IPX, Remote, and Bridge option flags later.

OPTIONS$ = "1111"

szKey$ = GetIniKeyString (GetWindowsDir + "SYSTEM.INI", "386Enh", "network")

IF szKey$ <> "" THEN
    '' Look for "vnetbios" and set the NetBIOS option flag if it is found

    IF (INSTR (szKey$, "vnetbios")) <> 0 THEN
        OPTIONS$ = OPTIONS$ + "1"
    ELSE
        OPTIONS$ = OPTIONS$ + "0"
    END IF

    '' Look for "vipx" and set the IPX option flag if it is found

    IF (INSTR (szKey$, "vipx")) <> 0 THEN
        OPTIONS$ = OPTIONS$ + "1"
    ELSE
        OPTIONS$ = OPTIONS$ + "0"
    END IF
ELSE
    '' The network line is not present or unrecognised. Windows is not
    '' correctly configured for an IPX or NetBIOS network.

    OPTIONS$ = OPTIONS$ + "00"
END IF

'' Add in the Remote and Bridge option flags to complete OPTIONS$

OPTIONS$ = OPTIONS$ + "11"
```

This code is obscure because S-BASIC doesn't allow MID$ to be used to specify a substring for replacement. OPTIONS$ is built up piecemeal instead.

Note: Do not test for "*vnetbios" or "*vipx" as these drivers may be replaced by updated VNETBIOS.386 or VIPX.386 VxDs.

A.2.4 Eliminating Installation Dialogs

It is not possible to eliminate the normal installation dialogs without editing the SETUP.MST script file. This is not supported in the current version of *PC-Duo*.

A.3 Installing PC-Duo onto a File Server

It is possible to run several *PC-Duo* Slaves from a shared file server installation. For further information on constraints, see Section A.4. This section deals with the initial installation of *PC-Duo* to a file server.

The initial installation is performed in the same manner as a conventional *PC-Duo* installation. The destination directory should be selected as "\PCDUO" on a drive which has been redirected to a suitable file service (for example "D:\PCDUO"). See Section A.2.1 for a code example which can be used to locate the PATHWORKS System File service drive. You will need to have write access to this drive, of course.

Perform the installation, selecting only the components that you require on the file server (i.e. probably the various Slave components). If you install all of the shareable package components (e.g. Bridge, Control, Remote, Slave), they will be available for later use.

The file server copy of STARTSLV.BAT may need to be edited so that Environment Variable PCDDIR references the correct location.

Make a copy of the *PC-Duo* Demonstration Disk (or copy the kit into another file server directory—see Section A.5), then edit file DEFAULTS.INC to set the COPY%, DEST$, and OPTIONS$ symbols, as appropriate for the majority of workstation installations.

Note: Changing the installed kit location during following installations will force the COPY% symbol to 1. This will cause an installation using a read-only pre-installed kit to fail. Edit DEFAULTS.INC instead.

Restore the read-only state of the file service. The local PC will have been configured for *PC-Duo* operation, using the components selected during the installation.

You can then repeat the installation on the remaining workstations. See Section A.5 for further assistance.

A.4 Running PC-Duo from a File Server

It is possible to run several *PC-Duo* Slaves from a shared, read-only file server installation.

Windows Users: Windows will not start if the *PC-Duo* Windows driver files cannot be accessed from the file server. This can happen if the file server is not available or the path specified in the SYSTEM.INI [Boot] display.drv line is incorrect.

If the file server fails, a temporary workaround can be made by changing the display driver back to the value contained in the display.old line. Also, it will be necessary to comment out the SYSTEM.INI [386Enh] device=C:\PCDUO\pcdvxd.386 line by inserting a semi-colon at the start of the line.

Control Users: The *PC-Duo* Control programs save their configuration information in files in the installation directory, or if this is not writable, in the current default directory. This requires write access to the directory, and could cause interference if multiple Control programs attempt to use the same configuration files. It is safer to run Controls from separate local installation directories, rather than a shared file server location.

A.5 Installing from a File Server

If you wish to perform further *PC-Duo* installations from a common source such as a file server, you must copy all files from the Installation Disk into the \DISK1 directory on the file server. You can run the Windows or DOS installation programs from there.

Note: If you want to customise the installation process, do this after the kit has been copied onto the file server. This eliminates the need for you to make a backup copy of the *PC-Duo* Demonstration Disk. See Section A.1 for further details.

You do not need write access to the file server to perform an installation from it onto other workstations.

A.6 Installing PC-Duo with LANutil

LANutil Automated Installation Scripts are included in directory \LANUTIL on the PC-Duo Demonstration Disk. They can be used with Vector Networks' *LANutil for PATHWORKS* package to install *PC-Duo* automatically on a population of PCs. The script files are VMS files, and are provided on the disk as plain ASCII text files, although they have been renamed to suit the DOS 8.3 character filename limits.

Table A–3 LANutil Installation Scripts

DOS Files	VMS Filename	Purpose
PCDAUTO.TPU	PCDUO_AUTOEXEC.TPU	Edits AUTOEXEC.BAT to call STARTSLV.BAT
PCDCUS.CMD	PCDUO_CUSTOM.COM	Customises installation on target PC
PCDINS.CMD	PCDUO_INSTALL.COM	Controls network-wide installation
PCDPROG.TPU	PCDUO_PROGMAN_INI.TPU	Edits PROGMAN.INI to add PCDUO.GRP
PRDPROT.TPU	PCDUO_PROTOCOL_INI.TPU	Edits PROTOCOL.INI [NetBEUI] section
PCDSYS.TPU	PCDUO_SYSTEM_INI.TPU	Edits SYSTEM.INI to load PC-Duo drivers
PCDTPL.TPU	PCDUO_TEMPLATE.TPU	Edits PATHWORKS v5 for DOS Template(s)
PCDWIN.TPU	PCDUO_WIN_INI.TPU	Edits WIN.INI to load Windows Slave

These files should be copied onto the *LANutil* host (in ASCII) mode and renamed according to the list in Table A–3. They require *LANutil* v2.0 or later for correct operation.

B Using PC-Duo with Windows for Workgroups

Microsoft's Windows for Workgroups (*WFW*) packages provide a convenient way of networking small groups of PC workstations. There are a number of items which require special attention when *PC-Duo* is used in a WFW environment.

For technical information regarding WFW, we recommend Microsoft's Windows for Workgroups Resource Kits for WFW 3.1 and 3.11.

B.1 Installing PC-Duo

The *PC-Duo* DOS or Windows installations can be performed in the normal way. *PC-Duo* Setup will configure Windows, and will create a new *PC-Duo* Group which can be used while Windows is running. The main differences from a regular Windows installation actually concern the *DOS* Slave and Control programs.

Note: See the Advanced Installation Options (Section A.2) for assistance with setting up *PC-Duo* on WFW.

B.2 Windows Networking

WFW can be used with its default network transport—*The Windows Network*—as well as a variety of third party networks. The Windows Network, also known as NetBEUI, is a type of NetBIOS network. WFW operates best over NetBIOS networks such as NetBEUI or PATHWORKS. It can also be configured to operate over NetWare (IPX), though this tends not to be as efficient or reliable.

WFW normally provides full networking only while Windows is running. This can produce problems for the *PC-Duo* DOS Slave and Control programs. IPX is normally loaded before Windows starts, and so the DOS IPX Slave and Control programs will operate outside Windows. On the other hand, NetBEUI is normally loaded as a virtual device driver, or VxD, during Windows startup. The DOS NetBIOS Slave must be loaded before Windows starts, and the Slave requires a running NetBIOS, so it is necessary to arrange for a *real-mode* NetBIOS to be accessible before the Slave will load. This is described further in Section B.4.

Also, WFW often loads multiple network stacks so that it can access more than one network simultaneously. These additional stacks may all be NetBIOS networks, but the reason for loading several of them is that they are mutually incompatible apart from the NetBIOS Application Programming Interface (or API). Programs such as the *PC-Duo* NetBIOS Slave use the NetBIOS API to access the network(s) in a standard manner.

When two or more NetBIOS stacks are loaded, they are distinguished by their NetBIOS Adapter Numbers. For example, WFW can be set up to operate over NetBEUI, DECnet, and TCP/IP. NetBEUI might be set up as Adapter 0, DECnet as Adapter 1, and the TCP/IP NetBIOS as Adapter 2.

Now, only one copy of the DOS Slave can be loaded at any time, and this can only communicate with a NetBIOS Control using one specific NetBIOS adapter, so it is important to arrange for the Slaves and Controls to be operating over the same type of network—for example all on NetBEUI, or all on DECnet. NetBIOS Adapter Numbers are described further in Section B.5.

Most MS-NET compatible networks set the DOS Machine Name, but WFW does not do this until Windows starts, so this name is not available to provide defaults for Slave and Control programs. The actual name is stored in the ComputerName line of the [Network] section of WFW's SYSTEM.INI file. *PC-Duo's* installation procedure can be modified so that it reads this name and configures the DOS Slave and Windows Controls accordingly. This is described in the Advanced Installation Options (Section A.2). Alternatively, you can refer to Section B.6 and Section B.8 for further details on setting the DOS Machine Name for *PC-Duo*.

So, you need to pay particular attention to:-

- Configuring Windows
- Starting the Network
- Determining Adapter Numbers
- Defining the Slave and Control Names
- Starting the DOS Slave
- Starting Windows.

These are described in the following sections.

B.3 Configuring Windows

Windows for Workgroups *must* be correctly configured if it is to operate correctly over any network. Network configuration is normally performed using the Network Setup program. The following sections describe setup operations for a few typical networks.

B.3.1 Windows for Workgroups on IPX

NetWare (IPX) networks are normally loaded before Windows is started up. When Network Setup configures Windows for an IPX network, it typically adds a new driver, ODIHLP.EXE, to the normal startup sequence. This becomes something like the following:

```
C:\WINDOWS\LSL.COM              ! Loads the ODI Link Support Layer
C:\WINDOWS\NE2000.COM           ! Loads the NE2000 card driver (MLID)
C:\WINDOWS\ODIHLP.EXE           ! Loads Windows' ODIHLP driver
C:\WINDOWS\IPXODI.COM           ! Loads IPX
C:\WINDOWS\NET START            ! Initialises the Windows Network
```

This sequence is typical of an ODI driver installation. The *PC-Duo* DOS IPX Slave or Control programs can be used after IPXODI has been loaded.

Monolithic IPX: **The so-called monolithic IPX stacks (IPX.COM) found in NetWare versions prior to 3.0 are not suitable for use with Windows for Workgroups (or *PC-Duo*). They should be upgraded to a configuration based on ODI drivers for reliable operation.**

ODI Drivers: The ODI modules supplied with Windows for Workgroups version 3.11 or earlier are not reliable, and often suffer from the "Black Screen of Death" problem, amongst others. They should be replaced with the Novell "DOSUP9" and "WINUP9" versions of DOS and Windows drivers, respectively. These updates are available to licensed NetWare users from the Novell NetWire download area on CompuServe (GO NOVFILES at a ! prompt).

Routed IPX Networks: When the Windows IPX Control is used over a routed or multi-segment IPX network, it will not "see" Slaves on other segments unless Windows is configured correctly. Multi-segment operation requires the Novell SPX protocol in addition to IPX. This is provided by the vipx.386 virtual device driver or VxD.

You can check Windows is configured correctly by examining the transport line in the [386Enh] section of SYSTEM.INI. The default configuration for IPX uses the 32-bit nwlink.386 VxD, as follows:

```
[386Enh]
    .
    .
    .
transport=nwlink.386,netbeui.386
```

This is from a PC configured for NetBEUI as well as IPX.

Copy the VIPX.386 driver file from the WINUP9 kit into the \WINDOWS\SYSTEM directory and replace the nwlink.386 VxD with vipx.386, so that SYSTEM.INI looks something like this:

```
[386Enh]
    .
    .
    .
transport=vipx.386,netbeui.386
```

NetWare does not normally define a DOS Machine Name, however, the *PC-Duo* installation procedure can be configured to use the ComputerName from WFW's SYSTEM.INI (see Section A.2).

B.3.2 Windows for Workgroups on NetBEUI

The Windows Network, or NetBEUI, can be configured to operate as a real-mode (for DOS) or a protected-mode transport (Windows only). *PC-Duo* requires a real-mode network to be accessible when the DOS Slave loads. This can be achieved in two ways:

- Windows Network Setup can be used to configure the network adapter for "Real and Enhanced Mode NDIS". This has the effect of setting the LoadRMDrivers value in the SYSTEM.INI [network drivers] section to "Yes". This change to SYSTEM.INI can also be made using a text editor such as DOS Edit or Windows Notepad.
- Alternatively, the normal NET START command in AUTOEXEC.BAT can be changed to NET START NETBEUI. This will load a real-mode NetBEUI transport stack.

PC-Duo Slave: The real-mode network is required for the DOS Slave and Control programs only. The Windows Control programs can use the normal Windows network, which is accessible once Windows has started up.

B.3.2.1 Configuring Network Storage

The protected-mode NetBEUI VxD is able to allocate additional storage to cope with network demand. The real-mode NetBEUI cannot do this, so when NetBEUI is used in real-mode, it is advisable to increase the number of SESSIONS and NCBS allocated. In WFW 3.11, the values can also be changed using Network Setup. They can be found by opening the Adapter window, and then selecting the [Advanced] button.

We recommend values of 16 SESSIONS and 36 NCBS for a Windows Slave. If you will only run the Windows Control, ensure that there are at least 24 NCBS available. Increase the value of NCBS, particularly, if the PC is running additional NetBIOS applications such as the *PC-Duo* Bridge or Windows Control programs as well as a Slave, if you experience difficulties connecting to the Slave, if you get a "White Screen" when viewing the Slave, or you get problems when File Manager is using network drives on other PCs or sharing drives on the Slave PC.

The SESSIONS and NCBS values are stored in the PROTOCOL.INI file, [NETBEUI] or [MS$NETBEUI] section (for WFW versions 3.11 or 3.1, respectively), and they can also be changed using a text editor such as DOS Edit or Windows Notepad. Any changes will not take effect until the next reboot.

The following example shows the NetBEUI section from a WFW 3.11 PROTOCOL.INI:-

```
[NETBEUI]
DriverName=netbeui$
SESSIONS=10
NCBS=12
BINDINGS=MS$EWTBTPB
LANABASE=0
```

B.3.3 Windows for Workgroups on PATHWORKS

PATHWORKS versions 5.0a and 5.1 include support for Windows for Workgroups v3.11 (only). When configured correctly, they can provide real-mode DECnet or NetBEUI NetBIOS transports which are both suitable for *PC-Duo* DOS Slave and Control programs.

The normal Windows NET START command loads the NDIS Protocol Manager, the PATHWORKS NDIS Datalink DLLNDIS.EXE, and the network card driver (e.g. EWRK3.DOS) and binds them together. This should be followed by a call to the PATHWORKS startup batch file STARTNET.BAT. This will load up the selected NetBIOS transports (e.g. NetBEUI and or DECnet). Once STARTNET.BAT has completed, the *PC-Duo* DOS NetBIOS Slave or Control programs can be used.

It is usually convenient to load the DOS NetBIOS Slave by calling STARTSLV.BAT from the [User Commands] section of the PATHWORKS template (see Section 2.3 for further details).

PATHWORKS 5 TCP/IP: The PATHWORKS versions 5.0, 5.0a, and 5.1 TCP/IP NetBIOS implementations are not suitable for *PC-Duo* operation. The NetBIOS emulation is not sufficiently complete or accurate.

The DOS Machine Name is not set in this configuration, so an alternative mechanism must be found to provide a default name for the DOS Slave and Control programs. See Section B.6 and Section B.8 for further details.

PATHWORKS 4: PATHWORKS 4 does not support WFW. Additional setup steps may be required for correct *PC-Duo* operation. See Section B.3.5 for further assistance.

B.3.4 Windows for Workgroups on Microsoft TCP/IP

Microsoft has both real-mode and protected-mode TCP/IP implementations. The real-mode TCP/IP is fairly old, has not been tested here, and is not recommended for use with *PC-Duo*.

The protected-mode TCP/IP, (code name Wolverine) is new and provides a protected-mode TCP/IP only. This TCP/IP does not provide a real-mode network, so there is no network at all outside Windows. Unfortunately, this means that it cannot be used with the DOS NetBIOS Slave TSR. However, it can be used with the Windows NetBIOS Control, provided that particular attention is paid to setting the Domain Name, Subnet Mask, and NetBIOS ScopeID, so that Controls and Slaves all use the same values.

See Section 2.6.7 for examples of parameter settings used with PATHWORKS TCP/IP.

B.3.5 Windows for Workgroups with Other Networks

If you run Windows over an unknown third-party real-mode network, the NetBIOS may not be able to respond to incoming network packets unless Windows is configured for a real-mode network. If you have difficulty making connections to Slaves, or experience reliability problems with *PC-Duo* running in a WFW environment, you may find that the following Windows setup option corrects the problem. This is done by adding the following line to the [386Enh] section of the WFW SYSTEM.INI file:-

```
[386Enh]
   .
   .
   .
v86modeLANAs=0
```

Here, the number 0 represents the NetBIOS Adapter Number for the real-mode network. WFW knows that it must switch to real-mode before it can respond to requests *from* that network, or process requests *for* that network.

This option is not needed with WFW's NetBEUI, provided the WFW has been set up for real-mode and protected-mode drivers (i.e. LoadRMDrivers=Yes), but it may be required with third-party real-mode NetBIOS networks such as the PATHWORKS 4 DECnet and TCP/IP stacks.

When multiple real-mode transports have been loaded, additional Adapter Numbers can be provided, in a comma-delimited list:-

```
v86modeLANAs=1,2
```

Here, NetBIOS Adapter Number 0 is a protected-mode transport (such as the normal NetBEUI VxD), so it is not included in the list. Adapters 1 and 2 are provided by unknown real-mode transports (e.g. PATHWORKS 4 DECnet and TCP/IP), so they are listed.

PATHWORKS 5: PATHWORKS 5.0a introduced official support for Windows for Workgroups 3.11. When versions 5.0a or later are used, Windows'

Network Setup knows that the NetBIOS transports are real-mode (indicated by SYSTEM.INI [network drivers] LoadRMDrivers=Yes), so it is not necessary to use the v86modeLANAs option.

B.3.6 Setting the NetHeapSize

The normal *PC-Duo* installation will increase the current NetHeapSize value to 24 if it is lower. *PC-Duo* will operate satisfactorily with this value, but other network applications may also need to use the Windows NetHeap. The File Manager and Mail applications typically require NetHeap, so it is likely that *PC-Duo*'s minimum value of 24 will not be sufficient. Increase the NetHeapSize to 36, more if you run lots of network applications simultaneously or receive "Insufficient NetHeap" warnings from Windows. The NetHeapSize value is stored in the [386Enh] section of the SYSTEM.INI file. It can be changed using a text editor such as DOS Edit or Windows Notepad. Values are specified in increments of 4 kilobytes.

B.4 Starting the Network

The Windows Network is initialised using the NET START command which is normally placed in the PC's AUTOEXEC.BAT. This is only used to initialise some low-level data structures, typically loading the NDIS Protocol Manager (PROTMAN.DOS) and the configured NDIS card driver (e.g. EWRK3.DOS). NET START will not load the network transport unless Windows has been configured for a real-mode network. However, a real-mode NetBEUI can be loaded if the NET START command is changed to NET START NETBEUI. This command loads a real-mode NetBEUI transport stack which is available outside Windows.

B.4.1 PATHWORKS 5 Transports

If WFW has been configured for PATHWORKS 5.0a or 5.1, then NET START will load the NDIS Protocol Manager, the card NDIS driver, and the NDIS Datalink DLLNDIS.EXE. These components are then bound together. NET START should be followed by a call to the PATHWORKS startup batch file STARTNET.BAT. This loads the real-mode NetBIOS transports (e.g. the DECnet NetBIOS DNP.EXE).

B.5 Determining Adapter Numbers

NetBIOS Adapter Numbers are normally defined in the PROTOCOL.INI file. For NetBEUI, it is specified in the LANABASE=*n* line in the [NETBEUI] or [MS$NETBEUI] section (for WFW v3.11 or 3.1, respectively).

The following example shows the NetBEUI section from a WFW 3.11 PROTOCOL.INI:-

```
[NETBEUI]
DriverName=netbeui$
SESSIONS=10
NCBS=12
BINDINGS=MS$EWTBTPB
LANABASE=0
```

NetBIOS Adapter Numbers are in the range 0 to 9. The example above uses adapter number 0.

Check the LANABASE value for the transport that you want to use. If this is not 0, it will be necessary to provide a /A*n* Alternate NetBIOS Adapter option when loading the DOS Slave and either Windows or DOS Controls. The DOS Slave is most readily configured by adding the following lines to the configuration file STARTSL1.BAT:-

```
REM Set the Slave NetBIOS Adapter using PCDOPTS
SET PCDOPTS=/A2
```

B.5.1 PATHWORKS 5 Adapter Numbers

PATHWORKS 5 NetBIOS normally determine their adapter numbers automatically when they are loaded. The first transport (e.g. NetBEUI) loads as Adapter 0, and any subsequent ones see that Adapter 0 is in use and they use Adapter 1, 2, and so on. When a particular transport requires a specific adapter number, this is specified using the /LANA:*n* command line option. The commands are listed in the [Network] section of the active template file, with the command line options defined in the [Keywords] section.

B.6 Defining the Slave and Control Names

Once the real-mode network has been started, the DOS Slave can be loaded. It will need a Slave *name* parameter. The most convenient way to do this for most NetBIOS networks is to use the DOS Machine Name. However, WFW does not set the DOS Machine Name until Windows starts, so it is necessary to obtain a name for the DOS Slave from another source. The SETMNAME program can be used to set the DOS Machine Name (refer to Section 2.8 for further details), but the most convenient method is to modify the *PC-Duo* installation process so that it takes the ComputerName value from the SYSTEM.INI [network] section and uses it to provide default names for the DOS Slave and Windows Control programs.

In the case of the DOS Slave, the Slave configuration file STARTSL1.BAT defines the Slave name through the PCDCMD environment variable. For example:-

