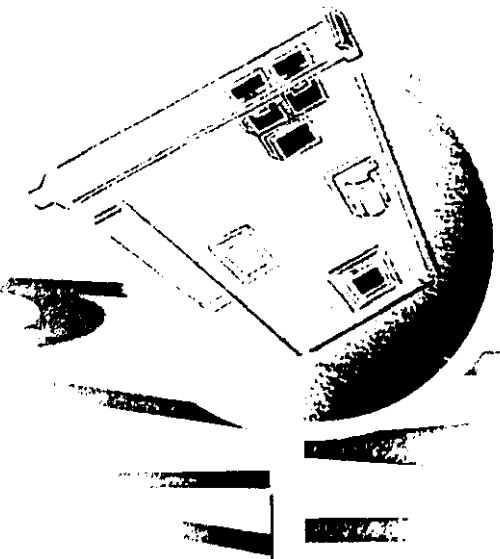


56000BPS PCI INTERNAL MODEM

**HOST BASED
V.90 PCI**

**HOST BASED
V.90 PCI**



WS-5614PMD(G)/PDD(G)
M20082123200

56000BPS PCI INTERNAL MODEM

The information contained in this manual has been verified at the time of this manual's printing. The manufacturer reserves the right to make any changes and improvements in the product described in this manual at any time and without notice.

All registered trademarks are the property of their respective owners.

Copyright ©1998 All rights reserved. No reproduction of this document in any form is permitted without prior written authorization from the manufacturer.

First Edition Version 1.0

Table of Contents

| | | | |
|--|-----------|--|-----------|
| Section One - Introduction | 4 | Section Five - AT Command Set | 20 |
| 1.1 Modem Compatibility | 4 | 5.1 Executing Commands | 20 |
| Section Two - Installing The Modem | 5 | 5.2 Command Format | 20 |
| 2.1 Unpacking Your Modem | 5 | 5.3 AT Commands | 20 |
| 2.2 Modem Installation | 5 | 5.4 Extended AT Commands | 22 |
| 2.2.1 Hardware Installation | 5 | 5.5 V.42bis Commands | 23 |
| 2.2.2 Jack Connections | 6 | Section Six - S Register Summary | 24 |
| 2.2.3 Setting Up Modem Under Windows 95 | 8 | Section Seven - Result Code Summary | 25 |
| 2.2.4 Checking Modem Functionality | 12 | Section Eight - Specifications | 26 |
| 2.2.5 Correcting "Can't Open Port" Message | 14 | | |
| Section Three - Installing and Configuring Communication Software | 16 | | |
| 3.1 Accessing the Fax Functions | 16 | | |
| 3.2 Using Your Modem | 16 | | |
| 3.3 Where To Go From Here | 17 | | |
| Section Four - Troubleshooting Communication Software | 18 | | |
| 4.1 Modem does not respond to commands. | 18 | 4.4 Modem experiences errors while online with a remote The modem | 19 |
| 4.2 Modem dials, but does not connect. | 18 | | |
| 4.3 Modem makes a connection, but no data appears on your screen. | 18 | | |

Section One - Introduction

Your new 56Kbps modem is a high speed PC communication peripheral that combines Data and FAX functions into a single device. This high performance modem connects your computer to all popular modems and fax machines available today.

This manual provides installation and operating instructions for your modem. Also included in this manual are listings and descriptions of the standard AT command set, S-registers, and troubleshooting tips. Be certain to read *Section Two - Installing the Modem* thoroughly before performing the actual installation. Our customer support experience has shown that many costly and time-consuming calls can be avoided with closer attention to the installation information provided here.

1.1 Modem Compatibility

Your modem is compatible with the following standards:

- V.90 (56Kbps down stream only)
- K56 flex (56Kbps down stream only)
- V.32bis (14400 bps)
- V.23 (1200/75 bps)
- V.22 (1200 bps)
- Bell 212A (1200 bps)
- V.17 (14400 bps FAX)
- V.27ter (4800 bps FAX)
- V.42bis (data compression)
- MNP 5 (data compression)
- TIA/EIA 602 AT Command set
- TIA/EIA 578 Class I Fax Command Set
- Plug and Play PCI Specification Version 1.0a
- V.34+ (33600 bps)
- V.34 (28800 bps)
- V.32 (9600 bps)
- V.22bis (2400 bps)
- V.21 (300 bps)
- Bell 103 (300 bps)
- V.29 (9600 bps FAX)
- V.21 Channel-2 (300 bps FAX)
- V.42 (error correction)
- MNP 2-4 (error correction)
- V.8 Start-up sequence
- V.8 bis Start-up sequence

** WS-5614PMD(G) is a Lucent chipset based Data Fax modem








*** WS-5614PDD(G) is a Lucent chipset based modem with Voice functions

Section Two - Installing The Modem

This section explains how to connect your modem to your computer.

