



INTERNATIONAL  
PC CARD  
DATA/FAX/MODEM

DataLink V.90™  
(FM560LKI)

User's Manual

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## Introduction

Thank you for purchasing the ActionTec DataLink V.90 (FM560LKI) international PCMCIA fax/modem. The FM560LKI has the capability to interface with and transfer data over the public telephone networks of many different countries. The modem comes with its own country selection software that enables you to easily configure the modem to recognize the standards of each individual country.

As an international traveler, you know that various countries' telephone systems may be different. You may have noticed distinct dial tones, busy signals, and rings. Your FM560LKI can effortlessly adapt to these different telephone system requirements. We include the exclusive software "Travelink Select" that enables you to easily select your current country and immediately use your modem without restarting.

The FM560LKI has a programmable feature that enables you to change the control codes that the modem uses. When new firmware (the commands that make the modem work) becomes available, you simply download the update utility from our website and reprogram the modem. This feature allows the modem to keep pace with any changes that might be made in the future.

In February 1998, Study Group 16 of the ITU-T (International Telecommunications Union, Telecommunication Standardization) agreed on the technical specifications for 56K modems (ITU-T V.90). As with any new standard, implementation will be an ongoing process. It may take some time for the entire industry to switch from their proprietary methods to the new standard. The ability to change your modem's control code will allow you to keep pace with these changing conditions.

Please visit ActionTec's website regularly for any new drivers available for your modem. Under the **Tech Support** section you will find an area for **56K Modem Upgrades**. Our website address is: [www.actiontec.com](http://www.actiontec.com)



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## Before You Begin

Please read the following tips carefully before attempting to install your new modem.

### *For DOS/WINDOWS 3.1X INSTALLATION*

- Most portable computers sold today include some form of Card and Socket Services. This software enables the computer's internal PCMCIA controller to operate. If the computer beeps when the modem is inserted, the modem should be configured and ready to use. If you do not have Card and Socket Services, follow the procedure for installing the *Point Enabler* in this section.
- Windows 3.1 and Windows for Workgroups 3.11 do not require any special drivers to communicate with the PC Card fax/modem if you are using your system's Card and Socket Services software. You only need to install communications software. If the version of the modem you purchased included communications software, go to the section **Installing and Configuring Software** and follow the installation instructions.
- If your computer does not have Card and Socket Services you will need to install the *Point Enabler*. This program provides DOS with the necessary drivers to interface with the modem. However, you will not be able to "hot swap" the modem. The Point Enabler will have to be reinstalled any time you insert or remove the modem. To install the Point Enabler in your system, insert the installation diskette (or CD-ROM) that came with your modem into the appropriate drive. Find the file "*pmxfm.exe*" and copy it to the root directory of your default hard drive. The Point Enabler needs to be executed each time you turn on your computer. This can be done by typing the following command line at the DOS C:> prompt:

**pmxfm c=n i=nn <enter>**

Where "c" specifies the COM Port number (from 1 to 4) and "i" specifies the Interrupt used (from 1 to 15). Using COM 3 and IRQ 9 will work in most systems. Once the **pmxfm.exe** driver has been loaded and is working correctly, you can add the statement to your *autoexec.bat* file.

Example: **pmxfm c=3 i=9 <enter>**

You may also need to modify your *config.sys* file to exclude an address range when using the Point Enabler. The two examples below show the most effective ranges and will work with the majority of computers. Example A: shows the most common exclusion range. Example B: may be the preferred setting

for certain notebooks. Try Example A: first and use Example B: if your results are not satisfactory. Add a line to your *config.sys* file as follows:

Example A: **device=c:\dos\emm386.exe noems x=d000-dfff**

Example B: **device=c:\dos\emm386.exe noems x=c800-c8ff x=d000-dfff**

Remember, the Point Enabler should not be used with any Card and Socket Services software. It is meant to be used in a computer that does not have its own PCMCIA Card and Socket Services software and is for a DOS/Windows 3.1X environment only. It should not be used if you have a Cardbus capable notebook or are running Windows 95/98.

## ***For WINDOWS 95/98 INSTALLATION***

- Since a fax/modem is usually the first accessory purchased for a notebook computer, it is a good idea to check that the computer's PCMCIA controller has been initialized and properly configured for Windows 95/98. Performing this simple procedure will eliminate the major cause of installation difficulties.

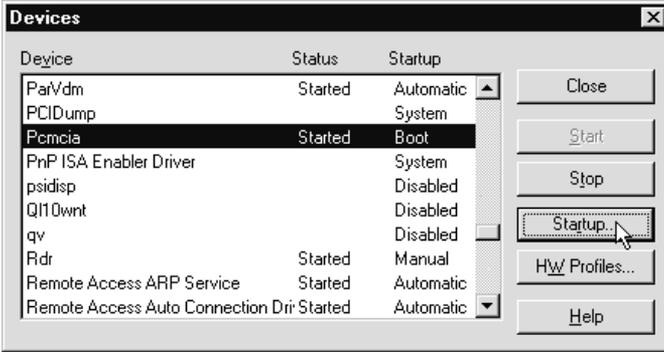
In Windows 95/98, go to: **Start-Settings-Control Panel** and double-click the **PC Card** icon. A properly installed PCMCIA controller will show the screen below.



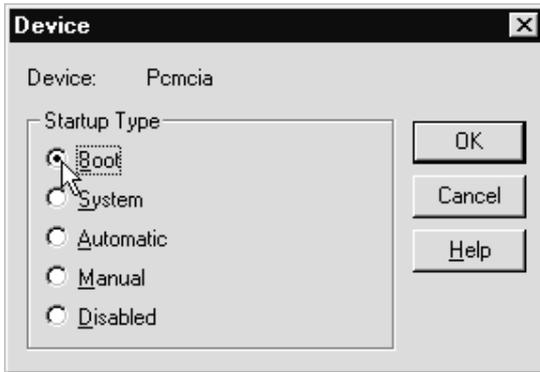
If the *New Hardware Found* panel appears, your computer's PCMCIA Ports have not been configured. Follow the installation instructions on the screen. You can also read your computer's Users Guide for additional instructions on configuring your PCMCIA ports for Windows 95/98.

## For WINDOWS NT 4.00 INSTALLATION

- Check that your PCMCIA device setting is selected for *boot* and *started*. Go to: **Start-Settings-Control Panel** and double-click the **Devices** icon. Scroll down to the **Pcmcia** listing and highlight it by clicking once. If the PCMCIA device is set correctly, you should see the screen below.



If the **Pcmcia** device is not set to *boot* and *started*, click once on the **Startup** button. Select **boot** and click the **OK** button. Close the **Devices** window and restart Windows NT before proceeding to the installation section

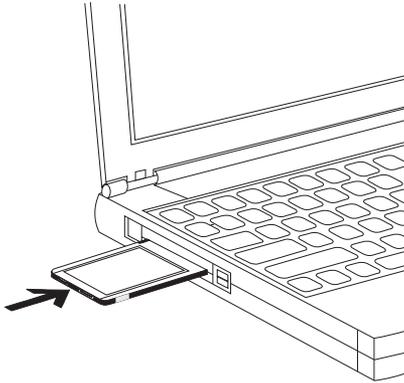


- Check that COM 2 is available for the modem to use. It is recommended that you disable COM2 through your System BIOS Setup routine (read your Computer's User Manual for instructions on how to invoke the BIOS Setup). Once inside the BIOS Setup, look for a section called *Integrated Peripherals*. Locate the entry for COM 2 or COM Port B and disable it. Save your settings before exiting.

# Installing the Modem

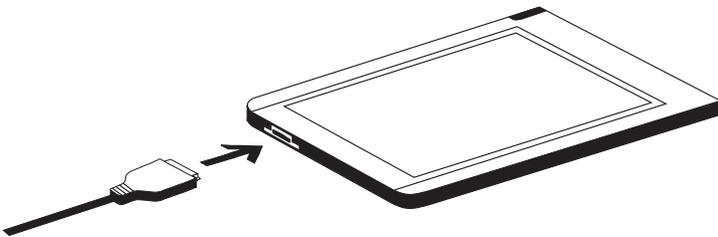
## *HARDWARE INSTALLATION*

Your FM560LKI is housed in a Type II PCMCIA case. It will install in a Type II or Type III 68 pin PCMCIA slot. PC Card slots are polarized and the modem will install only in the correct orientation. Notebook computers usually have their slots located on one side of the computer. To insert the modem, slide it gently into the opening of the slot keeping it straight. Apply an even pressure until that last 1/2 inch, then press firmly until the modem is seated completely into the notebook. If the PCMCIA slots are recessed, it may be difficult to properly insert modem. Be sure to apply pressure until you “feel” the modem “click”. The illustration below shows the modem being installed into a typical notebook.



**Fig. 1: Installing the Modem**

The modem comes with its own dedicated phone cable. This cable has a US standard RJ-11 connector on one end for the phone line and a special connector that fits into the modem on the other end. Be careful not to push the computer against an adjacent object when the cable is in place. This may bend the connector causing damage to the pins. Keep the area around the computer clear of large objects so that you can move the notebook freely without hitting the cable or connector.



**Fig. 2: Installing the Cable**

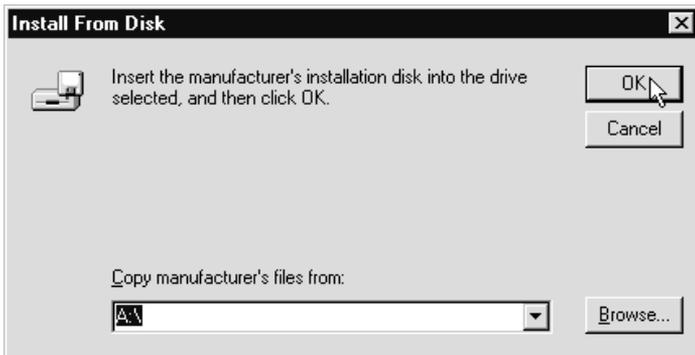
## CONFIGURING WINDOWS 95

- Step 1 Turn on the computer and load Windows 95. Insert the PC Card Modem into the computer's PCMCIA slot. Windows 95 will detect new hardware.



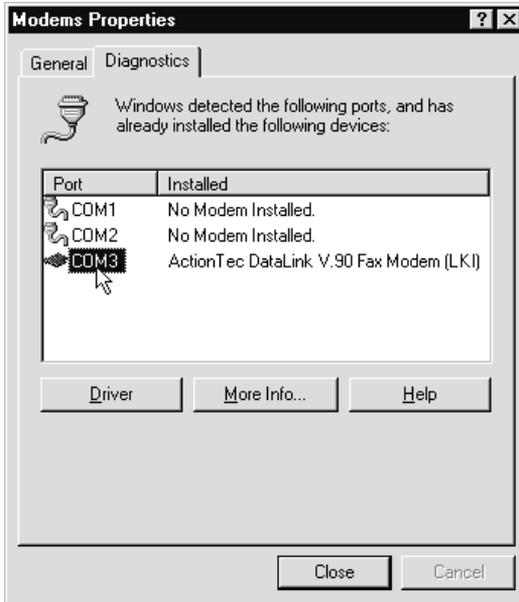
Select "Driver from disk provided by hardware manufacturer" then Click **OK**.