```
REM Setting Slave Name to WFW311
SET PCDCMD=WFW311
```

Setup specifies the Windows Control's name through the command line of the Control program's icon.

See Section A.2 in Appendix A for further details and examples of how to set this up.

B.7 Starting the DOS Slave

Assuming that WFW has been set up for NetBEUI, the *PC-Duo* DOS Slave can be loaded outside Windows by making the following changes to the AUTOEXEC.BAT. Change NET START to NET START NETBEUI, and add a call to STARTSLV.BAT:-

```
REM Initialise the network and start up the NetBEUI transport
NET START NETBEUI
REM Now we can call STARTSLV to load the PC-Duo Slave
IF EXIST C:\PCDUO\STARTSLV.BAT CALL C:\PCDUO\STARTSLV.BAT
```

When WFW has been configured for a real-mode transport such as PATHWORKS 5 DECnet, the following code can be used:-

```
REM Initialise the network
NET START
REM Start up PATHWORKS
IF EXIST C:\PW\STARTNET.BAT CALL C:\PW\STARTNET.BAT
REM Now we can load the PC-Duo Slave
IF EXIST C:\PCDUO\STARTSLV.BAT CALL C:\PCDUO\STARTSLV.BAT
```

B.8 Loading a Control

If the DOS Control program is used, it will need to be provided with a Control Name. This can be obtained from the DOS Machine Name, if that has been set. As WFW does not define a DOS Machine Name until Windows starts, it may be necessary to arrange for the name to be set during the Slave startup. This can be done using SETMNAME:-

```
REM Setting Slave Name to WFW311
SET PCDCMD=WFW311
%PCDDIR%\SETMNAME %PCDCMD%
```

Here, the SETMNAME command has been added to an already-configured STARTSL1.BAT file (see Section B.7 and Section B.6).

The DOS Machine Name is set automatically by Windows, using the ComputerName value in the SYSTEM.INI [network] section, so the Windows Control programs can use this value.

Once again, if the NetBIOS Adapter Number is not 0, this will need to be provided via the Control command line /A*n* option.

The Windows Control command line can be modified to provide the Control Name and/or Adapter Number. The steps needed to do this are described in Section 4.2.1.

B.9 Starting Windows for Workgroups

If a *PC-Duo* Control makes a connection to a PC that is not running Windows (i.e. it is at the DOS prompt) and then starts Windows, the Control user will not see the WFW logon screen. The screen will appear blank (either black or white) until the logon sequence has been completed. This is a Windows security feature which ensures that the logon is actually made by a local user.

You can bypass the logon screen if AutoLogon is set to "No". This value, which defaults to "Yes", is stored in the SYSTEM.INI [network] section. It can be changed with the Network icon in Control Panel, by clearing the Log On at Startup option. In WFW 3.11, this is located in the Startup Settings Dialogue Box. Alternatively, the *PC-Duo* Windows Control File Editor can be used to check and modify the value in the Slave's SYSTEM.INI before the Slave actually starts Windows.

The logon screen also delays the loading of the *PC-Duo* Windows Slave. This has the additional effect of preventing a viewing Windows Control from seeing the Windows Screen contents.

PC-Duo can connect to a PC which is already running WFW with no such restrictions.

C PC-Duo Operation on IPX Networks

This Appendix contains notes on the operation of *PC-Duo* over IPX networks.

C.1 General Notes

A number of problems stem from the use of monolithic IPX drivers (the old IPX.COM file generated by the WSGEN process). Novell stopped supporting these drivers a long time ago, when NetWare switched over to using ODI drivers and IPXODI. We recommend that you do the same. The older monolithic IPX is not reliable, and does not implement any new features.

The ODI configuration uses LSL, your ODI driver or MLID (e.g. NE2000.COM), and IPXODI. Current versions of these files can be obtained from Novell's NetWire support forum on CompuServe (!GO NOVFILES and download DOSUP9 and WINUP9 kits).

C.2 IPSLAVE Startup

The IPX Slave can encounter problems when starting up if the monolithic IPX is used. These typically result in the PC hanging after IPSLAVE displays "Initialising....". Check the version of IPX and the type of card used.

C.3 WIPCNTRL Startup

The Windows IPX Control requires an up to date VIPX.386 IPX VxD. If this is not loaded on the PC, the Control will exit after reporting "IPX not loaded". Make sure that Windows is loading the NetWare VxDs—the SYSTEM.INI [386Enh] network= line should contain vipx.386 and vnetware.386. You should be using the VIPX.386 from the WINUP9 kit from NetWire (see Section C.1), LSL, an ODI driver, and IPXODI.

C.4 IPX Addressing

On IPX networks, the Control has to establish the IPX addresses of any Available Slaves before it can connect to them. This is achieved using the normal "Connect" or "Manual Connect" menu options, but the situation is complicated on a multi-network installation.

Each IPX node has an IPX address. This comprises a network number followed by a network address. The network number is a 4-byte number. The local network is number 00000000. The network address is a 6-byte value (e.g. an Ethernet address). IPX address are written down as nnnnnnnn-aaaaaaaaaaaa, where nn.. is the network number, and aa.. is the network address.

Multiple networks are interconnected by Servers with multiple network cards or via dedicated (e.g. X.25 or ISDN) routers. These are also nodes, and they all have addresses on the local network.

A message that is intended for a PC on another network is sent via one of these local addresses. It has to contain the correct IPX address (network number and node number) for the destination, so that the Router can forward it to the correct remote network.

When the IPX Control starts up, it has to determine which networks are accessible. It does this by broadcasting a "Nearest Server" request on its local network. This is sent to IPX address 00000000-FFFFFFFFFFFF (i.e. network address FFFFFFFFFFFF on the local network), socket 0x452, servertype 4. If a Server does not respond, a similar packet is sent to the nearest Router (mostly the same, but with servertype 0x24).

If a reply is received, the Server or Router is then asked for all the network numbers that it knows about on the IPX "internetwork". All Servers and Routers should have this information, and the Control uses it to build a list of the accessible networks.

SPX Protocol: **This exchange is performed using the SPX protocol, so SPX support is required to find Slaves on other networks. This is normally the case, but it might have been removed if:**

- **IPXODI has been loaded with the A option (to save memory);**
- **Windows for Workgroups' default IPX support (NWLINK.386) is being used.**

See Section B.3.1 for further details on configuring Windows for Workgroups for IPX support.

If no reply is received, the Control eventually times out, and assumes that all Slaves must be on the local network. This means that the Control will take longer to start up if there is no server available.

When the Control is looking for all available Slaves (Connect), or it is looking for a specific name (Manual Connect), it first broadcasts a "GetLocalTarget" query for each network number found above. This should return the local network address for the appropriate Router. There is no need to do this for network 0, of course. When the local address for each Router is obtained, another broadcast is sent to IPX address nnnnnnnn-FFFFFFFFFFFF, socket 0xFC81 (allocated to PC-Duo by Novell). When a Slave replies to this broadcast, the Control is told what the Slave's IPX address actually is. It can then send an IPX connect request to this address.

D Changing the Modem Setup

PC-Duo uses one of the files listed in Table D–1 when initialising the modem.

Table D–1 Modem Configuration Files

Filename	Purpose
CONTROL.MDM	For the modem attached to the Control PC
BRIDGE.MDM	For the modem attached to the Bridge PC

These files contain modem commands and may be edited using a text editor such as Edit or Notepad. The Control Modem File is more readily edited using the [Edit] option of the Windows Control Configure Menu, Select Modem option. See Section 6.6.5 for further details.

The only essential settings in the modem file are:-

- The BRIDGE.MDM file must contain an initialisation string to set the modem to autoanswer
- XON/XOFF or Software Flow Control must be disabled

The most frequent causes of failure are that the modem has not been turned on or that XON/XOFF Flow Control has not been disabled.

For more reliable or faster performance you should also set the following:-

- Enable RTS/CTS or Hardware Flow Control
- Enable constant speed or speed buffering mode and run the PC-to-modem speed at a higher rate than any possible modem-to-modem speeds
- Disable data compression (unless you are transferring large volumes of uncompressed data)

In addition you may find the following improve also performance:-

- Disable error correction
- Disable fall forward and fall back if this is supported by your modem
- In most instances, the entry for Hayes will work. However the settings may not be optimal for your configuration
- As usual, the best advice is to experiment with different settings to find the one best suited to your hardware and particular needs

D.1 Creating Modem Files

When a Bridge initialises or a Control places a call, it looks in the appropriate modem file (i.e. BRIDGE.MDM or CONTROL.MDM) for the selected Modem name and sends the sequence of initialisation strings defined in the section for that modem.

These modem files can be edited to create Modem Initialisation Strings for any type of modem. This approach means that you do not require special modem drivers to support your modem, provided that you know the command set for it.

Both modem files contain a [TEMPLATE] modem that you can modify to insert the commands for your own modem. The modem file format is described next.

Control Modem File

Control Modem Files are structured as follows, with sections associated with each type of modem:-

```
@[MODEM]    The name for this modem configuration
@[DIAL]     This section contains the commands for dialling
@[HANGUP]   This section contains the commands for hanging up the phone
```

When you initiate a call, *PC-Duo* reads the file, looking for [MODEM] lines. It checks the modem name against the name specified when you selected the Modem to use. When it finds the correct one, it moves to the [DIAL] Section for that modem and works its way down the list of commands. These may be modem strings or *PC-Duo* modem commands. See Section D.2 for more details on *PC-Duo* modem commands.

Some commands are essential if *PC-Duo* is to work. These are shown in Table D–2.

Table D–2 Essential Modem Commands

Command	Example	Explanation
Modem Reset	AT&F	Puts the modem into a standard state
Initialise	ATV1E1	Enables responses and command echo
Disable XON/XOFF	AT&H3	Prevents Software Flow Control
Dial Command	ATDT	Specifies the prefix to be used before the phone number. ATDT is for tone dialling

Refer to Section 6.6.5.1 when the Control's Edit Modem Configuration dialog is used, or to the CONTROL.MDM file itself for further information and more specific examples.

Bridge Modem File

Bridge Modem Files are structured as follows, with sections associated with each type of modem:-

```
@[MODEM]    The name for this modem configuration
@[INIT]     This section initialises the modem
@[TERM]     This section resets the modem
```

The Bridge Modem File is simpler that the Control version, and requires only that the modem be reset and set to Autoanswer, with XON/XOFF disabled.

Refer to the BRIDGE.MDM file for examples.

D.2 Modem File Commands

The modem files have their own set of commands that can be used by advanced users to create a specific script of commands to be sent to the modem in remote communications applications.

The full list of modem file commands is shown in Table D–3.

Table D–3 Modem Command Syntax

Command	Description
@a(*nn*)	Abort if specified response IS received from the modem
@c(*nn*)	Wait for connect response (abort if anything else received)
@d(*nn*)	Wait for Data Carrier Detect signal from modem
@f	Flush any buffered response from the modem
@h(*nn*)	Hangup (drop DTR for specified timeout)
@i	Ignore specified response
@k(*nn*)	Wait for a keypress (DOS Control only)
@p(*nn*)	Pause
@q	Quiet—do not echo modem responses to the screen
@v	Verbose—echo modem responses to the screen
@V	Very verbose—echo modem commands and responses to the screen
@w(*nn*)	Wait for specified response (abort if timeout)
@#	Inserts the number to be dialled
@@	Sends a literal '@'
@;	Sends a literal ';'

All commands except "f", "i", "q", "v", "V", "#", "@", and ";" must be followed by a timeout value. This is a decimal integer, representing the timeout in units of 1/18th of a second. This is shown as *nn* in the table above. The timeout value must be enclosed in parentheses (i.e. (*nn*)).

For example:

```
@[MODEM] Hayes compatible
; $EZM: "", "AT&F", "OK", "ATV1E1", "", "", "ATDT", "CONNECT", "+++", "ATH0Z"

@[DIAL]           ; Dial section from CONTROL.MDM
@v                ; Set verbose mode
@f                ; Flush the modem buffer
AT&F              ; Reset to factory configuration
@w(54)OK          ; Wait for OK, with a three second timeout
ATV1E1            ; Initialise, display status, echo commands
@w(54)OK          ; Wait for OK, with a three second timeout
@p(9)             ; some modems need a delay here
ATDT@#            ; Dial the number (Tone Dialling, use ATD@# for pulse)
@w(18)ATD         ; Wait for ATD, with a one second timeout
@c(810)CONNECT    ; Wait for CONNECT, with a 45 second timeout
@w(27)            ; Wait for long enough to read the message
```

```
@[HANGUP]
@q                ; Set quiet mode
ATH0Z             ; Hangup and reset the modem
@a(24)OK          ; If OK seen within one second, abort -- all done
+++@p(24)         ; Otherwise, send +++ and wait another second
@w(18)OK          ; Wait for OK, with a one second timeout
ATH0Z             ; Hangup and reset the modem
@a(18)OK          ; If OK seen within one second, abort -- all done
@h(18)            ; Drop DTR for 1 second as a last resort
```

These commands are from the Hayes-compatible section of the CONTROL.MDM file.

E Using the Password Calculator

Slave passwords are always encrypted. This allows the encrypted password to be stored in a readable text file (e.g. STARTSLV.BAT) or in the PC's memory without compromising the security of the PC. Any Control user wishing to connect to a Slave with a password must enter the *unencrypted* password.

Rules for an Un-Encrypted Password

- An un-encrypted password can contain any printable characters
- The maximum length of an un-encrypted password is 9 characters
- All Password characters are significant—one space is different to two spaces

Passwords can be encrypted using the CALCPSW program. This is run from the DOS prompt.

```
CALCPSW [password]
```

If the password is not specified on the command line, CALCPSW will prompt for it, as follows:-

```
C:\PCDUO\>calcpsw

Calculate encrypted password for PC-Duo Slave
V1.02, Copyright (c) 1994, PCI Ltd

Enter desired password: racing123

The encrypted form of password RACING123 is: 6322564


Append the encypted value to the SLAVE command, after
the slave name, e.g.:

    SLAVE Accounts 6322564

Password RACING123 must be entered at the Control

C:\PCDUO\>
```

Note: You should use a password that is not obvious for a malicious user to guess! Do not use your name, or your daughter's name! Using a name that has to be entered *backwards*, however, or adding in some numbers, makes it much harder to guess.

F Using the Serialisation Program

PC-Duo is normally shipped as a Demonstration Kit. In this form, it is restricted to a small number of active Slaves and a short Connect time. These restrictions are removed, once the package has been purchased, by serialisation. This process writes the licence authorisation details into the serialisation file SLAVE.SER in the *PC-Duo* installation directory, normally C:\PCDUO.

F.1 Before you Start

Before you start serialisation, you should have your Product Authorisation Certificate with you. This contains the Transport Code, installation Serial Number, the Maximum number of Slaves permitted, the Licensee Name, and the *PC-Duo* Authorisation Key.

You will need to have write access to the *PC-Duo* installation directory, or you will not be able to update the serialisation file.

F.2 Running PCDSERIA

Set your current directory to the *PC-Duo* installation directory, and run the serialisation program PCDSERIA as follows:-

```
C:\>cd \pcduo
C:\PCDUO\>pcdseria
```

PCDSERIA will sign-on and prompt you for the licence information. Take care to enter the details correctly. They should be entered *exactly* as on the Authorisation Certificate.

```
Generate serial number file for PC-Duo Slave
V1.02, Copyright (c) 1994 PCI Ltd

Enter transport (0 = Any, 1 = IPX, 2 = NetBIOS):
```

Enter the Transport Code from the Authorisation Certificate. This is a number, either 0 for any transport, 1 for IPX only, or 2 for NetBIOS only.

```
Enter transport (0 = Any, 1 = IPX, 2 = NetBIOS): 0
```

Press <Return> and you will be prompted for the licence serial number. Enter the Serial Number from the Authorisation Certificate. This can be up to nine characters long:-

```
Enter serial number (upto 9 characters): VEC94001
```

Continue by entering the Maximum Slaves. This is a decimal number in the range 0 to 999:-

```
Enter max slaves (0..999, 0 = unlimited): 50
```

The next field is the Expiry Date. This is used for Evaluation and Short Term Licences. It must be entered in dd-mm-yy form (day-month-year), where the day, month, and year fields are entered as one or two decimal digits, separated by dashes:-

```
Enter expiry date (dd-mm-yy, 0 = never): 31-04-95
```

A Permanent Licence disables the Expiry Date by specifying a value of 0 (zero).

Next, you will be prompted for the Licensee Name. This is case sensitive, and must be entered *exactly* as on the Authorisation Certificate:-

```
Enter name of licensee: VECTOR NETWORKS
```

Lastly, the Authorisation Key code should be entered. This is a seven or eight digit decimal number.

```
Enter authorisation key: 77243985
```

The key code validates the previous information. If the validation succeeds, PCDSERIA will report the licence information before exiting to the DOS prompt.

```
PC-Duo License Sheet
   Transport     : 0 (Any)
   Serial number : VEC94001
   Maximum slaves: 50
   Expiry (dmy)  : 31-04-1995
   Licensee      : VECTOR NETWORKS
   Authorisation : 77243985

Output is in file SLAVE.SER

C:\PCDUO>
```

If the validation fails, PCDSERIA will report an error and will re-prompt for the correct Authorisation Key:-

```
Invalid key
Enter authorisation key: 77243985
```

If you have entered the key correctly, then the problem is probably an incorrect entry in one of the other fields. In this case, press <Control-C> to exit from PCDSERIA, and run it again. Make sure that you enter the details *precisely* as on the Certificate.

Note: The example key above is *not* valid!

F.3 After Serialisation

Successful serialisation writes a new copy of the SLAVE.SER file. If this is located on a file server, then all of the Slaves that are run from the File Server will be serialised the next time they start. If each PC has its own copy of the file, the new SLAVE.SER file will have to be copied to all of them. The *LANutil* product can be very useful for such distribution operations.

It is not normally necessary to repeat the serialisation process itself on the other PCs, unless they actually require different licence details.

G Changing the Keyboard Layout

PC-Duo allows the Control keyboard setup to be modified to suit different keyboard types and layouts. This is controlled through file CONTROL.KBD. This is a text file which can be edited to add new keyboard layout definitions, or to modify the existing definitions.

The current keyboard layout is stored in the Control configuration file CONTROL.CFG.

```
; Keyboard layout file for PC-Duo Control
;
; Format of this file is:
;   keyboard layout name
;   special key mappings
; repeated as often as desired
;
; Special key mappings take the form:
;   scancode=character scancode=character ...
; where scancode is a hexadecimal number
;   (if >= 80 hex, the SHIFTED key is mapped)