2.1 Unpacking Your Modem

In addition to this manual, your modem package contains the following items:

- One modem 
- One software manual 
- Modem driver diskette 
- Voice socket Bracket  (WS-5614PDD(G))
- Modern software diskette 
- or disc 
- One telephone cable 

NOTE: Contact your dealer if any of the above items are missing from your package.

2.2 Modem Installation

The following steps provide instructions for installing your modem.

2.2.1 Hardware Installation

CAUTION: Before removing the cover from your computer, turn off and unplug the computer and all attached peripherals. Discharge any static electricity from your body by touching any metal surface before removing the modem from its antistatic bag.

1. Turn off and unplug your computer from the AC outlet.
2. Remove the computer's cover according to its owner's manual.
3. Select any available PCI bus slot.
4. Remove the bracket and save the screw.
5. Carefully insert the modem into the selected slot. Apply even pressure until the modem is firmly seated.
6. Secure the bracket with the screw saved earlier. Store the bracket for future use.

7. Replace the computer cover and plug in your computer. Reconnect all cables.

8. Connect the telephone cable into the modem's "LINE" connector (see Figure 2-2). Attach the other end into the telephone walljack.

9. Connect the sound jacks between MODEM and your Sound Card or the bracket provided with the package. Please carefully read your Sound Card User's Manual for connector pin assignment of Sound Card.

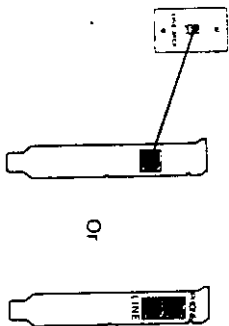
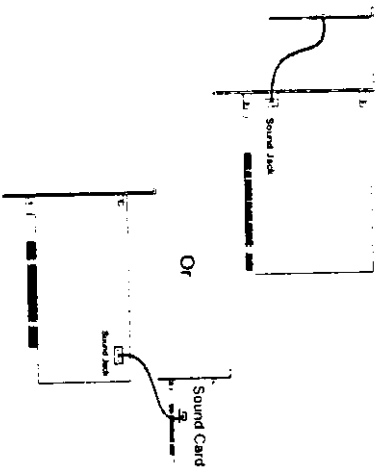


Figure 2-2



This completes the internal modem installation.

NOTE: The back of your modem should look like Figure 2-2

2.2.2 Jack Connections

Sound Jacks

If you purchased WS-5614PDD(G) Voice MODEM, you can use all voice functions through telephone handset (Telephone set connection is not allowed in some countries. Therefore, phone jack connection is not available for some country versions.), sound jacks on MODEM card or sound jacks on sound card. Please refer to figure 2-3 (WS-5614PDD) and 2-4 (WS-5614PDDG)

MODEM Ring Wake-Up

You can also connect the MODEM Ring Wake-Up pins (figure 2-3 and figure 2-4) to mother board. Please check the detailed usage information with mother board user's manual.