- Step 2 Insert the diskette ( or CD-ROM) containing the modem's Windows 95 .INF files and click **OK**



- Step 3 If Windows 95 asks for an installation disk, click **OK** and type *A:* (or if the .inf files were supplied on a CD-ROM, type in your CD-ROM drive letter) in the dialog box that appears and click **OK** again. Windows will find and load the .inf files.

- Step 4 To determine what COM port and IRQ is assigned to the modem in Windows 95, click on the **Modems** icon in **Control Panel** and select the **Diagnostic** tab. Click on the COM Port icon and then on the **More Info** button to view the modem properties.



## *CONFIGURING WINDOWS 95 OEM SR2*

- Step 1 Turn on the computer and load Windows 95. Insert the PC Card Modem into an available PCMCIA slot. Windows 95 will detect the modem and launch the **Update Device Driver Wizard** dialog box. Insert the diskette (or CD-ROM) containing the modem's .INF files and click **Next >**.

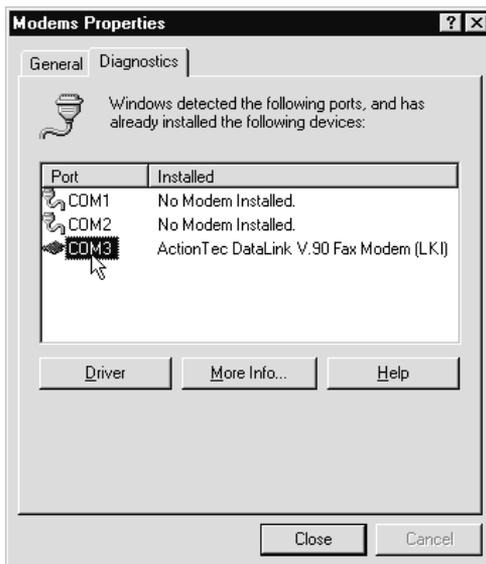


Step 2 After Windows has found the devices drivers for your modem, click the **Finish** button.



Step 3 If Windows 95 asks for an installation disk, click **OK** and using the **Other Locations** button, select *A:* (or if the .inf files were supplied on a CD-ROM, select your CD-ROM drive letter) and click **OK** again. Windows will find and load the .inf files.

Step 4 To determine what COM port and IRQ is assigned to the modem in Windows 95, click on the **Modems** icon in **Control Panel** and select the **Diagnostic** tab. Click on the COM Port icon and then on the **More Info** button to view the modem properties.



## CONFIGURING WINDOWS 98

- Step 1 Turn on the computer and load Windows 98, then insert the diskette (or CD-ROM) containing the modem's .inf files into the appropriate drive.
- Step 2 Insert the PC Card Fax/Modem into the computer's PCMCIA slot. A **Add New Hardware Wizard** should appear. Click **Next>**.



- Step 3 Windows will show a screen asking “*What do you want Windows to do?*”. Select: “*search for the best driver for your device.*” Click **Next>**.



- Step 4 A search screen will display options to do your search. Put a “check” on *Floppy disk drives* and *CD-ROM drive*. Click **Next>**.



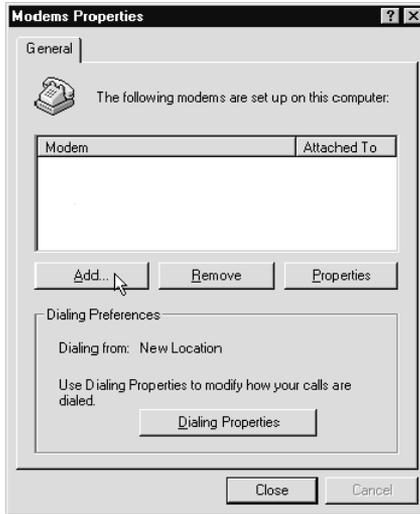
Step 5 Windows 98 will find the PCMCIA Fax/Modem driver on the floppy drive. If your modem came with a CD-ROM, Windows 98 will find the driver on the CD-ROM. Click *Next*>.



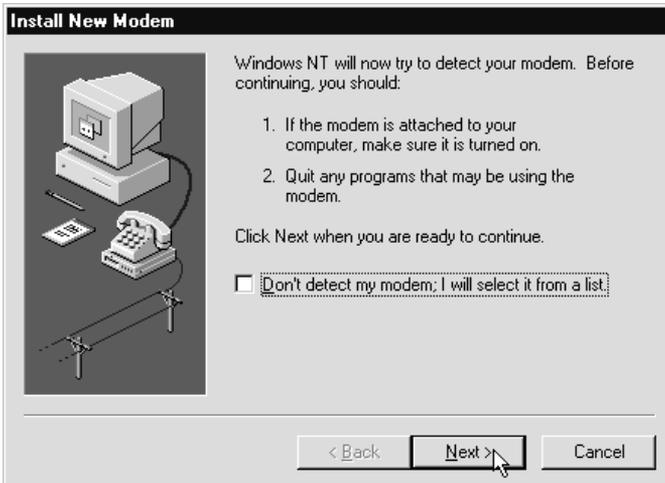
Step 6 At the next screen, click *Finish*. You are now ready to use your modem.

## CONFIGURING WINDOWS NT VER. 4.00

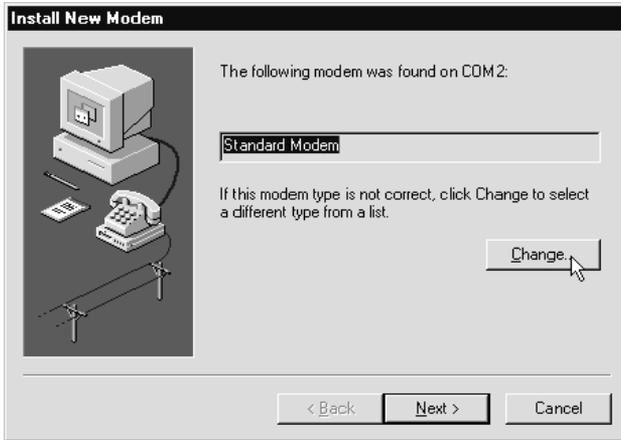
- Step 1 This installation assumes that you have disabled COM 2 in your system BIOS and have set the **Pcmcia** selection in **Control Panel-Devices** to *boot and started* as outlined in the **Do This First** section.
- Step 2 Insert the modem into the computer and load Windows NT. Go to **Start-Settings-Control Panel** and double-click the **Modems** icon. At the *Modems Properties* window, click the **Add** button.



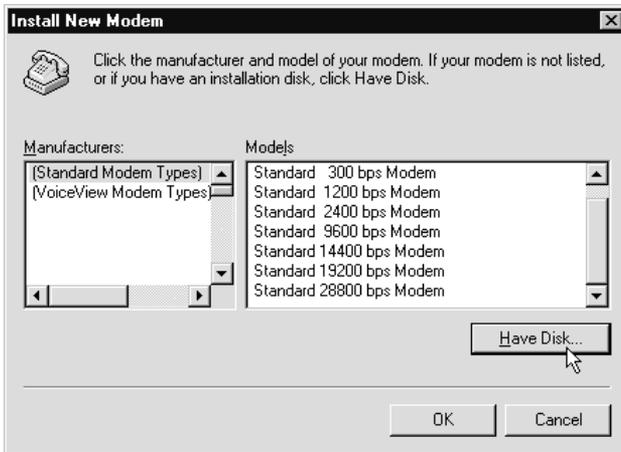
- Step 3 When the **Install New Modem** window appears, allow Windows NT to detect your modem. Click on the **Next>** button.



Step 4 If a modem is found, Windows NT will query it. In most cases Windows NT will detect the modem as a “Standard Modem”. Click on the **C**hange button.



Step 5 Insert the diskette (or CD-ROM) containing the modem’s .inf files and click the **H**ave Disk button. When prompted for the path, type *A:\* (or your CD-ROM drive letter if your modem came with a driver CD) and then click the **O**K button.



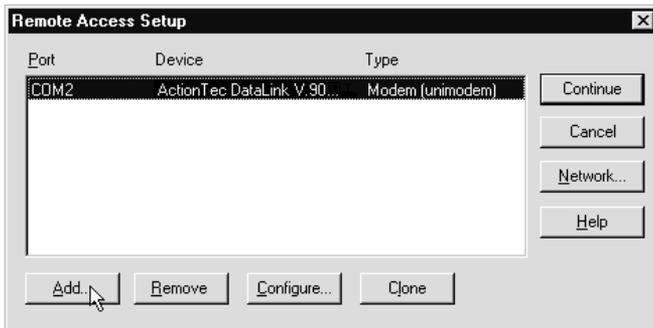
Step 6 When prompted to select the manufacturer and model of the modem, click the **O**K button. At the next screen click the **N**ext> button.

Step 7 Click on the **M**odems icon in the **C**ontrol Panel. Verify that Windows NT has correctly found the modem.

Step 8 If you wish to use your modem to dial into a Windows NT Remote Ac-

cess Server or wish to connect to the Internet, you will need to configure Dial-up Networking. Go to: **Start-Settings-Control Panel** and double-click the **Network** icon. Click on the **Services** folder and select **Remote Access Service**. If the Remote Access Service option is not listed (if present, go to **Step 9**), click on the **Add** button. Scroll-down the menu and select **Remote Access Service**. Click on the **OK** button. Windows NT may ask for its own disks or CD-ROM for some files. Insert as required. After you have installed Remote Access Service, add the appropriate protocols as directed (i.e.. TCP/IP for Internet Access).

- Step 9 At the **Remote Access Setup** dialog box, click on **Add....** Select the RAS Device you wish to add and Click **OK**.



- Step 10 Click **Continue** to finish the Installation.
- Step 11 After Windows NT has completed the binding process, allow Windows NT to shut down and restart the computer.

# Installing and Configuring Software

## INSTALLING COMMUNICATIONS SOFTWARE

If your modem came with a communications software package, it is strongly recommended that you use this software for your modem. It's default installation parameters have been specially configured to work with this modem. The included software features multi-language support in both data and fax modes. To install this software on your computer, follow these easy steps.

Step 1: Insert the CD-ROM into your computer's CD-ROM drive.

Step 2: If you are using Windows 95/98, a menu will automatically start (Note: if the menu does not appear, use *My Computer* and double-click the CD-ROM icon). If you are using Windows 3.1X, go to **File-Run** and type in the CD-ROM drive letter followed by **setup16**. This will load the 16 bit version of the software for use by Windows 3.1X.

Step 3: Choose the language you wish to use from the menu and install the software.