UK enhanced (102 key) keyboard
83=" 84= A8=@ 29=` A9=ª 2B=# AB=~ 56=\ D6=|
UK standard (83 key) keyboard
83=" 84= A8=@ 29=# A9=~ 2B=\ AB=| 56=\ D6=|
   .
   .
   .
```

Empty lines, and those starting with a semi-colon are ignored. The remaining lines are organised in pairs. The first line of each pair contains the layout name. This is displayed in the Control, Configure, Keyboard Layout dialogue box. The second line of each pair contains special key mappings, where a key scan code can be translated into the desired character.

Note: Many of the characters in the keyboard file are not printable here.

H Troubleshooting

Hopefully you will have few problems loading and running *PC-Duo*. However, as with any network application, this is dependent on your workstations being correctly configured. This Appendix sets out the symptoms of potential problems, and provides basic suggestions on how to tackle them.

Common problems are summarised in Table H–1, with references to the section that provides more detail, and suggested action.

Table H–1 Common Problems

Symptom	Refer To:
Applications will not load or run	Section H.1
Bridge hangs when starting Windows over Remote Comms	Section H.2
Colours are incorrect on the Control	Section H.3
Control is unable to communicate with the modem	Section H.4
It is difficult to connect to a Slave	Section H.5
Erroneous keystrokes are passed to the Slave	Section H.6
Fonts are not displayed correctly	Section H.7
Hotkeys do not appear to work	Section H.8
Keystrokes do not get through to the Slave	Section H.9
Loaded Slaves do not appear as Available Slaves	Section H.10
PC-Duo VGA Driver (PCDVGA.DRV) not installed	Section H.11
PC-Duo Virtual Device Driver (PCDVXD.386) not installed	Section H.12
Screen Updates and file transfer appear slow over remote Comms	Section H.13
Slaves disconnect unexpectedly	Section H.14
Slave hangs when starting Windows over Remote Comms	Section H.15
Slave in graphics mode (mode *xx*h)	Section H.16
You cannot see the Slave's screen	Section H.17

H.1 Applications will not Load or Run

Symptoms

When you are controlling a DOS Slave, an application will not load or run.

Possible Causes

- There is insufficient DOS memory available;
- There is a conflict between the application and the Slave;
- Another application is interfering with the Slave's software interrupt.

Possible Solutions

- Make more memory available. If possible load the Slave into Upper Memory, EMS, or XMS;
- Try using the BIOS keyboard instead of the Low Level Keyboard and vice versa;
- Use the /V option to change the Slave's Software Interrupt Vector. See Section 3.4.17.

H.2 Bridge Hangs when Starting Windows over Remote Comms

Symptoms

When connected to a DOS Slave over a *PC-Duo* Bridge, you start Windows. Whilst Windows is loading you receive the message "Unable to communicate with Bridge".

Possible Causes

When Windows is loading it stops communicating with the serial port until it has initialised. If this initialisation exceeds 60 seconds, Control assumes that the Bridge has shut down and ends the call.

Possible Solutions

You should be able to reconnect after the Windows initialisation sequence has completed. However please note that if the initialisation contains any messages that require user intervention, such as the Windows for Workgroups Login, you will not be able to do so until someone at the Slave end has made the required response.

H.3 Colours are Incorrect on the Control

Symptoms

The Colours on the Slave and the Control do not match.

Possible Causes

- You have incompatible video cards on the Control and the Slave;
- The video modes on the Slave and Control are out of synchronisation.

Possible Solutions

- If the problem is with DOS Slaves and Controls refer to the /0 option to turn off colour palette send. See Section 3.4.1 and Section 4.4.1 for further details;
- Disconnect and reconnect the Slave. This will cause the Slave to re-send Control its current video mode.

Note: If the Control and Slave are at different colour resolutions, for example a 16 colour Control is watching a 256 colour Slave, then *PC-Duo* has to convert those colours. It is not always possible to find an exact match so an approximation is made.

H.4 Control is Unable to Communicate with the Modem

Symptoms

This message is displayed when a Control is dialling.

Possible Causes

- The modem is not turned on;
- The modem is not connected to the right COM port;
- The modem has entered a "Hung" state;
- The serial port or an internal modem is using a non-standard interrupt.

Possible Solutions

- Check that the modem is turned on;
- Check that the specified COM port is correct, and the cables are connected;
- Turn the modem off and on, and then reload the Bridge or Remote;
- Check the Modem File;
- Check and reset the port interrupt and address in Windows, Control Panel, Ports.

Windows: If the above message occurs when trying to dial from a Windows Control, the modem may have been reset by Windows. Turning the modem off and on will reset it. You should then review your initialisation strings and the modem's default power-up configuration to ensure that it is providing RTS/CTS or Hardware Flow Control.

H.5 It is Difficult to Connect to a Slave

Symptoms

It sometimes takes a few attempts to Connect to a Slave, but operation is otherwise reliable.

Possible Causes

- The Slave is running a Windows application which uses Critical Sections, and the TimerCriticalSection value in SYSTEM.INI [386Enh] is too high. If this is the case, the Slaves will appear to freeze for several seconds when the Control starts looking for Available Slaves;
- A Real-Mode NetBIOS, other than NetBEUI, is being used under Windows for Workgroups, and the Windows configuration is incorrect.

Possible Solutions

- Reduce the TimerCriticalSection value (e.g. from 10000 to 1000);
- This is often corrected by setting the "v86modelanas" option in Windows' SYSTEM.INI. See Section B.3.5 for more details.

H.6 Erroneous Keystrokes are Passed to the Slave

Symptoms

When Controlling a Slave erroneous characters appear when you type at the Control keyboard.

Possible Causes

- The application at the Slave is translating the keystrokes;
- The Slave keyboard has been set to an incorrect state;
- You are using the wrong keyboard layout at the Control.

Possible Solutions

- Try using the BIOS keyboard instead of the Low Level Keyboard and vice versa;
- Try pressing and releasing the <CTRL> key at both the Control and Slave. If this doesn't cure the problem, try disconnecting and reconnecting;
- Select the correct keyboard layout for Control from the Configure Menu.

If all else fails, unload and reload the Slave and ascertain if the problem is repeatable. If so submit a problem report to your supplier.

H.7 Fonts are not Displayed Correctly

Symptoms

The fonts on the Slave and Control screens do not match.

Possible Causes

The Slave is using a screen font that is not available on the Control. Control will use the nearest match that is available to the Windows Font Mapper, but this may have significantly different metrics to the Slave's font.

This is particularly likely with applications such as terminal emulators that have their own screen fonts.

Possible Solutions

The solution is to make sure that whatever screen fonts are used on a Slave are also available on the Control. Find out which fonts are being used on the Slave, copy the files into the \WINDOWS\SYSTEM directory on the Control, and then use Windows Control Panel to install them on the Control. *PC-Duo* will them be able to use them.

Examples

Reflection 2 for Windows uses the following screen fonts:-

Table H–2 Reflection Screen Fonts

Font	File	WIN.INI [Fonts] Line
r_ascii	R_ASCII.FON	r_ascii=R_ASCII.FON
r_graph	R_GRAPH.FON	r_graph=R_GRAPH.FON
r_multi	R_MULTI.FON	r_multi=R_MULTI.FON
r_tech	R_TECH.FON	r_tech=R_TECH.FON

KEAterm for Windows uses the following screen fonts:-

Table H–3 KEAterm Screen Fonts

Font	File	WIN.INI [Fonts] Line
KEAterm (Set #1)	KTEGA.FON	KEAterm (Set #1)=KTEGA.FON
KEAterm (Set #2)	KTVGA.FON	KEAterm (Set #2)=KTVGA.FON

Note: Dynamically-loaded fonts are normally loaded from the application directory. If the application is present on the Control, it is not necessary to copy the fonts into the \WINDOWS\SYSTEM directory. Control Panel can install them from the application directory, provided the application is not active at the time.

If the font files are actually in use on the Slave, Windows may have the font files open for exclusive access and you will not be able to use *PC-Duo* File Transfer to copy them onto the Control. You may have to stop the application, or even Windows, on the Slave to get access to the font files.

MS-Word: Microsoft Word v2 uses its own font—MS Dialog—for the drop down boxes in the toolbar (and elsewhere). This font cannot be installed by Control Panel. To get it to display correctly, copy DIALOG.FON from the \WINWORD directory on the Slave to the \WINDOWS\SYSTEM directory on the Control, and add the following line to the [Fonts] section of WIN.INI:

```
[Fonts]
   .
   .
   .
MS Dialog=DIALOG.FON
```

If you know the font and file names you can install them by copying the font file(s) and editing WIN.INI directly. In general though, it is safer to install fonts using Windows Control Panel.

H.8 Hotkeys do not Appear to Work

Symptoms

You press the Hotkey combination but nothing happens.

Possible Causes

You have re-mapped the Hotkey combination to a different setting or one that is already used by another program.

Possible Solutions

Change the Hotkey combination from the Configure menu.

If you are using a Windows Control to view a Slave in full screen mode you can access the *PC-Duo* Menus by pressing the PAUSE key followed by the ALT Key. They will appear as drop downs at the top of the screen.

H.9 Keystrokes do not get Through to Slave

Symptoms

You can see the Slave's screen but keystrokes at the Control do not appear to be passed through.

Possible Causes

- You are watching instead of sharing or Controlling the Slave;
- The application at the Slave is "Filtering out" the keystrokes;
- The Slave has become locked out;
- The Slave keyboard has been set to an incorrect state.

Possible Solutions

- Switch to Share or Control mode;
- Try using the BIOS keyboard instead of the Low Level Keyboard and vice versa;
- Disconnect and reconnect the Slave;
- Try pressing and releasing the <CTRL> key at both the Control and Slave. If this doesn't cure the problem, try disconnecting and reconnecting.

If all else fails, unload and reload the Slave and ascertain if the problem is repeatable. If so please submit a problem report to your supplier.

H.10 Loaded Slaves do not appear as Available Slaves

Symptoms

Workstations that you know have the Slave loaded are not listed as available on the Control.

Possible Causes

- The Slave is running a Windows application which uses Critical Sections, and the TimerCriticalSection value in SYSTEM.INI [386Enh] is too high. If this is the case, the Slaves will appear to freeze for several seconds when the Control starts looking for Available Slaves;
- Internal Bridging has not been enabled on a NetWare File Server with multiple network cards;
- IPXODI has been loaded with the A option to disable SPX support;
- Windows for Workgroups is not correctly configured for IPX/SPX;
- Network bridges have been configured to filter out broadcasts.

When a NetBIOS Control is building a list of Available Slaves it broadcasts a message asking all Slaves to identify themselves. It then waits for about 12 seconds for any responses. Slaves on the same network segment as the Control should always receive the broadcast. The broadcast may not get through to Slaves that are on different network segments. If the broadcasts are not passed through, or it takes too long for the Slaves' responses to get back, they will not appear on the Control's list of Available Slaves.

IPX Networks: *PC-Duo* operation on IPX networks is more complex. Refer to Appendix C for further details.

Possible Solutions

- Reduce the TimerCriticalSection value (e.g. from 10000 to 1000);
- Enable Internal Bridging on the NetWare File Server (i.e. run ROUTE.NLM);
- Load IPXODI without the A option;
- Configure Windows for Workgroups correctly for IPX/SPX;
- Use Manual Connect to address the Slave directly, or reconfigure the network routers and bridges to pass broadcasts.

Internal Bridging: On versions of NetWare up to 3.11, Internal Bridging is referred to as such. Look also under ROUTE.NLM, the NetWare Loadable Module responsible for Internal Bridging. On version 3.12 and later, Internal Bridging has been removed into the separate NetWare Multiprotocol Repeater layered product.

Routed IPX Networks: See Section B.3.1 for further information on setting up Windows for Workgroups for correct operation on routed or multi-segment IPX networks.

H.11 PC-Duo VGA Driver (PCDVGA.DRV) Not Installed

Symptoms

You start Windows on a Slave, or start a Show on a Windows Control, and this message appears.

Possible Causes

- Windows Setup has changed the display.drv value in SYSTEM.INI;
- The *PC-Duo* Slave software has not been installed on this PC;
- The Windows Slave cannot "see" the PCDVGA.DRV Windows Driver.

Possible Solutions

- Run the "Reinstall after Windows Setup" program from the *PC-Duo* group window;
- Windows Show requires the Windows Slave software to be installed on the Control PC as well as the Slaves. Install the *PC-Duo* Windows Slave software on the Control, then stop and re-start Windows;
- Check your memory configuration. This sometimes happens when EMS memory is being used. Disable EMS memory, and try again.

H.12 PC-Duo Virtual Device Driver (PCDVXD.386) Not Installed

Symptoms

You start Windows on a Slave, or start a Show on a Windows Control, and this message appears.

Possible Causes

- The *PC-Duo* Slave software has not been installed on this PC;
- The Windows Slave cannot "see" the PCDVXD.386 Device Driver;
- The device=*path*\PCDVXD.386 line has been removed from SYSTEM.INI, [386Enh] section.

Possible Solutions

- Windows Show requires the Windows Slave software to be installed on the Control PC as well as the Slaves. Install the *PC-Duo* Windows Slave software on the Control, then stop and re-start Windows;
- Check your memory configuration. This sometimes happens when different versions of EMM386.SYS and HIMEM.SYS are used. Make sure that the versions match (e.g. both from DOS 6.2), and try again;
- Reinstall the Windows Slave software or correct the SYSTEM.INI settings, and try again.

H.13 Screen Updates or File Transfer Slow over Remote Comms

Symptoms

After allowing for the speed of the link, updates and file transfer are slower than would be expected. If you have an external modem you may notice pauses of two to three seconds between sending and receiving data as indicated by the TX and RX lights.

Possible Causes

- Poor line quality;
- The modem is receiving data faster than it can pass it to the PC. Characters are therefore being lost and Control is having to request the Slave to re-send them;
- The PC is sending data to the modem faster than the modem can pass it on. The modem is unable to buffer the overflow and again characters are lost;
- The modems themselves may be incompatible.

Possible Solutions

- Disconnect and re-dial;
- Reduce the Baud rate between the PC and the modem;
- Enable RTS/CTS or Hardware Flow Control on the modem;

- Try to use modems from the same manufacturer at each end.

Note: The PC-to-modem baud rate is an important figure. If this is set too high or too low then the modem may not be able to keep up with the PC or vice versa and data will be lost. This is one of the most frequent causes of communication failures. We recommend the use of 16550 UARTS in the PCs, especially with Windows. Unlike the more common 16450, these UARTS have a 16 character buffer and can therefore run at higher speeds without losing data. High speed serial port cards can also produce significant performance improvements.

H.14 Slaves Disconnect Unexpectedly

Symptoms

You have a group of Slaves connected during a Control session but they intermittently disconnect with the message "*slavename* has disconnected".

Possible Causes

The Control maintains contact with the Slave by sending it 'tickle packets'. If the Slave does not receive a packet every 30 seconds it assumes that the Control has "gone away" and disconnects so that it will be available for other Control users.

This situation may occur if the Control is too busy to maintain normal contact with the Slave or has insufficient network resources available.

An example of this might be where the Control was sharing a Slave running a Windows Show (which involves almost constant screen updates), whilst at the same time communicating over the network as a Windows for Workgroups (WFW) Server.

Possible Solutions

As a rule you should find that you are able to reconnect to the Slave. However there are a number of ways in which you might be able to make the connections more reliable.

- Increase the Number of NCBs available. For Windows for Workgroups's NetBEUI, this value is stored in the PROTOCOL.INI file. It should be at least 24, but if you are also loading a Bridge on the same PC, you should use at least 30. Increase the value, in steps of 4, to determine the minimum value that provides reliable connections;
- Increase the NetHeapSize (In the [386Enh] Section of SYSTEM.INI) on the Control and Slave. The normal *PC-Duo* installation increases this value to 24, but workstations that use a lot of network resources may need a higher figure. Increase the value, in steps of 4, to determine the minimum value that provides reliable connections.

H.15 Slave Hangs when Starting Windows over Remote Comms

Symptoms

When connected to a DOS Slave over a PC-Duo Bridge you start Windows. Whilst Windows is loading you receive a message that the Slave has disconnected.

Possible Causes

When Windows is loading it stops communicating with the serial port until it has initialised. If this initialisation exceeds 30 seconds Control assumes that the Slave has shut down and ends the connection.

Possible Solutions

You should be able to reconnect after the Windows initialisation sequence has completed. However please note that if the initialisation contains any messages that require user intervention, such as the Windows for Workgroups Login, you will not be able to so until a user at the Slave has made the required response.

H.16 Slave is in Graphics Mode (mode *xx*h) ... Please Wait

Symptoms

You start Windows on a Slave, or connect to a Slave that is running Windows, and you see the "If starting Windows, please wait..." message, but the Windows screen does not appear.

Possible Causes

For some reason, the Windows Slave program, WSLAVE.EXE, has not been loaded. This can be caused by a number of conditions:-

- The *PC-Duo* Windows Slave software has not been installed on the Slave;
- The Windows Slave cannot "see" the DOS Slave's software interrupt;
- The Windows drivers (PCDVGA.DRV and PCDVXD.386) are not loaded;
- A Windows pop-up, such as a file server auto-connect dialogue, is blocking the execution of WSLAVE;
- A DOS Slave is using an unrecognised display mode.

Possible Solutions

- Install the Windows Slave software, stop and re-start Windows;
- Check the DOS Slave's Software Interrupt setting;
- Check the Windows System files SYSTEM.INI and WIN.INI for *PC-Duo's* changes (see Section 2.1.1).
- Try to avoid running any Windows pop-ups, as they may prevent WSLAVE from loading;
- Note the display mode (mode *xx*h). Try again using a DOS Control.

H.17 You Cannot see the Slave's Screen

Symptoms

Keystrokes get through but you cannot see the Slave screen. The Slave screen comes across as a "White Screen" at the Control.

Possible Causes

- The video modes on the Slave and Control are out of synchronisation;
- You are using Windows for Workgroups (WFW), but there are insufficient network resources (e.g. NCBS) available for *PC-Duo's* network requests.

Possible Solutions

- Disconnect and reconnect the Slave. This will cause the Slave to re-send its video mode to Control;
- Increase the network resources (NCBS particularly, when using WFW's NetBEUI). NetHeapSize in SYSTEM.INI may also need to be increased.

Error Messages

This Appendix contains messages that can be displayed by *PC-Duo*, including when it is used in a non-PATHWORKS, or multi-LAN environment. The Slave programs normally only report fatal errors when they attempt to start up. Most of these are network errors. IPX and NetBIOS errors are described in more detail in Section I.2 and Section I.3.

Errors reported by the Control programs produce a more friendly error message which is generally self-explanatory. In addition, the Windows Control programs will provide additional assistance if the Help button in the error dialogue box is pressed.

I.1 Control Error Messages

Control errors are normally reported in a dialogue box. The Windows Control displays the error message and offers one or more buttons to press to recover from the error, cancel the operation, or get help. The DOS Control requires the user to press <Enter> to acknowledge an error and cancel the operation.

Cannot communicate with (NB/IP)BRIDGE

Explanation: The Remote program on the Control was unable to establish (or subsequently lost) a link with the Bridge at the remote site. This can happen for the following reasons:-

- The Bridge program is not loaded on the remote workstation
- You are using the wrong version of the Bridge program. You must use matching IPX or NetBIOS (IP- or NB-) versions of the Bridge, Control, and Remote programs at both ends
- The modems did not connect correctly
- The PC-to-modem link at the remote site is not working
- The modems are not configured correctly
- The PC-to-modem Baud rate is set too high at one or both ends

User Action:

- Make sure that the Bridge has been loaded on the workstation attached to the modem at the remote site
- Check that matching versions of the Bridge, Control, and Remote programs are being used at both ends i.e. all IPX or all NetBIOS (NB)
- Check that the modems are connecting. They should both show On-line (Off-hook)
- Check that the modem at the remote site is initialising. The Auto Answer light should be on
- Ensure that XON/XOFF or Software Flow Control is turned off in the initialisation string. See Appendix D for details on modem configuration

- Reduce the Baud rate and try again

Note: The PC-to-modem baud rate is an important figure. If this is set too high or too low then the modem may not be able to keep up with the PC or vice versa and data will be lost. This is one of the most frequent causes of communication failures. We recommend the use of 16550 UARTS in the PCs, especially with Windows. Unlike the more common 16450, these UARTS have a 16 character buffer and can therefore run at higher speeds without losing data. High speed serial port cards can also produce significant performance improvements.

Windows: When Windows starts up, it resets the serial ports, including the PC-to-modem link. This can sometimes cause the PC-to-modem speed to be set to an inappropriate value, causing this error. Loading a Slave on the Bridge resets the link after Windows startup.

Cannot communicate with the modem

Explanation: The Remote or Bridge program is unable to initialise the modem. This can happen for the following reasons:-

- The modem is not switched on
- The modem is not connected to the right COM port
- The modem has entered a "Hung" state
- The modem file contains an incorrect initialisation string

User Action:

- Check that the modem is turned on
- Check that the specified COM port is the correct one, and the cables are correctly connected
- Turn the modem off and on and then reload the Bridge or Remote
- Check the Modem File

Windows: If this message appears when a Windows Control is trying to dial, then the modem may have been reset by Windows. Turning the modem off and on will reset it. You should review the initialisation commands in the Control Modem File (CONTROL.MDM) to ensure that it is configuring the modem correctly (e.g. for RTS/CTS or Hardware Flow Control).

Cannot connect to more than *n* Slaves

Explanation: You are trying to connect to more Slaves than are allowed by the Control. The default value is twelve Slaves.

User Action: The default value for the maximum number of Slaves that a Control can connect to simultaneously is twelve. To increase this you must re-start the Control, using the /S option (see Section 4.4.12) to specify a higher value. You can increase the number of allowed connections to a maximum value of 30.

Cannot contact phone number

Explanation: The remote number that you are dialling is not available. It may be engaged or an incorrect number. Alternatively, you may be using pulse dialling when tone dialling is required or vice versa.

User Action:

- Check that the number is correct. Try dialling it from a standard telephone hand set to confirm that the modem at the other end answers
- You can prefix the number that you are dialling with a P for pulse dialling or a T for Tone Dialling

Note: The Control Modem File assumes that tone dialling will be used for all numbers. If you have to use pulse dialling for all numbers, change the ATDT commands in CONTROL.MDM to ATDP for pulse dialling.

Cannot open file *filename*

Explanation: A file that you are trying to open, or one that is required for *PC-Duo* operation, is not accessible or has been corrupted. This can happen for the following reasons:-

- The file has been deleted
- The directory where the file is located is not on the current path
- You do not have the required access rights (e.g. you are trying to write to a read-only file)
- *PC-Duo* is not correctly installed

User Action: If the file exists, then check the its attributes. *PC-Duo* File Transfer can display and change file attributes. If the file is one that is required for *PC-Duo* operation, and the file is not present in the *PC-Duo* installation directory, then it may be necessary to re-install *PC-Duo* to correct the problem.

Cannot save Dial Directory

Explanation: You have made a change to the Dial Directory and *PC-Duo* is trying to save it, but is unable to do so. This can happen for the following reasons:-

- Your disk is full
- You have exceeded the maximum number of Dial Directory entries. This is limited to 300 entries
- The path containing the Dial Directory is not valid
- You do not have the required access rights to change the Dial Directory
- The existing Dial Directory file (CONTROL.DIR) is write protected

User Action:

- Free up disk space
- Delete some of the existing entries in the Dialling Directory
- Check that the path is still valid
- Contact your network supervisor

- Disable file protection

COM*n* is in use by another program

Explanation: You are trying to load a Bridge or Remote program but it is not able to take control of the COM port. The port is not available because it is already "claimed" by another application.

User Action: Check the serial port that you specified. If it is correct, then check for another active program which is using that port. Unload the other program or use another COM port. Make sure that you connect the modem to the correct port.

Demonstration Slave *slavename* has been deactivated

Explanation: The timeout for the demonstration Slave has been reached. The Demonstration Kit Slave will only allow a Control to remain connected for a maximum of five minutes. After this time, the Slave will de-activate itself. In this state, it will not allow further Control connections.

User Action: You must unload and reload the Demonstration Slave to re-enable it. If you are running Windows on the Slave PC, then you will have to exit Windows before you can do this.

Evaluation, Short-Term, and Permanent Keys can be obtained. Contact your supplier for further details. You could always buy a copy!

Dial Directory is full

Explanation: You are trying to add a new entry to the Dial Directory, but you have already reached the maximum of 300 entries.

User Action: Delete some of the existing entries in the Dial Directory to free up some space.

Directory *directoryname* not empty or in use

Explanation: You are in File Transfer mode and are trying to delete a directory that contains files or is locked by another network user. Similarly, you cannot delete the current default directory on Slave or Control PCs. You cannot delete a directory that is write protected or is on a write-protected drive.

User Action: If you have the required access rights to the directory, then you can check for any files being present. Delete the files and then you will be able to delete the directory. If the directory is in use, then it cannot be deleted. Try again later when the user has finished.

Disk *drivename* full

Explanation: There is insufficient space on the disk to complete the current activity.

User Action: Free up space on the disk by deleting some files, and then try again.

Error creating *directory* at slave

Explanation: An error has occurred whilst trying to create a directory in File Transfer mode. This can happen for the following reasons:-

- The directory exists already
- The name you are using is already taken by a file with the same name
- The disk is write protected
- You do not have the required access rights

User Action:

- Choose a different name and try the operation again
- Enable write access to the disk
- Contact your network supervisor

Error deleting file *filename*

Explanation: An error has occurred whilst trying the delete a file in File Transfer mode. This can happen for the following reasons:-

- The file is read only
- The disk is write protected
- Another program is using the file
- You do not have the required access rights

User Action:

- Make sure that it is permissible to delete the file then change the read-only attribute from the File Info dialogue box.
- Disable write protection on the disk
- Exit from the other program and try again
- Contact your network supervisor

Error in file *filename*.MDM at line *n*.

Explanation: The specified Modem File (either BRIDGE.MDM or CONTROL.MDM) contains an invalid command in the section for the modem that you are using.

User Action: Use a text editor to find the incorrect line in the Modem File and correct it. The number of the offending line is reported in the error message.

Error opening file *filename*

Explanation: An error has occurred opening the file. This can happen for the following reasons:-

- The file is read only
- The disk is write protected
- Another program is already using the file

- You do not have the required access rights

User Action:

- Check that the file is readable from DOS
- Enable write access
- End the other program and try again
- Contact your network supervisor

Error reading *drive*

Explanation: An error has occurred whilst trying to read from a drive. This can happen for the following reasons:-

- There may not be a disk in the drive
- The drive may be write protected
- The drive mappings may no longer be valid
- You do not have the required access rights

User Action:

- Put a disk in the drive
- Check your access rights
- Check the drive mappings
- Contact your network supervisor

Error reading file *filename*

Explanation: An error has occurred reading the file. This can happen for the following reasons:-

- The file may be corrupted
- You may not have access rights to the file

User Action:

- Check that the file is readable using another method
- Check your access rights

Error renaming *filename*

Explanation: An error has occurred whilst trying to rename a file in File Transfer mode. This can happen for the following reasons:-

- A file of that name already exists
- The name you are using is already taken by a directory of that name
- The disk is write protected
- You do not have the required access rights

User Action:

- Choose another name
- Choose another name
- Disable write protection on the disk

- Contact your network supervisor

Error writing file *filename*

Explanation: An error has occurred whilst trying to write to a drive in File Transfer mode. This can happen for the following reasons:-

- There may not be a disk in the drive
- The drive may be write protected
- The drive mappings may no longer be valid
- You do not have the required access rights

User Action:

- Put a disk in the drive
- Disable write protection
- Check the drive mappings
- Contact your network supervisor

File transfer disabled at Slave

Explanation: You are not authorised to conduct File transfers on this Slave. The Slave has been started with the /F option to disable file transfer.

User Action: Contact the user at the Slave and ask them to restart the Slave without the /F option.

If starting Windows please wait

Explanation: The Slave is currently in a graphics mode that it cannot transmit to the Control workstation. This message appears on the Windows Control screen when the Slave starts a graphics program such as Windows.

User Action: If the Slave is indeed starting Windows the message will disappear when the Windows Slave has loaded.

Note: Windows pop-ups, such as a file server auto-connect dialogue, can block the execution of WSLAVE until the dialog box is closed. The Windows Control will not be able to see, let alone respond to the dialogue. See also Section H.16.

IPREMOTE not loaded

Explanation: You are trying to use one of the remote communications options that require IPREMOTE, but the IPREMOTE program has not been loaded.

User Action: Load IPREMOTE from the DOS command line before starting Windows.

IPX not loaded

Explanation: An IPX program cannot find an IPX network. This message can appear in the following circumstances:-

- You are trying to load an DOS IPX Slave or Control, but there is no IPX network running

- You are trying to run an Windows IPX Control, and it has not found an IPX stack to attach to because Windows has not been set up to support IPX

User Action:

- Load the IPX network before starting IPSLAVE.EXE or IPCONTRL.EXE
- Configure Windows to support IPX

Windows: You can check Windows is configured correctly for IPX by examining the network line in the [386Enh] section of the SYSTEM.INI file. It should look like this:

```
[386Enh]
   .
   .
   .
network=vipx.386,vnetware.386
```

The Windows IPX Control requires vipx.386 for correct operation.

Windows for Workgroups: See also Section B.3.1 for further information on setting up Windows for Workgroups for correct operation over IPX networks.

Machine Name not set

Explanation: You are trying to load the Slave or Control using the * parameter to default the Slave or Control name to be set from the DOS Machine Name. However the DOS Machine Name has not been set.

User Action: Set the DOS Machine Name and try again.

Name *name* already in use

Explanation: Slaves and Controls must have unique names, and there is a Slave or a Control with the same name already active on the network. You are trying to start another one with a clashing name.

User Action: Start the Control or Slave with a different name. If you use the DOS Machine Name to provide default names, this error is unlikely to occur unless you try to run a second Control on the same PC. In this case, the Controls will need different names. See Section 4.2.2 for further details.

Note: A Control and a Slave can have the same name (such as the DOS Machine Name).

NBREMOTE not loaded

Explanation: You are trying to use one of the Remote Communications options that require NBREMOTE, but the NBREMOTE program has not been loaded.

User Action: Load NBREMOTE from the DOS command line before starting Windows.

NetBIOS not loaded

Explanation: A NetBIOS program cannot find a NetBIOS network. This message can appear in the following circumstances:-

- You are trying to load a DOS NetBIOS Slave or Control, but the NetBIOS network is not running
- You are trying to run a Windows NetBIOS Control, and it has not found a NetBIOS network to attach to because Windows has not been set up to support NetBIOS (or NetBEUI).

User Action:

- Load the NetBIOS network before starting SLAVE.EXE or CONTROL.EXE
- Configure Windows to support NetBIOS or NetBEUI.

Windows: You can check Windows is configured correctly for NetBIOS by examining the network line in the [386Enh] section of the SYSTEM.INI file. It should look like this:

```
[386Enh]
   .
   .
   .
network=*vnetbios,*dosnet,decpw.386
```

This is from a PC configured for PATHWORKS 5.1.

The Windows NetBIOS Control normally requires *vnetbios or vnetbios.386 for correct operation.

Windows for Workgroups: See also Section B.3 for further information on setting up Windows for Workgroups for correct operation over NetBIOS networks.

No files selected

Explanation: You are trying to do a File Transfer operation but you have not selected any files.

User Action: Select the files you want to work with and try again.

No matching files

Explanation: There are no files matching the current wildcard pattern. If you have set a wildcard pattern in File Transfer mode, there are no files matching this pattern.

User Action: Change the wildcard pattern.

No Slaves found

Explanation: There are no Available Slaves on the network whose names match the specified pattern. This can happen for the following reasons:-

- There are no Slaves available meeting the pattern
- There is a network error
- You are using the wrong version of Control

- You are looking on the wrong network

User Action:

- Make sure that Slaves have been started and you are setting a valid search pattern for connect
- Check that the network is operating correctly
- Make sure you use IPX controls for IPX Slaves and NetBIOS Controls for NetBIOS Slaves
- If you have multiple networks loaded (e.g. with Windows for Workgroups), make sure that you are running the Control on the same network (e.g. PATHWORKS DECnet, NetBEUI, TCP/IP, etc.) as the Slaves.

Note: When Slaves that you know are loaded do not appear in the listing, see also Section H.10.

NetBIOS Adapters: See Section 4.4.3, Section 3.4.2, and Section B.2 for further assistance on setting NetBIOS Adapter Numbers.

No Slaves free - please try later

Explanation: You are starting a Control from the command line using the /C option to connect to the first free Slave. However there are no free Slaves. All Slaves are currently in use.

User Action: Use the Connect command to discover which operators have the Slaves in use and ask them to free them up.

Not enough memory or *filename* not found

Explanation: There is not enough memory free to complete the current operation You have probably tried to shell out to DOS and are exceeding the available memory when loading a DOS program.

User Action: Free up conventional memory and try again. If you are not attempting a Show from the DOS Control, exit *PC-Duo* and try again.

Slave *slavename* already connected to Control

Explanation: You are trying to connect to a Slave that is already in use by another Control operator.

User Action: Contact the other Control operator and request them to release the Slave.

Slave *slavename* does not respond

Explanation: You are trying to connect to a named Slave using Manual Connect but the Slave is not Available. Either the Slave has not been loaded, you have entered an incorrect name, or there is a network configuration problem such that the Slave does not respond in time.

User Action: If the Slave is on the local network, use the Connect command to check that the Slave is available. If the Slave is on a remote network, or on a different segment of the local network, check the Server, router, or bridge configuration to ensure that the Manual Connect request is being passed through.

Note: When Slaves that you know are loaded do not appear in the listing, see also Section H.10.

Slave *slavename* has disconnected

Explanation: The Slave has disconnected. This can happen for the following reasons:-

- The Slave workstation has been turned off
- The network has failed
- The Slave's Inactivity Timeout has expired
- A Demonstration Slave has timed out

User Action:

- Check that the Slave workstation is up and running with Slave loaded
- Contact your network supervisor
- Re-connect to the Slave
- Unload and re-load the Demonstration Slave TSR, or buy a licence!

Slave *slavename* is running on this machine

Explanation: You have loaded a Slave on the Control workstation and are trying connect to it using Manual Connect.

User Action: You can connect to Slaves on *other* Control workstations but not the one you are using.

Slave *slavename* rejected the link

Explanation: The Slave has been started with the acknowledgement option /K. The user does not wish to be disturbed and has rejected your request to Connect to it.

User Action: Contact the user or try later.

Slave *slavename* unavailable (in graphics mode)

Explanation: You are trying to send a DOS Show to a Slave that is in graphics mode, possibly running Windows. Showing to a Slave when the Slave is in DOS graphics mode is not supported.

User Action: Ask the user at the Slave to exit the graphics package they are in. If the Slave is running Windows, ask the user to run Receive DOS Show to open a DOS box, or use the Windows Control Show option instead.

slavename has wrong version of SLAVE.EXE installed

Explanation: The versions of Control and Slave are not compatible.

User Action: Upgrade either the Control or the Slave to be the same version.

There are no Slaves connected

Explanation: You are to send a Message to or Select from a group of connected Slaves without first having connected to any.

User Action: Use the Connect option to connect to one or more Slaves.

There is no Slave selected

Explanation: You are trying to carry out a one-to-one operation without first having selected a Slave to work with.

User Action: Use Select to choose a Slave to work with.

Too many files to display - list truncated

Explanation: There are too many files in the current directory for Control to display.

User Action: Use the wildcard pattern to reduce the number of files listed.

Versions of (IP/NB)REMOTE and (IP/NB)BRIDGE do not match

Explanation: You are trying to establish a remote connection but the versions at either end do not match.

User Action: Use the correct version. You must use the IPX versions or the NetBIOS versions of the Slave, Bridge, Remote, and Control programs in order to establish a remote connection.

Waiting for *slave* to acknowledge

Explanation: The Slave has been started with the /K option that requires the Slave user to explicitly grant access.

User Action: Wait until the user grants access.

Warning: *filename* is too long to display it all

Explanation: The file is too long to view or edit in File Transfer mode. The maximum file size that can be viewed or edited is approximately 30K.

User Action:

- Start an Editor on the Slave and view or edit that way.
- Transfer the file back to Control and use a local editor.

Wrong password

Explanation: The Slave or Bridge has been started with password protection. You have entered the wrong password.

User Action: Ensure that you enter the *un-encrypted* version of the password.

Wrong versions of (IP/NB)REMOTE installed

Explanation: You are trying to establish a remote connection but the version of IP- or NBREMOTE that you have loaded does not match the version of Control you are using.

User Action: You must use the IPX version or the NetBIOS version of the Slave, Bridge, Remote, and Control programs to establish a remote connection. Use the correct version.

I.2 IPX Error Messages

IPX errors look like this:-