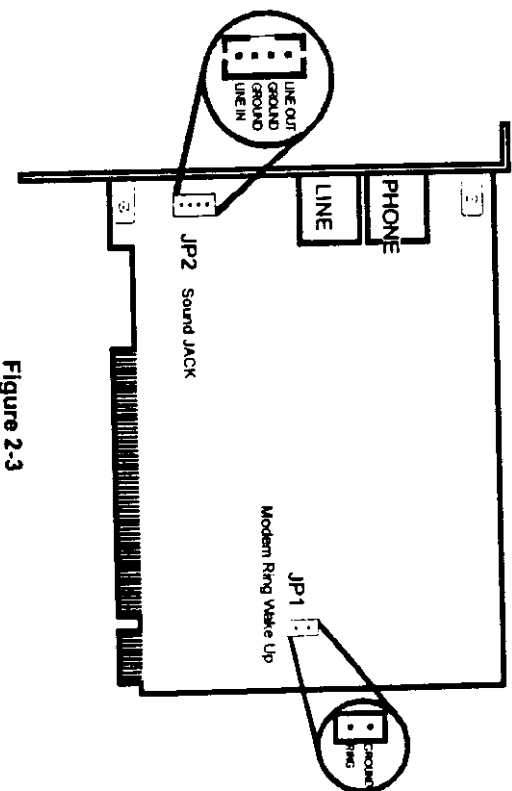
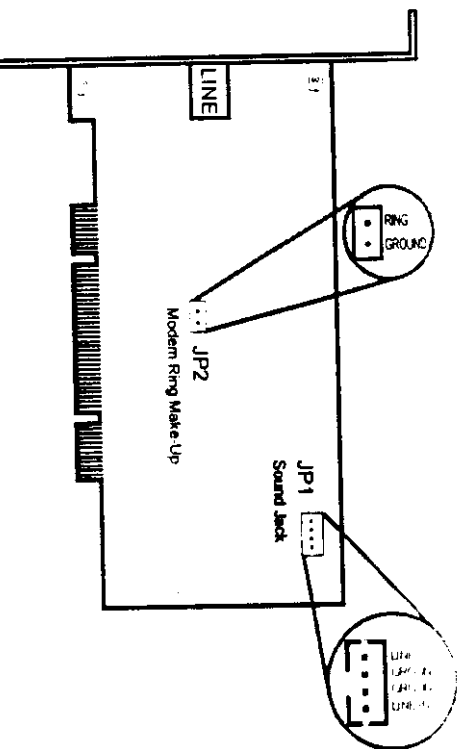
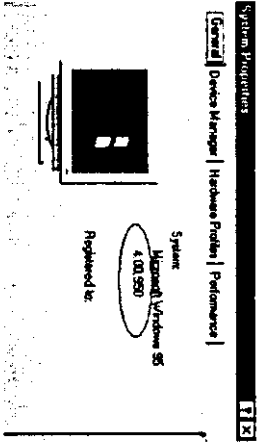


Figure 2-3



2.2.3 Setting Up Modem Under Windows 95

This internal modem supports the Plug and Play feature. It allows your computer to set the optimal configuration for the modem and communication software automatically.

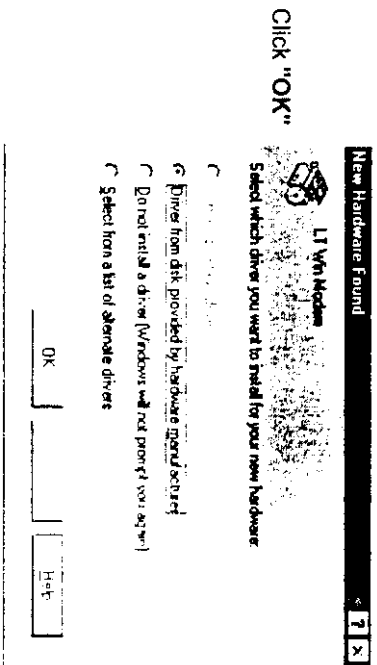


*PART A (OSR1 Windows 95 version 4.00.950)

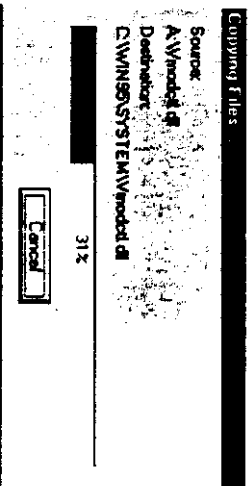
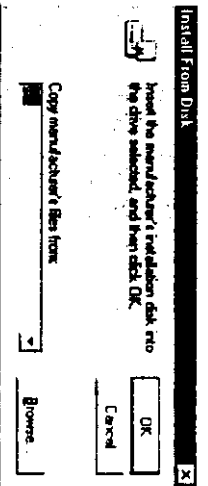
*Go to Part B (pg. 10) if you have OSR2

A Windows[®]95 modem driver diskette labeled with "WS-5614PMD(G) Modem Driver" or "WS-5614PDD(G) Modem driver" was provided with the modem. Please follow the procedure below to install the modem driver:

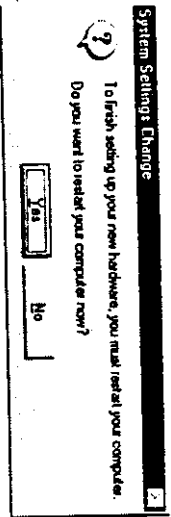
1. Turn ON computer power after completing hardware installation.
2. Windows[®]95 will automatically detect the Plug and Play modem and display a "LT Win Modem" message under New Hardware Found as shown below.