If you want to use another software package, please be sure that it supports this modem. Most software manufacturers have a listing of supported modems on their websites or BBS's. Check these sites to see if this model is supported. If you are unsure, or your brand of software supports only a few modems, try selecting "Hayes Compatible" or "Standard Modem". This may work in certain cases. Some software programs allow manual input of parameters. For the users of these programs, here is a listing of the data/fax command standards supported.

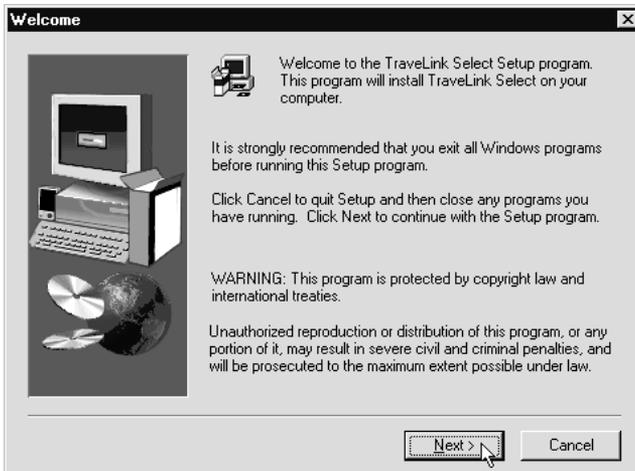
Data:           TIA/EIA-602  
Fax:            TIA/EIA-578 for Class 1 Fax  
Init String:   **AT&F&C1&D2W2**

Note: Some programs must be configured to communicate with the modem on the same COM port and or IRQ setting used by the modem.

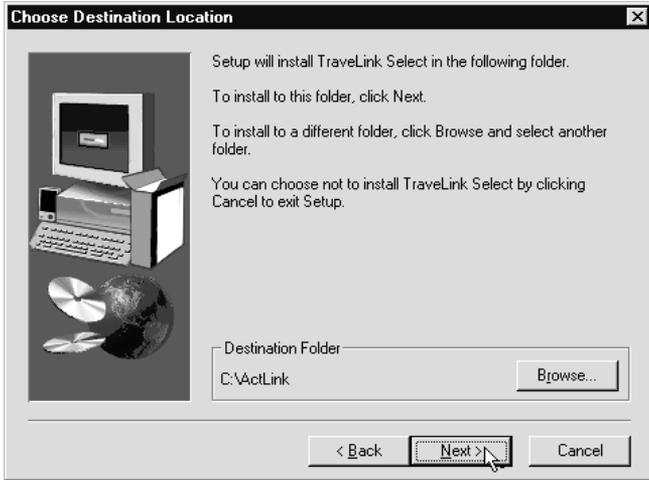
## INSTALLING TRAVELINK SELECT™

Your FM560LKI is supplied with a unique country selection program. This software enables you to change the country setting for your modem through a user-friendly menu. The program is a 32-bit application and Windows 95 or Windows 98 is required to run it. If you are using MS-DOS, Windows 3.10, or Windows 3.11, changing the country setting can still be accomplished by the use of the **AT%T19,0,nn** command. See *Appendix A, AT Commands* for instructions on using AT Commands and the *AT%T19,0,nn* listing for guidelines on changing the country setting. To install the Travelink Select program, follow the installation instructions below.

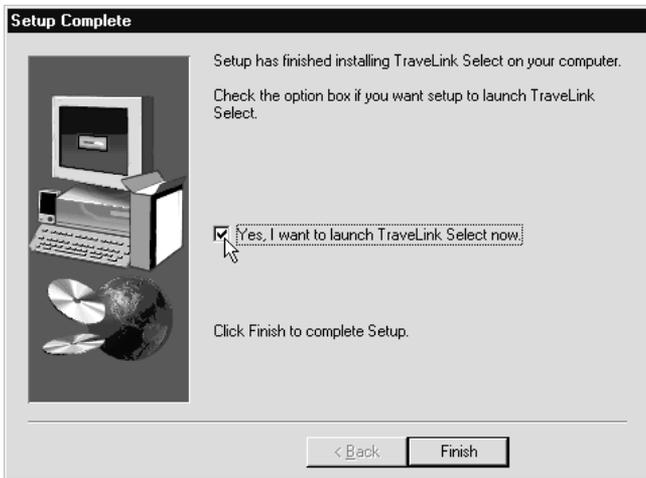
- Step 1 Turn on the computer and load Windows 95 or Windows 98. After Windows has started, insert the FM560LKI into one of the computer's PCMCIA slots.
- Step 2 Insert the diskette or CD-ROM containing the Travelink Select program into the computer's floppy disk drive or CD-ROM drive.
- Step 3 Using *Windows Explorer* or *My Computer*, open the floppy drive window and double-click the Travelink Select icon. (Note: If you are using the CD-ROM, select *Install Travelink Select* from the menu.) The file will self extract and launch the installation utility.
- Step 4 A welcome screen will appear with a caution notice asking you to close all open applications. If you have any open or minimized applications running, exit the installation utility and close all other programs before proceeding. If there are no other open applications, click the **Next>** button to continue.



Step 5 A screen will prompt you for a *Destination Folder*. You can use the default destination folder or click the **Browse...** button to choose another location. Click the **Next>** button to continue.



Step 6 The final installation screen will give you the option to launch the TraveLink Select Program. Put a “check” in the option box and make sure your DataLink International Fax Modem is properly inserted into one of the computer’s PCMCIA slots. Click the **Finish** button to exit setup and launch TraveLink Select.



Step 7 TraveLink Select will attempt to autodetect the modem. A screen will display the detection process. Once your modem is found, the TraveLink Select application screen will display the current country setting for your modem.

## USING TRAVELINK SELECT

The Travelink Select Program is opened by double-clicking the Travelink short-cut icon on your desktop screen or by selection from the **Start-Programs** menu. Once opened, the program will autodetect your modem. If the modem is not installed, it will ask that you install it. Once detected, the country selection window below will show the modem status and currently selected country.



To change the country that your modem is selected for, choose the name of the country from the *Country Selection* option box. Once the country is selected, click the **S**et button. The modem will be configured to use the PSTN (Public Switched Telephone Network) of that particular country. (Note: the modem comes with an RJ-11 connector as standard equipment. You may need an adapter to physically connect your modem to the phone jack if you are in another country.) To close the selection window, click either the **H**ide or **Q**uit button.

If you choose the **H**ide option, the program minimizes to the lower right-hand corner of the task-bar. It can be reactivated by clicking once on the icon.



If you place your mouse cursor over the task-bar icon, the currently selected country will be shown in the status window.



## Troubleshooting

This section lists some common problems and offers suggestions for a solution. Before attempting any troubleshooting, it is strongly recommended that you carefully follow the pre-installation procedures outlined in the **Do This First** section. These steps have been thoughtfully chosen to help minimize difficulties during the installation of the modem in both Windows 95/98 and Windows NT 4.00. If you have installed the modem without performing any of the pre-installation steps, eject the modem from the computer and remove the driver from the **Modems** panel. Go to **Start-Settings-Control Panel** and double-click the **Modems** icon. Highlight the modem by clicking once and then click the **Remove** button. Restart Windows 95/98 and follow the pre-installation suggestions listed in the **Do This First** section before attempting a reinstallation. If you have reinstalled the modem but it is still not functioning or Windows does not detect it, follow the steps listed below. These troubleshooting procedures will correct the majority of installation problems that might be encountered when installing the modem.

### Case 1: Resetting the PCMCIA Controller (Modem Is Not Detected).

Resetting the PCMCIA Socket controller corrects the vast majority of non-installation difficulties and should be the first step chosen when trying to remedy a situation where the modem is not detected. Before attempting this procedure, uninstall the modem using the procedure outlined in the previous paragraph.

Go to **Start-Settings-Control Panel** and double-click the **System** icon. Select the **Device Manager** tab to display the device tree. In the device tree, double-click the **PCMCIA Socket** icon to expand the socket tree. Highlight the listed socket device by clicking once on the icon, then click the **Remove** button. Exit **Device Manager** and restart Windows. On startup, Windows should detect new hardware for the PCMCIA Socket that was previously removed (If Windows does not detect new hardware, go to **Start-Settings-Control Panel** and double-click the **PC Card** icon). At the PCMCIA installation screens, choose **No**, **No**, and then **Finish**. The PCMCIA controller in your system is now reset. Go to **Start-Settings-Control Panel** and double-click the **PC Card** icon. The screen should say socket 1 & socket 2 “empty”. Try reinstalling the modem again using the steps in the **Installing The Modem** section.

### Case 2: Correcting an *Open COM Port Error (Disabling a COM Port)*

When Windows displays an *Open COM Port Error*, it means that there are no COM Ports available for the modem to use. To correct this condition, you must disable any unused COM Ports listed in Windows. COM

Port 1 (COM 1) is usually required by the system and should not be removed. Go to **Start-Settings-Control Panel**. Double-click on the **System** icon, and select the **Device Manager** tab. From the device tree, double-click the **Ports [COM & LPT]** icon to expand the **Ports** tree. COM 1 should be listed. If COM 2, COM 3, or COM 4 are listed, disable them by clicking once to highlight each port and then click the **Properties** button. At the **Properties** screen, Uncheck *Original Configuration, Current* (Windows 95a) or check *Disable In This Hardware Profile* (Windows 95 OSR2). If there is a message screen, choose *yes* and click the **OK** button. If the COM Port is properly disabled, there will be a red "X" over the COM Port icon.

Case 3: Modem is installed as a *Standard Modem* or some other modem. Not as a DataLink V.90 Modem.

When you insert your modem into the computer, Windows 95 detects it as either new hardware or as hardware that has already been installed at one time. Under rare circumstances, Windows 95 will see your modem and identify it as new hardware, but will not use the installation files that you give it. Instead, it uses some other .inf file, usually one from previously installed hardware. As a result, your modem does not work with Windows 95 programs like Dial Up Networking (but will work with programs that access COM Ports). Correcting this condition requires that you know the version of Windows 95 that you are using. To find the version of Windows 95 on your computer, go to **Start-Settings-Control Panel**. Double-click on the **System** icon. If the version of Windows 95 is 4.00.950 or 4.00.950A, use the *Windows 95a* procedure below. If the version of Windows 95 reads 4.00.950B, see the procedure for *Windows 95 OSR2*. Read these instructions first before attempting anything. If you feel uncomfortable with renaming files, please ask the assistance of someone who is knowledgeable with Windows files and Windows file extensions.