```
IPX error 0x80
```

IPX error codes are standardised by Novell. Several of the possible IPX error messages are documented here. They are reported in hexadecimal. *PC-Duo* will attempt to recover from many IPX errors, but some are fatal, and will cause the current operation to be aborted.

IPX error 0x80

Explanation: This error indicates that IPBRIDGE is not responding. It is occasionally displayed while the Control is starting up if the Bridge (or the phone line) fails at an inopportune moment.

User Action: Restart the Control and try to reconnect.

Windows: This error may occur if Windows is started on the Bridge PC. If so, wait for a few minutes to allow startup to complete, and try to re-connect.

IPX error 0x83

Explanation: This message indicates that IPBRIDGE has run out of memory.

User Action: Please report this error to your supplier.

IPX error 0xEF

Explanation: This indicates that the SPX connection table is full.

User Action: This message is very unlikely, but in the event that you see it, add the following line to the start of your NET.CFG file:

```
SPX CONNECTIONS n
```

The default value for SPX CONNECTIONS is 100.

IPX error 0xFE

Explanation: This indicates that the IPX socket table is full.

User Action: Add the following line to the start of your NET.CFG file:

```
IPX SOCKETS n
```

The default value for IPX SOCKETS is 20.

IPX error 0xFF

Explanation: This message indicates a network hardware failure.

User Action: Investigate the network setup on the PC. It may be necessary to reboot to clear the error.

I.3 NetBIOS Error Messages

NetBIOS errors look like this:-

```
Netbios error 14 in command b1
```

NetBIOS error codes are standardised by IBM. Many of the possible NetBIOS error messages are documented here. They are reported in hexadecimal, with the hexadecimal NetBIOS command code that produced the error. *PC-Duo* will attempt to recover from many NetBIOS errors, but some are fatal, and will cause the current operation to be aborted.

There are other NetBIOS errors which are unlikely to occur. If you get an undocumented error, call your technical support contact for further assistance. Please have details of your configuration and the error message available when you call.

Although most NetBIOS error messages also display the actual NetBIOS command code that produced the error, we do not document all possible command codes as the error code alone normally provides sufficient information to trace the fault. However, we do include a one-line explanation of the error in each case; this is not displayed by the software, but is the normal NetBIOS explanation of the error.

NetBIOS error 5...
Command Timed-Out

Explanation: This error indicates that the *PC-Duo* Slave did not respond within the expected time period. This can be caused by failure or reboot of the remote system, or by a network failure, or by excessive network loading.

User Action: Check to see if the remote system has been switched off!

See also NetBIOS error 18, below.

NetBIOS error 8...
Invalid Local Session Number

Explanation: This error may be produced as a side-effect after the network connection between the *PC-Duo* Control program and the Slave has been broken. If you are running in a *LANbridge* environment, please also refer to the NetBIOS error A description below.

User Action: See also NetBIOS error 18, below.

NetBIOS error 9...
Internal Storage Exhausted

Explanation: This error can occur when the NetBIOS software is already being used to its capacity. This is very rare, and you are more likely to see errors E or 11, described below.

User Action: Retry the operation when the network transport is not so busy. If the problem persists, see if you can reconfigure the transport for more buffer space (typically), or contact your supplier for higher capacity transport availability.

See also NetBIOS errors e and 11, below.

NetBIOS error a...
Session has been closed

Explanation: This error can result from a PC user executing a NET DISCONNECT command, or it can occur in an environment using a *LANbridge* package, where the target PC name has been defined on the bridging PC, and the 'bridge has accepted the Call, but has been unable

to find the PC on the other network. In this situation, the 'bridge has no choice but to drop the session, usually resulting in this error message.

User Action: Check that the target PC is running the correct network stack, with Slave, that Slave is using the correct name, and that the 'bridge has been configured to forward the connection correctly. It is possible to make the 'bridge translate names, and it is also possible to have it forward the request onto the wrong LAN altogether! It may be easiest to delete the name on the 'bridge and re-publish it. See if you can connect to any other PCs on the same LAN. (Note that in this explanation, 'LAN' means the combination of the physical LAN type *and* the protocol running on it - the 'bridge can connect different protocols running on the same wire, as well as connecting to different types of network.)

NetBIOS error d
Duplicate Name in Local Table

Explanation: This error can occur when a NetBIOS name has been specified which clashes with another NetBIOS application running on the local system. This can be produced by both the Control and Slave applications, usually as they start. The Slave will use a name which is derived from the name of the local system if it is run with "*" as the *first* command parameter, and this is very unlikely to cause such a clash. The Control program, however, will default to use a name starting with "OPERATOR". Clashing names on other nodes will not produce this error code.

User Action: This is usually caused by running the same application more than once on the same system, typically running multiple Controls under Windows will produce this error. You should use the Command field in the Windows File Manager Run dialog to specify a different name for all but the first Control.

See also NetBIOS error 16, below.

NetBIOS error e...
Local Name Table is Full

Explanation: This error can occur when the NetBIOS local name table is full. It indicates that the NetBIOS transport configuration cannot cope with any more network applications at this time. It is unlikely to occur in a *PC-Duo* environment as it only needs one or two NetBIOS names to run each application. Other NetBIOS applications (such as the *LANutil* SERVER) will also need NetBIOS names, typically using one NetBIOS name and one NetBIOS session while they are loaded.

User Action: See if you can reconfigure the NetBIOS to accept more simultaneous names. The PATHWORKS v4 and v5 netbioss (DNNETH.EXE and DNP.EXE, respectively) use the /LCN:*nn* command option to vary the number of local NetBIOS names.

Try to avoid having applications active when they are not required. If the problem persists, contact your supplier for higher capacity transport availability.

See also NetBIOS errors 9 and 11.

NetBIOS error 11...
Local Session Table is Full

Explanation: This error can occur when the network transport is already being used to its capacity. It indicates that the NetBIOS transport cannot cope with any more simultaneous network connections at this time. It is caused in similar circumstances as NetBIOS error e.

User Action: See if you can reconfigure the NetBIOS to accept more simultaneous sessions. The PATHWORKS v4 and v5 NetBIOSs (DNNETH.EXE and DNP.EXE, respectively) use the /MAX:*nn* and /SES:*nn* command options to vary the maximum number of sessions. The PATHWORKS NCP SET MAX LINKS command varies the number of DECnet links which are allowed (each NetBIOS session uses a DECnet link). Refer to Section 2.6.2 for more details.

Try to avoid having applications active when they are not required. If the problem persists, contact your supplier for higher capacity transport availability.

See also NetBIOS error 9.

NetBIOS error 12...
Call Rejected - No Listen Outstanding

Explanation: The specified target PC is switched on, and is running PATHWORKS (or any other supported transport), but Slave is not running, or it is already in use (normally produces a more informative error message), or the remote PC's DECnet (or other NetBIOS) has all configured links (sessions) active.

User Action: Make sure that Slave is loaded on the target PC. If it is loaded, wait for the PC to become free, and try again. You may wish to reconfigure the NetBIOS to accept more simultaneous connections. Please refer to Section 2.6.2 for DECnet configuration information, or to the documentation associated with any *LANlink* package, as appropriate.

NetBIOS error 14...
Cannot Find Specified Name

Explanation: The specified Slave PC is not switched on, is not running PATHWORKS (or any other supported transport), or is not running Slave, or cannot be reached over the network (perhaps due to a cabling problem). All of these situations will normally produce a more informative error message.

User Action: Use the Control "Connect" option to see which Slaves are active. If the Slave is not running, or its name was specified incorrectly, fix it, and try again.

NetBIOS error 16...
Name clashes with existing Name

Explanation: This error can occur when a NetBIOS name has been specified which clashes with another NetBIOS application on a remote node. The *PC-Duo* Slave uses a name which is derived from the name of the local system if "*" is used as the *first* command parameter. This is unlikely to cause such a clash.

User Action: This is usually caused by multiple Control users attempting to run either DOS or Windows Controls without specifying a Control *name* (i.e. using the default name "OPERATOR"), or by attempting to run

multiple Controls simultaneously on the same PC without providing them with different names. It can also be caused by using the same explicit name for either Slave or Control (rather than using the "*" option). Use the "*" name option for both Slaves and Controls whenever possible, as this helps to avoid clashes such as this. If you are using a network which does not set the DOS Machine Name (such as Windows for Workgroups or NetWare), you must set the name differently on each Slave as the "*" option is not available. This is best done by setting the PCDCMD environment variable before calling STARTSLV.BAT — refer to Section 2.5 for more details.

See also NetBIOS error d, above.

NetBIOS error 18...
Session ended abnormally

Explanation: The network connection between the Control and Slave programs has been broken. This can be caused by a PC reboot or power-off, or by physical disconnection of the PC, or by network hardware failure. It can also be caused by a software-level forced disconnection of the network session, such as the PC NET DISCONNECT command, or the NCP DISCONNECT command.

User Action: Check that the physical connection is intact and that the network software is still running on both systems. Try to re-connect. If a File Transfer was underway at the time of disconnection, there may be partially-written files on either PC. Restarting the operation will usually correct the data.

NetBIOS error 22...
Too many commands outstanding

Explanation: This error can occur when the network transport is already being used to its capacity. It indicates that the NetBIOS transport cannot cope with any more simultaneous network requests at this time. It is unlikely to occur in a *PC-Duo* environment as it does not issue an unusual number of asynchronous network requests, and errors e or 11 are more likely to occur first.

User Action: See if you can reconfigure the NetBIOS to allow more simultaneous commands. The PATHWORKS v4 and v5 NetBIOS (DNNETH.EXE and DNP.EXE, respectively) support the /CMD:*nn* command option to vary the number of commands that can be handled at once. See NetBIOS errors e and 11.

NetBIOS error 40...
Unusual Network Condition
NetBIOS error ff...
Command pending

Explanation: These errors are unlikely to occur, usually indicating that the NetBIOS itself is in an unusual, or confused state.

User Action: Look for hardware problems, either a faulty card or a cabling fault.

J Reader's Comments

If you have any comments regarding the design, installation, configuration, or operation of this package, please inform Vector Networks or your local **VIA** distributor.

We can never test our software on every possible combination of equipment. We may have inadvertently introduced a restriction or incompatibility which affects you. We apologise for any shortcomings that you may discover. Please let us know, so we can fix them.

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Thankyou.

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