3. Next, insert disk labeled "Modem Driver Disk" in A:\ or B:\, then click "OK". If you have a CD-ROM disc, change the path as X:\Drivers (X = CD-ROM drive letter).



4. Windows 95 has finished installing your modem and will prompt you to restart Windows.

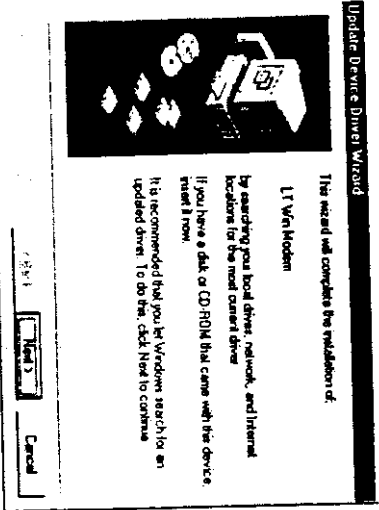


5. Proceed to Section 2.2.4.

PART B(OSR2 Windows 95 version 4.00.950B)

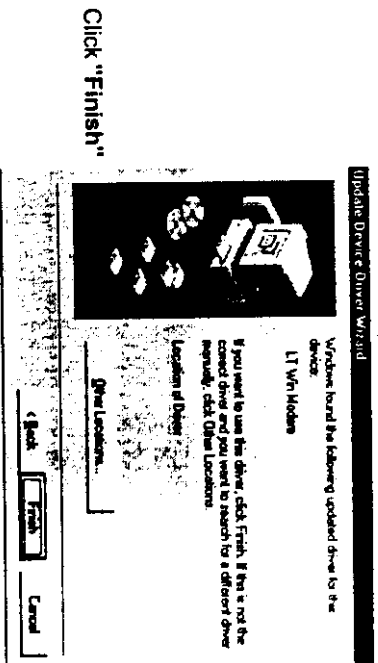
A Windows®95 modem driver diskette labeled with "WS-5614P:MD(G) Modem Driver" or "WS-5614PDD(G) Modem Driver" was provided with the modem. Please follow the procedure below to install the modem driver:

1. Turn ON computer power after completing hardware installation.
2. Windows®95 will automatically detect the Plug and Play modem and display a "LTWinmodem" message under Update Device Driver Wizard menu as shown below:

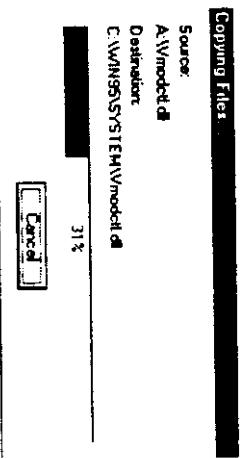
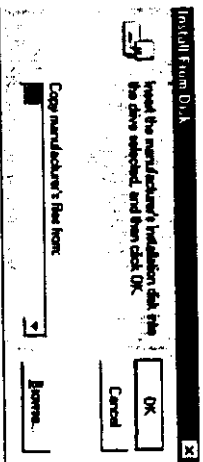


Click "Next"

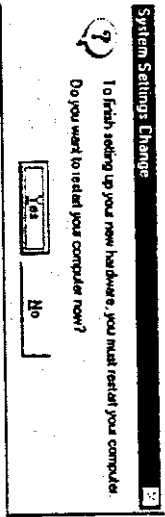
3. Next, insert disk labeled "Modem Driver Disk" in A:\ or B., then click "OK". If you have a CD-ROM disc, change the path as X:\Drivers (X = CD-ROM drive letter).



Click "Finish"



4. Windows 95 has finished installing your modem and will prompt you to restart Windows.

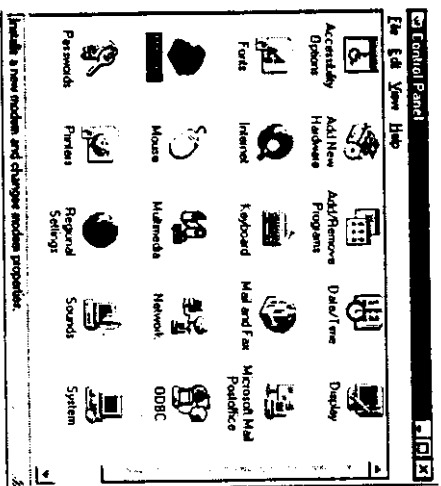


Click "Yes"

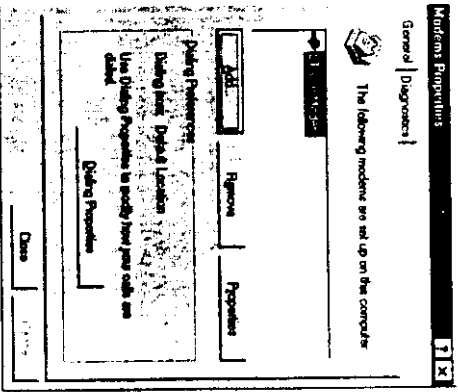
5. Proceed to Section 2.2.4.