### Windows 95a

Eject the modem from the computer and go to **Start-Settings-Control Panel**. Double-click the **Modems** icon. Highlight the modem by clicking once and then click the **Remove** button. Close the control panel and return to the desktop screen. **Do not** reboot or restart the system. Now go to **Start-Programs** and select **MS-DOS Prompt**. At the c:> prompt, type in the following commands in the order listed (Note: if you have renamed your Windows Directory from **C:\Windows**, substitute the new name for **Windows** in the commands that follow.):

```
cd c:\windows\inf <enter>
rename *.inf *.bak <enter>
exit <enter>
```

If you have correctly typed these statements in, you should now be back at the Windows Desktop. It is important that you **do not reboot** or restart the system at this time. Instead, insert your DataLink V.90 Fax Modem into the computer and perform the installation using the files provided with the modem (See the **Installing the Modem**, Windows 95 section). After you have finished the installation, return here and follow these **very important steps**. Go to **Start-Programs** and select **MS-DOS Prompt**. At the c:> prompt, type in the following commands in the order listed:

```
cd c:\windows\inf <enter>
rename oem0.inf oem20.inf
rename *.bak *.inf <enter>
exit <enter>
```

If everything has been entered and no errors have been issued, your modem and system will be properly configured and ready to use. This procedure renames all of the .inf files in Windows, basically removing them from the system. This allows you to install the modem and force Windows to accept the installation files you provide. After the modem has installed, you then rename all of the .inf files to their proper file extension so that the hardware they control can be used by the system. This is a complicated but safe procedure if carried out according to the instructions.

### *Windows 95 OSR2*

Eject the modem from the computer and go to **Start-Settings-Control Panel**. Double-click the **Modems** icon. Highlight the modem by clicking once and then click the **Remove** button. Close the control panel and return to the desktop screen. **Do not** reboot or restart the system. Now go to **Start-Programs** and select **MS-DOS Prompt**. At the c:> prompt, type in the following commands in the order listed (Note: if you have renamed your Windows Directory from **C:\Windows**, substitute the new name for **Windows** in the commands that follow.):

```
cd c:\windows\inf <enter>
rename *.inf *.bak <enter>
cd c:\windows\inf\other <enter>
rename *.inf *.bak <enter>
exit <enter>
```

If you have correctly typed these statements in, you should now be back at the Windows Desktop. It is important that you **do not reboot** or restart the system at this time. Instead, insert your DataLink V.90 Fax Modem into the computer and perform the installation using the files provided with the modem (See the **Installing the Modem, Windows 95 OEM SR2** section). After you have finished the installation, return here and follow these **very important steps**. Go to **Start-Programs** and select **MS-DOS Prompt**. At the `c:>` prompt, type in the following commands in the order listed:

```
cd c:\windows\inf <enter>
rename *.bak *.inf <enter>
cd c:\windows\inf\other <enter>
rename *.bak *.inf <enter>
exit <enter>
```

If everything has been entered and no errors have been issued, your modem and system will be properly configured and ready to use. This procedure renames all of the .inf files in Windows, basically removing them from the system. This allows you to install the modem and force Windows to accept the installation files you provide. After the modem has installed, you then rename all of the .inf files to their proper file extension so that the hardware they control can be used by the system. This is a complicated but safe procedure if carried out according to the instructions.

Case 4: The modem has been recognized and installed using the files provided, but Windows HyperTerminal issues *Device Not Ready Error*.

*STEP 1: Check System Resources.*

With the modem installed, go to **Start-Settings-Control Panel** and double-click the **System** icon. Select the **Device Manager** tab. From the device tree, double-click the **Modems** icon to show what modems are installed. If your modem is listed, check that there is no yellow exclamation mark or red "X" over the modem's telephone icon (if there is, go to *STEP 2*). If any other modems are listed, highlight the modem by clicking once on the telephone icon next to the listed modem and then click on the **Remove** button. Shutdown the system and turn off the power. Wait 5 seconds and turn your computer back on and repeat *STEP 1*.

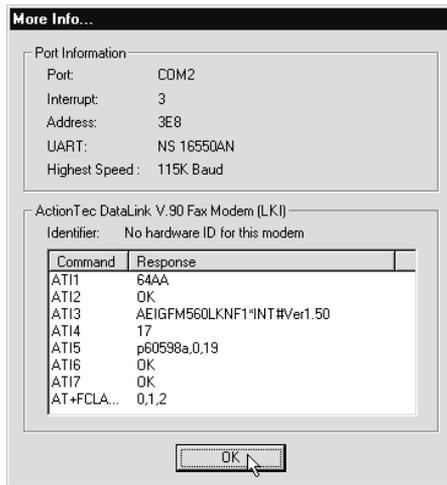
*STEP 2: Check Modem Properties.*

From the **Device Manager** tab within **System Properties**, double-click the **Modems** icon in the device tree to show what modems are installed. Highlight your modem by clicking once on the icon and then click the **Properties** button. Read the *Device Status* under the **General** tab to see if

the device is working properly. Check the *Device Usage* box and make sure there is no check mark on “*Disable in this hardware profile*” (Windows 95 OEM SR2 only) or (for Windows 95 or 95a) the box labeled “*Original Configuration, Current*” has a check mark . If either of these conditions are not as they should be, correct them. Make a note of the COM Port and IRQ the modem is using. If the *Device Status* box shows some error message, it will generally be about a conflict. Go to the *Resources* tab and read the *Conflicting Device List*. If a conflict is present, uncheck the box “*Use automatic settings*” and select a configuration that does not cause conflicts. Manually change the IRQ settings if needed (see your Windows 95 on-line help file for a more detailed discussion on changing these settings).

*STEP 3: Modem Diagnostics.*

Go to **Start-Settings-Control Panel** and double-click the **Modems** icon. Your modem should be listed. Highlight the modem by clicking once and then click on the *Diagnostics* tab. Highlight the modem by clicking once on the *COM Port* icon next to its listing. Now click on the **More Info** button. You should see the panel below.



**More Info Panel**

If the diagnostics window is blank, the modem is not responding. This is usually a sign that the computers PCMCIA controller is either not installed correctly or has not been initialized. If you have carried out these three steps and the modem is not functioning, go to the *Case 1:* listing in **Troubleshooting** and reset the computer’s PCMCIA Controller.

## Some Common Problems:

### **No Dialtone Error**

You may have too many devices connected to the phone line. Remove all other equipment, especially cordless phone recharger bases.

If you are calling from an office, are you using a PBX system. If you have to dial “9” to reach an outside number, you are using a PBX. Use the modem only with a regular analog telephone line (PSTN).

Your modem may not recognize the dialtone. Use the country selection program (or the `AT%T19,0,nn` command) and select the proper country.

Try checking the modem cable. Is it installed securely into the modem? apply a little more pressure when installing the cable.

### **Communications Software Does Not Work**

Some communications software packages need to be configured to the same COM Port and or IRQ as the modem.

Does the communications software support this modem? See the **Installing and Configuring Software** section. If you are using a different software from the one supplied with the modem (some models of this modem may be shipped without communications software), try installing the supplied software and verify its functionality with the modem.

### **Nothing Appears On The Screen When I Type In Terminal Mode**

Issue the command `ATE1` to the modem to enable command echo. This will let you see what you type.

### **Can't Connect at 56K**

Note: Current FCC regulations limit your maximum connection rate to 53K bits / s.

The number you are calling may not support V.90 or K56flex protocols. Some ISP's (**I**nternet **S**ervice **P**roviders) have special numbers that you must call to connect to 56K. Contact your service provider and ask if the number you are calling supports V.90 or K56flex connections to their service.

Check the maximum speed setting in the **Modem Properties** window. Go to **Start-Settings-Control Panel** and double-click the **Modems** icon. Highlight your modem by clicking once on the icon next to the modem and then click the **Properties** button. Select the **General** tab and look at

the setting in the *Maximum speed* box. Make sure this is set to 115200.

You may have other telephone devices connected to the phone line. To help your modem achieve the best connection possible, remove all extra devices connected to the telephone line when the modem is in use. This includes extension phones, answering machines, cordless phone bases, caller ID boxes, etc. Don't just disconnect the phone cable from the units. Disconnect the phone cable from the wall. This reduces the load on your phone line and keeps signal attenuation to a minimum. Not having loose phone line cords coming from your phone line sockets will help reduce the possibility of interference being transmitted to the phone line.

If you are attempting to make a call from a hotel or office, are you using a direct outside line or are you using a PBX hookup? If you have to dial "9" or some other number to reach an outside line, you are using a PBX. Do not use this modem on any digital or PBX phone system. The modem will not be damaged, but it is not compatible with a digital or digital PBX phone system. Before using your modem in a hotel or office, verify that the phone line to be used is compatible with PC fax modems. Try using the line connected to a fax machine. Fax machines are normally hooked-up to a direct outside line, not through a PBX or digital phone system.

The phone line you are using may not support a 56K connection.

# Appendix A: AT Command Set

## AT Commands

AT commands are issued to the modem to control the modem's operation and software configuration. AT commands can only be entered while the modem is in command mode. The format for entering AT commands is:

**TYPE:**            **ATXn**

where X is the AT command, and n is the specific value for that command.

**PRESS:**           **Enter**

Any command issued is acknowledged with a response in text format known as result codes. For multiple AT commands in the same command line, the commands are executed in the order received from the DTE. Should execution of a command result in an error, or a character not be recognized as a valid command, execution is terminated, the remainder of the command line is ignored, and the ERROR result code is issued. Otherwise, if all commands execute correctly, only the result code associated with the last command shall be issued; result codes for preceding commands are suppressed.

In the following listing, all commands and command values accepted by the modem are shown; any entries other than those shown cause the ERROR result code.

+++               **Escape sequence**

The escape sequence allows the modem to exit data mode and enter on-line command mode. While in on-line command mode, you may communicate directly to your modem using AT commands. Once you are finished, you may return to data mode using the ATO command. A pause, the length of which is set by the Escape Guard Time (S12), must be used after an escape sequence is issued. This pause prevents the modem from interpreting the escape sequence as data. The value of the escape sequence character may be changed using Register S2.

A/               **Repeat Last Command**

This command repeats the last command string entered. Do not precede this command with an AT prefix or conclude it by pressing Enter.

A               **Answer Command**

This command instructs the modem to go off-hook and answer an incoming call.

## **Bn**                      **Communication Standard Setting**

This command determines CCITT vs. Bell standard.

- B0:      Selects CCITT V.22 mode when the modem is at 1200 bits/s.
- B1:      Selects Bell 212A when the modem is at 1200 bits/s (default).
- B2:      Unselects V23 reverse channel ( same as B3).
- B3:      Unselects V23 reverse channel ( same as B2).
- B15:     Selects V.21 when the modem is at 300 bits/s.
- B16:     Selects Bell 103J when the modem is at 300 bits/s (default).

Result Codes:

- OK                      n = 0, 1, 15, 16
- ERROR                Otherwise

## **Cn**                      **Carrier Control**

The modem will accept the C1 command without error in order to ensure backward compatibility with communications software that issues the C1 command. However, this modem does not support the C0 command. The C0 command may instruct some other modems to not send carrier (i.e., it puts them in a receive-only mode).

- C0:      Transmit carrier always off.
- C1:      Normal transmit carrier switching.

Result Codes:

- OK                      n = 1
- ERROR                Otherwise

## **Dn**                      **Dial**

This command instructs the modem to begin the dialing sequence. The dial string (n, including modifiers and the telephone number) is entered after the ATD command.

A dial string can be up to 40 characters long. Any digit or symbol (0-9, \*, #, A, B, C, D) may be dialed as touch-tone digits. Characters such as spaces, hyphens, and parentheses do not count, they are ignored by the modem and may be included in the dial string to enhance readability.

The following may be used as dial string modifiers:

- L Redials last number. Should be the first character following ATD, ignored otherwise. The modem displays the dialing string in the following format: “Dialing...xxxxxxx” where “xxxxxxx” is the last number dialed.
- P Pulse dialing. (e.g. ATDPxxx. Dialing set to pulse as default.)
- T Touch-tone dialing (default). (e.g. ATDTxxx. Dialing set to tone as default.)
- , Pause during dialing. Pause for time specified in Register S8 before processing the next character in the dial string.
- W Wait for dial tone. Modem waits for a second dial tone before processing the dial string.
- @ Wait for quiet answer. Wait for five seconds of silence after dialing the number. If silence is not detected, the modem sends a NO ANSWER result code back to the user.
- ! Hook flash. Causes the modem to go on-hook for 0.5 seconds and then return to off-hook.
- ; Return to command mode. Causes the modem to return to command mode after dialing the number, without disconnecting the call.
- ^ Disable data calling tone transmission.
- S=n Dial a telephone number previously stored using the &Zn=x command (see the &Zn=x command for further information). The range of n is 0-3.
- \$ Bong tone detection.

**En                    Echo Command**

This command controls whether or not the characters entered from your computer keyboard are echoed back to your monitor while the modem is in command mode.

- E0:        Disables echo to the computer.
- E1:        Enables echo to the computer (default).

Result Codes:

- OK                    n = 0, 1
- ERROR                Otherwise

**Fn                    On-line Data Character Echo Command**

This command determines if the modem will echo data from the DTE. This modem does not support the F0 version of the command. However, the modem will accept F1, which may be issued by older communication software, to assure backward compatibility.

- F0:        On-line data character echo enabled (NOT SUPPORTED, ERROR).
- F1:        On-line character echo disabled.

Result Codes:

OK                    n = 1  
ERROR                Otherwise

**Hn                    Hook Control**

This command instructs the modem to go on-hook to disconnect a call, or off-hook to make the phone line busy.

H0:     Modem goes on-hook (default).  
H1:     Modem goes off-hook.

Result Codes:

OK                    n = 0, 1  
ERROR                Otherwise

**In                    Request ID Information**

This command displays specific product information about the modem.

I0:     Returns default speed and controller firmware version. (same as I3)  
I1:     Calculates ROM checksum and displays it on the DTE (e.g., 12AB).  
I2:     Performs a ROM check and calculates and verifies the checksum displaying OK or ERROR.  
I3:     Returns the default speed and the controller firmware version. (same as I0)  
I4:     Returns firmware version for data pump (e.g., 94).  
I5:     Returns the board ID: software version, hardware version, and country ID.  
I6     Response OK  
I7     Response OK  
I8     Response OK  
I9:     Returns country code (e.g., North America Ver. 1).

Result Codes:

OK                    n = 0-9  
ERROR                Otherwise

**Ln                    Monitor Speaker Volume**

This command sets speaker volume to low, medium, or high.

- L0: Selects lowest volume.
- L1: Selects low volume.
- L2: Selects medium volume (default).
- L3: Selects high volume.

Result Codes:

- OK n = 0, 1, 2, 3
- ERROR Otherwise

**Mn Monitor Speaker Mode**

This command turns the speaker on or off.

- M0: The speaker is off.
- M1: The speaker is on until the modem detects the carrier signal (default).
- M2: The speaker is always on when modem is off-hook.
- M3: The speaker is on until the carrier is detected, except while dialing.

Result Codes:

- OK n = 0, 1, 2, 3
- ERROR Otherwise

**Nn Modulation Handshake**

This command controls whether or not the local modem performs a negotiated handshake at connection time with the remote modem when the communication speed of the two modems is different.

- N0: When originating or answering, this is for handshake only at the communication standard specified by S37 and the ATB command.
- N1: When originating or answering, begin the handshake only at the communication standard specified by S37 and the ATB command. During handshake, fallback to a lower speed may occur (default).

Result Codes:

- OK n = 0, 1
- ERROR Otherwise

**On Return On-line to Data Mode**

- O0: Instructs the modem to exit on-line command mode and return to data

mode (see AT Escape Sequence, +++).

- O1: This command issues a retrain before returning to on-line data mode.
- O3: This command issues a rate renegotiation before returning to on-line data mode.

Result Codes:

OK                    n = 0, 1, 3  
ERROR                Otherwise

### **P                    Select Pulse Dialing**

This command configures the modem for pulse (non-touch-tone) dialing. Dialed digits are pulsed until a T command or dial modifier is received. Tone dial is the default setting.

### **Qn                    Result Code Control**

Result codes are informational messages sent from the modem and displayed on your monitor. Basic result codes are OK, CONNECT, RING, NO CARRIER, and ERROR. The ATQ command allows the user to turn result codes on or off.

- Q0: Enables modem to send result codes to the computer (default).
- Q1: Disables modem from sending result codes to the computer.

Result Codes:

OK                    n = 0, 1  
ERROR                Otherwise

### **T                    Select Tone Dialing**

This command instructs the modem to send DTMF tones while dialing. Dialed digits are tone dialed until a P command or dial modifier is received. This is the default setting.

### **Vn                    DCE Response Format**

This command controls whether result codes (including call progress and negotiation progress messages) are displayed as words or their numeric equivalents.

- V0: Not supported. Results are always text.
- V1: Displays result codes as text (default).

Result Codes:

OK                    n = 0, 1  
ERROR                Otherwise

**Wn                    Result Code Option**

W0:    CONNECT result code reports DTE speed. Disable protocol result codes.  
W1:    CONNECT result code reports DTE speed. Enable protocol result codes.  
W2:    CONNECT result code reports DCE speed. Enable protocol result codes (default).

Result Codes:

OK                    n = 0, 1, 2  
ERROR                Otherwise

**Xn                    Result Code Selection and Call Progress Monitoring**

This command enables tone detection options used in the dialing process. As these functions are chosen, the modem chipset's result codes are also affected. Therefore, this command is frequently used to control the modem chipset's responses. The primary function of this control is to control the modem chip set's call response capabilities.

**Extended Result Codes**

Disabled: Displays only the basic result codes OK, CONNECT, RING, NO CARRIER, and ERROR.  
Enabled: Displays basic result codes, along with the connect message and the modem's data rate, and an indication of the modem's error correction and data compression operation.

**Dial Tone Detect**

Disabled: The modem dials a call regardless of whether it detects a dial tone. The period of time the modem waits before dialing is specified in register S6.  
Enabled: The modem dials only upon detection of a dial tone, and disconnects the call if the dial tone is not detected within 10 seconds.

## Busy Tone Detect

Disabled: The modem ignores any busy tones it receives.

Enabled: The modem monitors for busy tones.

<u>Ext.</u>	<u>Result Code</u>	<u>Dial Tone Detect</u>	<u>Busy Tone Detect</u>
X0	Disable	Disable	Disable
X1	Enable	Disable	Disable
X2	Enable	Enable	Disable
X3	Enable	Disable	Enable
X4	Enable	Enable	Enable (default)
X5	Enable	Enable	Enable
X6	Enable	Enable	Enable
X7	Disable	Enable	Enable

Result Codes:

OK	n = 0, 1, 2, 3, 4, 5, 6, 7
ERROR	Otherwise

### **Yn**                      **Long Space Disconnect**

Long space disconnect is always disabled.

Y0: Disable long space disconnect (default).

Y1: Enable long space disconnect. (NOT SUPPORTED)

Result Codes:

OK	n = 0
ERROR	Otherwise

### **Zn**                      **Recall Stored Profile**

This command instructs the modem chip set to go on-hook and restore the profile saved by the last &W command. Either Z0 or Z1 restores the same single profile.

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

## **&Bn**                    **V.32 Auto Retrain**

This modem always auto retrains.

**&B0:** Disable V.32 auto retrain. ( NOT SUPPORTED)

**&B1:** Enable V.32 auto retrain (default).

Result Codes:

OK	n = 1
ERROR	Otherwise

## **&Cn**                    **Data Carrier Detect (DCD) Control**

Data Carrier Detect is a signal from the modem to your computer indicating that the carrier signal is being received from a remote modem. DCD normally turns off when the modem no longer detects the carrier signal.

**&C0:** The state of the carrier from the remote modem is ignored. DCD circuit is always on.

**&C1:** DCD turns on when the remote modem's carrier signal is detected, and off when the carrier signal is not detected (default).

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

## **&Dn**                    **DTR Control**

This command interprets how the modem responds to the state of the DTR signal and changes to the DTR signal.

**&D0:** Ignore. The modem ignores the true status of DTR and treats it as always on. This should only be used if your computer does not provide DTR to the modem.

**&D1:** If the DTR signal is not detected while in on-line data mode, the modem enters command mode, issues OK result code, and remains connected.

**&D2:** If the DTR signal is not detected while in on-line data mode, the modem disconnects (default). If this signal is not present, the modem will not answer or dial.

&D3: Monitor DTR signal when an on-to-off transition occurs, the modem performs a soft reset as if the ATZ command was received.

Result Codes:

OK	n = 0, 1, 2, 3
ERROR	Otherwise

### **&Fn                    Load Factory Settings**

This command loads the configuration stored and programmed at the factory. This operation replaces all of the command options and the S-register settings in the active configuration with factory values.

&F0: Recall factory setting as active configuration. (default)

### **&Gn                    V.22bis Guard Tone Control**

This command determines which guard tone, if any, to transmit while transmitting in the high band (answer mode). This command is only used in V.22 and V.22bis mode. This option is not used in North America and is for international use only.

&G0: Guard tone disabled (default).

&G1: Sets guard tone to 550 Hz.

&G2: Sets guard tone to 1800 Hz.

Result Codes:

OK	n = 0, 1, 2
ERROR	Otherwise

### **&Jn                    Auxiliary Relay option**

&J0: The auxiliary relay is never closed.

&J1: NOT SUPPORTED, responds ERROR.

Result Codes:

OK	n = 0
ERROR	Otherwise

### **&Kn                    Local Flow Control Selection**

&K0: Disable flow control.

&K1: Reserved.  
&K2: Reserved.  
&K3: Enable RTS/CTS flow control (default).  
&K4: Enable XON/XOFF flow control.

Result Codes:

OK	n = 0, 3, 4
ERROR	Otherwise

### **&Mn                    Asynchronous Communications Mode**

&M0: Asynchronous mode (default).  
&M1: Reserved.  
&M2: Reserved.  
&M3: Reserved.  
&M4: Reserved.

Result Codes:

OK	n = 0
ERROR	Otherwise

### **&Pn                    Pulse Dial Make-to-Break Ratio Selection**

This Command is effective only for Japan.

&P0 39/61 make/break ratio, 10PPS  
&P1 33/67 make/break ratio, 10PPS (default)  
&P2 33/67 make/break ratio, 20PPS

Result Codes:

OK	n = 0, 1, 2
ERROR	Otherwise

### **&Qn                    Asynchronous Communications Mode**

&Q0: Asynchronous Mode, buffered. **Same as \N0.**  
&Q1: Reserved.  
&Q2: Reserved.  
&Q3: Reserved.  
&Q4: Reserved.  
&Q5: Error Control Mode, buffered (default). **Same as \N3.**

&Q6: Asynchronous Mode, buffered. **Same as \N0.**

&Q7: Reserved.

&Q8: MNP error control mode. If an MNP error control protocol is not established, the modem will fallback according to the current user setting in S36.

&Q9: V.42 or MNP error control mode. If neither error control protocol is established, the modem will fallback according to the current user setting in S36.

Result Codes:

OK	n = 0, 5, 6, 8, 9
ERROR	Otherwise

### **&Sn                      Data Set Ready (DSR) Option**

This command selects DSR action.

&S0: DSR always ON (default).

&S1: DSR comes on when establishing a connection and goes off when the connection ends.

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

### **&V0                      View Active Configuration and Stored Profile**

This command is used to display the active profiles.

&V0: View active file

<u>Option</u>	<u>Selection</u>	<u>AT Cmd</u>
Comm Standard	Bell	B
CommandCharEcho	Enable	E
Speaker Volume	Medium	L
Speaker Control	OnUntilCarrier	M
Result Codes	Enable	Q
Dialer Type	Tone	T/P
ResultCode Form	Text	V
ExtendResultCode	Enabled	X
DialTone Detect	Enable	X
BusyTone Detect	Enable	X

LSD Action	Standard RS232	&C
DTR Action	Standard RS232	&D

Press any key to continue; ESC to quit.

<u>Option</u>	<u>Selection AT</u>	<u>Cmd</u>
V22b Guard Tone	Disable	&G
Flow Control	Hardware	&K
Error Control Mode	V42, MNP, Buffer	\N
Data Compression	V42bis/MNP5	%C
AutoAnswerRing#	0	S0
AT Escape Char	43	S2
CarriageReturn Char	13	S3
Linefeed Char	10	S4
Backspace Char	8	S5
Blind Dial Pause	2 sec	S6
NoAnswer Timeout	50 sec	S7
“;“ Pause Time	2 sec	S8

Press any key to continue; ESC to quit.

<u>Option</u>	<u>Selection AT</u>	<u>Cmd</u>
No Carrier Disc	2000 msec	S10
DTMF Dial Speed	95 msec	S11
Escape GuardTime	1000 msec	S12
Data Calling Tone	Disabled	S35
Line Rate	33600	S37
DSVD mode	Disabled	-SSE

Press any key to continue; ESC to quit.

Stored Phone Numbers

&Z0=

&Z1= 101

&Z2=

&Z3=

OK

**&Wn            Store Current Configuration**

This command stores certain command options and S-register values into the

modem's nonvolatile memory. The ATZ command or a power-up reset of the modem restores this profile.

Result Codes:

OK	n = 0
ERROR	Otherwise

**&Yn                    Select Stored Profile for Hard Reset**

This command does not change the behavior of the modem but is included for compatibility with applications that issue the &Y0 command:

&Y0: Select stored profile 0 on power-up  
&Y1: ERROR.

Result Codes:

OK	n = 0
ERROR	Otherwise

**&Zn=x                    Store Telephone Number**

This command is used to store up to four dialing strings in the modem's nonvolatile memory for later dialing. The format for the command is &Zn = "stored number" where n is the location 0?3 to which the number should be written. The dial string may contain up to 40 characters. The ATDS = n command dials using the string stored in location n.

Result Codes:

OK	n = 0, 1, 2, 3
ERROR	Otherwise

**\An                    Select Maximum MNP Block Size**

The modem will operate an MNP error corrected link using a maximum block size controlled by the parameter supplied.

\A0 64 characters.  
\A1 128 characters.  
\A2 192 characters.  
\A3 256 characters (DEFAULT).

Result Codes:

OK	n = 0, 1, 2, 3
ERROR	Otherwise

### **\Bn                    Transmit Break to Remote**

In non-error correction mode, the modem will transmit a break signal to the remote modem with a length in multiples of 100ms according to parameter specified. The command works in conjunction with the \K command.

\B1-\B9 Break length in 100ms units. (Default = 3.) (Non-error corrected mode only.)

Result Codes:

OK	If connected in data modem mode.
NO CARRIER	If not connected or connected in fax modem mode.

### **\G                        Modem Port Flow Control**

\G0: Returns an "OK" for compatibility (default).

\G1: NOT SUPPORTED responds ERROR.

Result Codes:

OK	n = 0
ERROR	Otherwise

### **\J                         Adjust Bits/s Rate Control**

When this feature is enabled, the modem emulates the behavior of modems that force the DTE interface to the line speed.

\J0: Turn off feature (default).

\J1: Turn on feature.

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

## **\Kn                    Break Control**

Controls the response of the modem to a break received from the DTE or the remote modem or the \B command. The response is different in three separate states. The first state is where the modem receives a break from the DTE when the modem is operating in data transfer mode:

- \K0 Enter on-line command mode, no break sent to the remote modem.
- \K1 Clear data buffers and send break to remote modem.
- \K2 Same as 0.
- \K3 Send break to remote modem immediately.
- \K4 Same as 0.
- \K5 Send break to remote modem in sequence with transmitted data.  
(Default.)

The second case is where the modem is in the on-line command state (waiting for AT commands) during a data connection, and the \B is received in order to send a break to the remote modem:

- \K0 Clear data buffers and send break to remote modem.
- \K1 Clear data buffers and send break to remote modem. (Same as 0.)
- \K2 Send break to remote modem immediately.
- \K3 Send break to remote modem immediately. (Same as 2.)
- \K4 Send break to remote modem in sequence with data.
- \K5 Send break to remote modem in sequence with data. (Same as 4.)  
(Default.)

The third case is where a break is received from a remote modem during a connection:

- \K0 Clear data buffers and send break to the DTE.
- \K1 Clear data buffers and send break to the DTE. (Same as 0.)
- \K2 Send a break immediately to DTE.
- \K3 Send a break immediately to DTE. (Same as 2.)
- \K4 Send a break in sequence with received data to DTE.
- \K5 Send a break in sequence with received data to DTE. (Same as 4.)  
(Default)

Result Codes:

OK	n = 0,1, 2, 3, 4, 5
ERROR	Otherwise

## **\Nn                    Error Control Mode Selection**

This command determines the type of error control used by the modem when

sending or receiving data.

\N0: Buffer mode. No error control (same as &Q6).

\N1: Direct mode.

\N2: MNP or disconnect mode. The modem attempts to connect in MNP 2-4 error control procedure. If this fails, the modem disconnects. This is also known as MNP reliable mode.

\N3: V.42, MNP, or buffer (default). The modem attempts to connect in V.42 error control mode. If this fails, the modem attempts to connect in MNP mode. If this fails, the modem connects in buffer mode and continues operation. This is also known as V.42/ MNP auto reliable mode (same as &Q5).

\N4: V.42 or disconnect. The modem attempts to connect in V.42 error control mode. If this fails, the call will be disconnected.

\N5: V.42 MNP or buffer (same as \N3)

\N7: V.42. MNP or buffer (same as \N3).

Result Codes:

OK n = 0, 1, 2, 3, 4, 5, 7

## **\Q                    Local Flow Control Selection**

\Q0: Disable flow control. Same as &K0.

\Q1: XON/XOFF software flow control. Same as &K4.

\Q2: CTS-only flow control. This is not supported, and the response is ERROR.

\Q3: RTS/CTS to DTE (default). Same as &K3.

Result Codes:

OK	n = 0, 1, 3
ERROR	Otherwise

## **\Rn                    Ring indicator signal off after the telephone call is answered (Compatibility command)**

\R0 ring indicator signal is off after the telephone call is answered

Result Codes:

OK	n = 0
ERROR	Otherwise

## **\Tn                    Inactivity Timer**

This command specifies the length of time (in minutes) that the modem will wait

before disconnecting when no data is sent or received. A setting of zero disables the timer. Alternatively, this timer may be specified in register S30. This function is only applicable to buffer mode.

Result Codes:

OK	n = 0– 255
ERROR	Otherwise

**\Wn                    Protocol Result Code**

\W0: Disable protocol result code

\W1: Enable protocol result code

\W2: Enable protocol result code

Result Codes:

OK	n = 0, 1, 2
ERROR	Otherwise

**\Xn                    XON/XOFF Pass Through**

\X0 Modem processes XON/XOFF flow control characters locally (DEFAULT).

\X1 Modem processes and pass XON/XOFF flow control characters.

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

**-Cn                    Data Calling Tone**

Data Calling Tone is a tone of certain frequency and cadence as specified in V.25 which allows remote Data/FAX/Voice discrimination. The frequency is 1300 Hz with a cadence of .5 s on and 2 s off.

-CO: Disabled (default).

-C1: Enabled.

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

## **%B View Numbers in Blacklist**

If blacklisting is in effect, this command displays the numbers for which the last call attempted in the past two hours failed. The ERROR result code appears in countries that do not require blacklisting.

## **%Cn Enable/Disable Data Compression**

Enables or disables data compression negotiation on an error corrected link.

%C0 Disables data compression

%C1 Enables both V.42 bis and MNP 5 data compression

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

## **%T19,0,nn Change Country Setting**

Changes the country setting so the modem can use the PSTN of that particular country. The proper syntax is: *AT%T19,0,nn* where *nn* is a code from the list below.

<u>Country</u>	<u>nn code</u>
Australia	01
Belgium	02
Denmark	03
Finland	04
France	05
Germany	06
Netherlands	07
Italy	08
New Zealand	09
Norway	0A
Spain	0B
Sweden	0C
Switzerland	0D
United Kingdom	0E
Austria	0F
Japan	10
Peoples Repub. of China	11
Korea	12
Malaysia	13
Singapore	14

Taiwan	15
Thailand	16
Indonesia	17
Portugal	18
North America (USA)	19
Ireland	1a
Hong Kong	1b
Canada	1c
Mexico	1d
India	1e
Vietnam	1f
Philippines	20
Greece	21
Hungary	22
Turkey	23
South Africa	24

Result Codes:

OK	n = 0, 24
ERROR	Otherwise

## *AT Commands for Testing and Debugging*

The following commands are to be used for testing and debugging only and are not meant for general use.

### **&Tn                    Self-Test Commands**

This command allows the user to perform diagnostic tests on the modem. These tests can help to isolate problems when experiencing periodic data loss or random errors.

&T0: Abort. Stops any test in progress.

&T1: Local analog loop. This test verifies modem operation, as well as the connection between the modem and computer. Any data entered at the local DTE is modulated, then demodulated, and returned to the local DTE. To work properly, the modem must be off-line.

&T3: Local digital loopback test.

&T6: Remote digital loopback test. This test can verify the integrity of the local modem, the communications link, and the remote modem. Any data entered at the local DTE is sent to, and returned from, the remote modem. To work properly, the modems must be on-line with error control disabled.

Result Codes:

OK	n = 0
CONNECT	n = 1, 3, 6
ERROR	Otherwise

### **&&C                    Write to/Read from DSP Register**

AT&&C<loc>,<val> writes the value <val> to DSP register at location <loc>.

AT&&C<loc> reads from location <loc>.

### **&&L                    Line-to-Line Loopback**

This command provides a loopback for line-to-line.

### **&&R                    Write to/Read from DSP RAM Location**

AT&&R<loc>,<val> writes the value <val> to DSP RAM location <loc>.

AT&&R<loc> reads from location <loc>.

**ATI11****Display Diagnostic Information for the last modem connection**

The “ATI11” command displays the following diagnostic information for the last modem connection. A value of “NA” will be displayed if that parameter is not applicable for that connection.

Table 1. Diagnostic Information

<u>Description</u>	<u>Example</u>	<u>Comments</u>
Last Connection	V.34	V.90/56K/V.34/V.32 - The last data connection is successful. Failure - The last data connection failed.
Initial Transmit Carrier Rate	33600	The upload connection rate at the first negotiation.
Initial Receive Carrier Rate	33600	The download connection rate at the first negotiation.
Final Transmit Carrier Rate	33600	The last upload connection rate.
Final Receive Carrier Rate	33600	The last download connection rate.
Protocol Negotiation Result	V.42	Possible results are: V.42, MNP or noEC
Data Compression Result	V.42bis	Possible results are: V.42bis, MNP5 or no Compression.
Estimated Noise Level	100	An average of the squared error between the received constellation point and the decision point.
Receive Signal Power Level	20	Receive signal (-dBm)
Transmit Signal Power Level	10	Transmit signal level (-dBm)
Round Trip Delay (msec)	60	Measured Round Trip Delay in ms
Near Echo Level (-dBm)	39	Measured Near Echo Level
Far Echo Level (-dBm)	60	Measured Far Echo Level

<u>Description</u>	<u>Example</u>	<u>Comments</u>
Transmit Frame Count	5000	Number of HDLC frames transmitted.
Transmit Frame Error Count	10	Number of frame errors transmitted
Receive Frame Count	5000	Number of HDLC frames received.
Receive Frame Error Count	10	Number of frame errors received
Retrain and Rate Negotiate Event by the local Modem	1	Number of retrains initiated by the local modem.
Retrain and Rate Negotiate Event by the remote Modem	1	Number of retrains initiated by the remote modem.
Call Termination Cause	0	0 -Call Terminated by Local Modem 1 -Call Terminated by Remote Modem 2 -No Answer - the Remote Modem did not answer 3 -Training Failure - the modems failed to negotiate V.34 or 56K protocols. 4 -Protocol Failure - the modems failed to negotiate V.42 protocol.
Robbed-Bit Signaling	6	The number of robbed-bits detected during the session.
Digital Loss	0	Digital Loss in dB.
Remote Server ID	nnn	The I.D. number of the remote server.

## S-Registers Reference

### *S-Registers Definitions*

S-registers generally affect how the AT commands perform. Contents of the registers can be displayed or modified when the modem is in command mode.

To display the value of an S-register:

TYPE:            ATSn?

where n is the register number.

PRESS:           Enter

To modify the value of an S-register:

TYPE:            ATSn = r

where n is the register number, and r is the new register value.

PRESS:           Enter

### **S0                    Auto Answer Ring Number**

This register determines the number of rings the modem will count before automatically answering a call. Enter 0 (zero) if you do not want the modem to automatically answer at all. When disabled, the modem can only answer with an ATA command.

Range:            0–255

Default:          0

Units:            rings

### **S1                    Ring Counter**

This register, Ring Counter, is read only. The value of S1 is incremented with each ring. If no rings occur over a six second interval, this register is cleared.

Range:            0–255

Default:          0

Units:            rings

### **S2                    AT Escape Character (user defined)**

This register determines the ASCII valued used for an escape sequence. The default is the + character. The escape sequence allows the modem to exit data mode and enter command mode when on-line. Values greater than 127 disable the escape sequence.

Range: 0–255  
Default: 43  
Units: ASCII

### **S3 Command Line Termination Character (user defined)**

This register determines the ASCII values as the carriage return character. This character is used to end command lines and result codes.

Range: 0–127, ASCII decimal  
Default: 13 (carriage return)  
Units: ASCII

### **S4 Response Formatting Character (user defined)**

This register determines the ASCII value used as the line feed character. The modem uses a line feed character in command mode when it responds to the computer.

Range: 0–127, ASCII decimal  
Default: 10 (line feed)  
Units: ASCII

### **S5 Command Line Editing Character (user defined)**

This register sets the character recognized as a backspace and pertains to asynchronous only. The modem will not recognize the backspace character if it is set to a value that is greater than 32 ASCII. This character can be used to edit a command line. When the echo command is enabled, the modem echoes back to the local DTE the backspace character, an ASCII space character, and a second backspace character. This means a total of three characters are transmitted each time the modem processes the backspace character.

Range: 0–32, 127  
Default: 8 (backspace)  
Units: ASCII

### **S6 Wait Before Dialing**

This register sets the length of time, in seconds, that the modem must wait (pause) after going off-hook before dialing the first digit of the telephone number. The modem always pauses for a minimum of two seconds, even if the value of S6 is less than two seconds. The wait for dial tone call progress feature (W dial modifier in the dial string) will override the value in register S6. This operation, how-

ever, may be affected by some ATX options according to country restrictions.

Range: 2-65  
Default: 2  
Units: seconds

### **S7 Connection Completion Time-Out**

This register sets the time, in seconds, that the modem must wait before hanging up because carrier is not detected. The timer is started when the modem finishes dialing (originate), or goes off-hook (answer). In originate mode, the timer is reset upon detection of an answer tone if allowed by country restriction. The timer also specifies the wait for silence time for the @ dial modifier in seconds. S7 is not associated with the W dial modifier.

Range: 1-255  
Default: 50  
Units: seconds

### **S8 Comma Dial Modifier Time**

This register sets the time, in seconds, that the modem must pause when it encounters a comma (,) in the dial command string.

Range: 0-65  
Default: 2  
Units: seconds

### **S10 Automatic Disconnect Delay**

This register sets the length of time, in tenths of a second, that the modem waits before hanging up after a loss of carrier. This allows for a temporary carrier loss without causing the local modem to disconnect. The actual interval the modem waits before disconnecting is the value in register S10.

Range: 1-254  
Default: 20  
Units: 0.1 seconds

### **S11 DTMF Dialing Speed**

This register determines the dialing speed which is prefixed for each country.

Range: 50-150  
Default: 95  
Units: 0.001 seconds

**S12 Escape Guard Time**

This register sets the value (in 20 ms increments) for the required pause after the escape sequence (default 1 s).

Range: 0-255  
Default: 50  
Units: 0.02 seconds

**S14 General Bit Mapped Options Status**

Indicates the status of command options. Only bit 2 and bit 5 are used, read only.

Bit 3 Result codes (&Vn)  
0 = Numeric (V0)  
1 = Verbose (V1) (Default)

Bit 6 Pulse dial PPS selection (&Pn)  
0 = 10 PPS (&p0, &p1) (Default)  
1 = 20 PPS (&p2)

Default: 8 (00001000b)

**S21 V.24/General Bit Mapped Options Status**

Indicates the status of command options. Only bits 3, 4 and 5 are used, read only.

Bits 3-4 DTR behavior (&Dn)  
0 = &D0 selected  
1 = &D1 selected  
2 = &D2 selected (Default)  
3 = &D3 selected

Bit 5 DCD behavior (&Cn)  
0 = &C0 selected  
1 = &C1 selected (Default)

Default: 48 (00110000b)

**S22 Results Bit Mapped Options Status**

Indicates the status of command options. Only bits 4, 5 and 6 are used, read only.

Bits 4-6 result codes (Xn)

0 = X0 selected

4 = X1 selected

5 = X2 selected

6 = X3 selected

7 = X4 selected (Default)

Bit 7 Pulse dial make/break ratio (&Pn)

0 = 33/67 make/break ratio (&P1, &P2) (Default)

1 = 39/61 make/break ratio (&P0)

Default: 112 (01110000b)

## **S24 Timer to Control Sleep Mode**

This command displays the number of seconds of inactivity (no characters sent from the DTE, no RING) in the off-line command state before the modem places itself into standby mode. A value of zero prevents standby mode.

**Note:** If a number between 1 and 4 is entered for this register, it will set the value to 5, and the inactivity before standby will be 5 seconds. This is done for compatibility with previous products which allowed time-outs down to 1 s.

Range: 0, 5-255

Default: 10

## **S28 V.34 Modulation Enable/Disable**

This register enables/disables V.34 modulation.

0 = disabled, 1-255 = enabled,

Range: 0-255

Default: 1

## **S30 Inactivity Timer**

S30 specifies the length of time (in minutes) that the modem will wait before disconnecting when no data is sent or received. This function is only applicable to buffer mode.

Range: 0-255

Default: 0

Units: minutes

### **S32 Synthetic Ring Volume**

This register specifies a synthetic ring volume in dB with an implied minus sign.

Range:

Default: 16

### **S33 Synthetic Ring Frequency**

This register specifies a synthetic ring frequency. Valid ranges are 0-5, with 0= disabled and 1-5 corresponding to 5 ring frequencies.

Range: 0-5

Default: 0

### **S35 Data Calling Tone**

Data Calling Tone is a tone of certain frequency and cadence as specified in V.25 which allows remote Data/FAX/Voice discrimination. The frequency is 1300 Hz with a cadence of .5 s on and 2 s off.

0 = disabled, 1 = enabled,

Range: 0-1

Default: 0

### **S36 Negotiation Fallback (default 7)**

This register specifies the action to take in the event of negotiation failure when error control is selected.

S36 = 0, 2	Hang up.
S36 = 1, 3	Fall back to an asynchronous connection.
S36 = 4, 6	Attempt MNP. If MNP fails, hang up.
S36 = 5, 7	Attempt MNP. If MNP fails, fall back to asynchronous connection.

### **S37 Dial Line Rate (default 0)**

S37 = 0	maximum modem speed (default)
S37 = 1	reserved
S37 = 2	1200 bits/s and 75 bits/s
S37 = 3	300 bits/s
S37 = 4	reserved

S37 = 5	1200 bits/s
S37 = 6	2400 bits/s
S37 = 7	4800 bits/s
S37 = 8	7200 bits/s
S37 = 9	9600 bits/s
S37 = 10	12000 bits/s
S37 = 11	14400 bits/s
S37 = 12	16800 bits/s
S37 = 13	19200 bits/s
S37 = 14	21600 bits/s
S37 = 15	24000 bits/s
S37 = 16	26400 bits/s
S37 = 17	28800 bits/s
S37 = 18	31200 bits/s
S37 = 19	33600 bits/s

**S38                    56K Dial Line Rate (default 1)**

There are 3 S-registers which support K56flex, V.90, and V.34 connections. S38 sets the maximum downstream speed that the modem attempts to connect. To disable V.90, set S38 to 0. The S37 register is used to control the upstream V.34 rate. Use the S109 register to select between K56flex and V.90 protocols.

S38 = 0	V.90 disabled
S38 = 1	autorate - maximum achievable connection (default)
S38 = 2	29333 bits / s
S38 = 3	30666 bits / s
S38 = 4	32000 bits / s
S38 = 5	33333 bits / s
S38 = 6	34666 bits / s
S38 = 7	36000 bits / s
S38 = 8	37333 bits / s
S38 = 9	38666 bits / s
S38 = 10	40000 bits / s
S38 = 11	41333 bits / s
S38 = 12	42666 bits / s
S38 = 13	44000 bits / s
S38 = 14	45333 bits / s
S38 = 15	46666 bits / s
S38 = 16	48000 bits / s
S38 = 17	49333 bits / s
S38 = 18	50666 bits / s
S38 = 19	52000 bits / s
S38 = 20	53333 bits / s

**S40 ETC Startup Autorating (default 0, range 0-2)**

S20=0 Startup with normal autorating.  
S20=1 Startup at initial rate of 4800 or below.  
S20=2 Startup at initial rate of 9600 or below.

Range: 0-2  
Default: 0

**S42 Auto Rate (default 1, range 0-1)**

This command is used for testing and debugging only.

V.32bis and V.22bis auto rate is disabled. Retrain operation is disabled or enabled in data mode, and fallback is disabled in data mode.

0 = auto rate disabled, 1 = enabled.

Range: 0-1  
Default: 1

**S43 Auto Mode (default 1, range 0-1)**

This command is used for testing and debugging only.

V.32bis startup auto mode operation disabled.

0 = auto mode disabled, 1 = enabled.

Range: 0-1  
Default: 1

**S48 LAPM Error Control and Feature Negotiation (default 7)**

S48 = 7 Negotiation enabled.  
S 48 = 128 Negotiation disabled; forces immediate fallback options specified in S36.

The following chart lists the S36 and S48 configuration settings necessary to negotiate certain types of connections:

	<u>S48=7</u>	<u>S48 =128</u>
S36 = 0, 2	LAPM or hangup	do not use
S36 = 1, 3	LAPM or async	async

S36 = 4, 6	LPAM, MNP, or hangup	MNP or hangup
S36 = 5, 7	LAPM, MNP, or async	MNP or async

### **S89                   Timer to Control Sleep Mode**

This command displays the number of seconds of inactivity (no characters sent from the DTE, no RING) in the off-line command state before the modem places itself into standby mode. A value of zero prevents standby mode.

**Note:** If a number between 1 and 4 is entered for this register, it will set the value to 5, and the inactivity before standby will be 5 seconds. This is done for compatibility with previous products which allowed time-outs down to 1 s.

Range:               0, 5-255  
 Default:            10

### **S90                   Local Phone Status**

This register tells the status of the local phone. It is read only.

0 = local phone on-hook  
 1 = local phone off-hook

### **S91                   Line Transmit Level**

This register is effective only for Japan. It specifies the line transmit level in dB with an implied minus sign.

Range:               6-15  
 Default:            15  
 Units:               1 dB

### **S92                   Direct Connect Transmit Level (default 20)**

Sets the transmit level, in dBm for direct connect. This value may have different settings for different phones.

### **S109                 K56flex and V.90 Selection (default 1)**

Use this register to disable 56K connections or to choose between K56flex and V.90 protocols. The default setting (S109=1) will attempt K56flex first, then V.90, and then V.34 depending upon the central site modem being called and your phone line conditions. (see the next page for listing.)

S109 = 0	Disable all 56K connections
S109 = 1	K56flex first, then V.90 (default)
S109 = 2	V.90 only. K56flex disabled

Table 2. The Result Code Summary

<u>Result Code</u>	<u>Description</u>
OK	Command executed
CONNECT	Modem connected to line
RING	A ring signal has been detected
NO CARRIER	Modem lost carrier signal, or does not detect carrier signal, or does not detect answer tone
ERROR	Invalid command
CONNECT 1200 EC*	Connection at 1200 bits/s
NO DIALTONE	No dial tone detected
BUSY	Busy signal detected
NO ANSWER8	No quiet answer
CONNECT 2400 EC*	Connection at 2400 bits/s
CONNECT 4800 EC*	Connection at 4800 bits/s
CONNECT 9600 EC*	Connection at 9600 bits/s
CONNECT 14400 EC*	Connection at 14400 bits/s
CONNECT 19200 EC*	Connection at 19200 bits/s
CONNECT 7200 EC*	Connection at 7200 bits/s
CONNECT 12000 EC*	Connection at 12000 bits/s
CONNECT 16800 EC*	Connection at 16800 bits/s
CONNECT 300 EC*	Connection at 300 bits/s
CONNECT 21600 EC*	Connection at 21600 bits/s
CONNECT 24000 EC*	Connection at 24000 bits/s
CONNECT 26400 EC*	Connection at 26400 bits/s
CONNECT 28800 EC*	Connection at 28800 bits/s
CONNECT 31200 EC*	Connection at 31200 bits/s
CONNECT 33600 EC*	Connection at 33600 bits/s
CONNECT 38400 EC*	Connection at 38400 bits/s
CONNECT 57600 EC*	Connection at 57600 bits/s
CONNECT 115200 EC	Connection at 115200 bits/s
DELAYED	Delay is in effect for the dialed number
BLACKLISTED	Dialed number is blacklisted
BLACKLIST FULL	Blacklist is full
CONNECT 29333 EC*	Connection at 29333 bits/s, V.90 rate
CONNECT 30666 EC*	Connection at 30666 bits/s, V.90 rate
CONNECT 32000 EC*	Connection at 32000 bits/s, V.90 rate
CONNECT 33333 EC*	Connection at 33333 bits/s, V.90 rate
CONNECT 34666 EC*	Connection at 34666 bits/s, V.90 rate
CONNECT 36000 EC*	Connection at 36000 bits/s, V.90 rate
CONNECT 37333 EC*	Connection at 37333 bits/s, V.90 rate
CONNECT 38666 EC*	Connection at 38666 bits/s, V.90 rate
CONNECT 40000 EC*	Connection at 40000 bits/s, V.90 rate
CONNECT 41333 EC*	Connection at 41333 bits/s, V.90 rate
CONNECT 42666 EC*	Connection at 42666 bits/s, V.90 rate
CONNECT 44000 EC*	Connection at 44000 bits/s, V.90 rate
CONNECT 45333 EC*	Connection at 45333 bits/s, V.90 rate
CONNECT 46666 EC*	Connection at 46666 bits/s, V.90 rate

## Result Code

## Description

CONNECT 48000 EC*	Connection at 48000 bits/s, V.90 rate
CONNECT 49333 EC*	Connection at 49333 bits/s, V.90 rate
CONNECT 50666 EC*	Connection at 50666 bits/s, V.90 rate
CONNECT 52000 EC*	Connection at 52000 bits/s, V.90 rate
CONNECT 53333 EC*	Connection at 53333 bits/s, V.90 rate

## K56flex Result Codes

## Description

CONNECT 32000 EC*	Connection at 32000 bits/s, 56K rate
CONNECT 34000 EC*	Connection at 34000 bits/s, 56K rate
CONNECT 36000 EC*	Connection at 36000 bits/s, 56K rate
CONNECT 38000 EC*	Connection at 38000 bits/s, 56K rate
CONNECT 40000 EC*	Connection at 40000 bits/s, 56K rate
CONNECT 42000 EC*	Connection at 42000 bits/s, 56K rate
CONNECT 44000 EC*	Connection at 44000 bits/s, 56K rate
CONNECT 46000 EC*	Connection at 46000 bits/s, 56K rate
CONNECT 48000 EC*	Connection at 48000 bits/s, 56K rate
CONNECT 50000 EC*	Connection at 50000 bits/s, 56K rate
CONNECT 52000 EC*	Connection at 52000 bits/s, 56K rate
CONNECT 54000 EC*	Connection at 54000 bits/s, 56K rate
CONNECT 56000 EC*	Connection at 56000 bits/s, 56K rate
CONNECT 58000 EC*	Connection at 58000 bits/s, 56K rate
CONNECT 60000 EC*	Connection at 60000 bits/s, 56K rate

\* EC only appears when the Extended Result Codes configuration option is enabled. EC is replaced by one of the following symbols, depending upon the error control method used:

V42bis—V.42 error control and V.42bis data compression.

V42—V.42 error control only.

MNP 5— MNP class 4 error control and MNP class 5 data compression.

MNP 4— MNP class 4 error control only.

NoEC—No error control protocol.

## *Appendix B: Communications Regulations*

### *FCC REGULATIONS*

The following statements are provided in accordance with the Federal Communications Commission (FCC) regulations. Please read these statements carefully before installing your modem.

### *FCC PART 68 REQUIREMENTS*

This equipment complies with Part 68 of the FCC Rules. On the bottom of this equipment is a label that contains, among other information, the FCC Registration Number and Ringer Equivalence Number (REN) for this equipment. If requested, this information must be given to the telephone company.

The REN is used to determine the maximum number of devices connected to your telephone line that will ring in response to an incoming call. In most, but not all, areas, the total REN of devices connected to a line should not exceed five (5.0). To find out the total permitted in your area, contact your local telephone company.

If your telephone equipment causes harm to the telephone network, the telephone company can discontinue your service temporarily. If possible, the company will notify you in advance. But if advance notice isn't practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC.

Your telephone company can make changes in its facilities, equipment, operations, or procedures that could affect the operation of your equipment. If so, you will be notified in advance so you can make the changes needed to maintain uninterrupted service.

If you experience trouble with this equipment, please contact the manufacturer at the address given in this manual. The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning.

DECLARATION of CONFORMITY

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio and television reception, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**CAUTION: CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.**

Requirements for End Users:

**Notice:** The Canadian Department of Communications label identifies certified equipment. This certification means the equipment meets certain telecommunications network requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment users should ensure that connection to the line is allowed by the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a telephone extension cord. Compliance with the above conditions may not prevent degradation of service in certain situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

**Caution:** Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

EUROPEAN NOTICE

The Fax-Modem DataLink (FM560LKI) complies with the European Directives 89/336/EEC, “Electromagnetic Compatibility” (EMC) and 73/23/EEC “Low Voltage Directive”.