2.2.4 Checking Modem Functionality

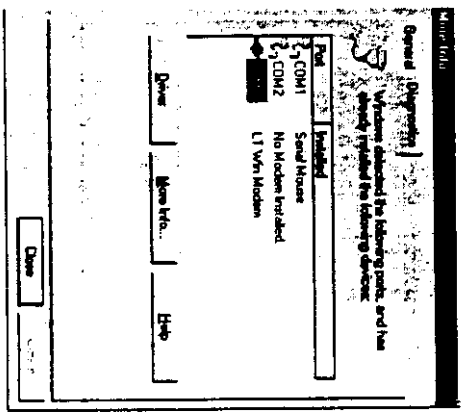
1. Start Windows 95 ==> Click "Start" ==> "Settings" ==> "Control Panel" ==> "Modem".



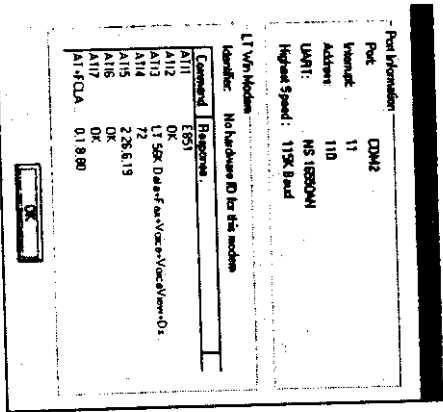
2. Click "General" and highlight "LT Win Modem" as shown below.



3. Click diagnostic and highlight the designated COM as shown below. Click "More Info ..." and the system will communicate with the modem.



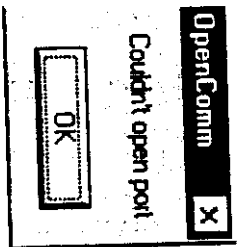
Click "More Info"



Click "OK"

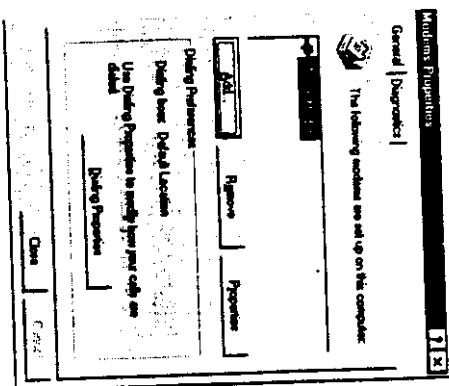
If there is no error message, then your modem is set-up properly and is functional.

If you have the error message "Couldn't Open Port", please follow the instructions in Section 2.2.5.

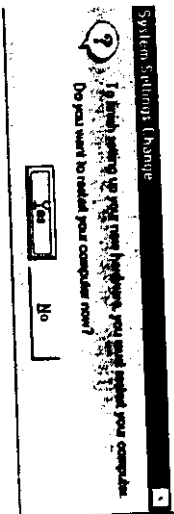


2.2.5 Correcting "Can't Open Port" Message

1. Click "Start" ==> "Settings" ==> "Control Panel" ==> "Modems" and remove the "LT Win Modem" from modem list.



2. Restart Windows 95 and follow the instructions starting from Section 2.2.3.



Section Three - Installing and Configuring Communication Software

NOTE: Install the communications software according to the software user's manual. Be certain that you are configuring it to communicate with the modem on the same COM port and IRQ line used by the modem.

You may be prompted by the software to configure certain communication parameters. We suggest the following settings:

Baud rate: 57,600 bps Data bits: 8
Parity: None Stop bit: 1
Flow Control: RTS/CTS Initialization string: AT&f

The AT commands used by the modem are compatible with the command set used by Intel modems. Select a "Lucent" modem type if prompted by your data communications software. Select "Generic Class 1" or "Lucent" modem type when prompted by your FAX software.

3.1 Accessing the Fax Functions

The Fax functions of your modem are application driven and are accessed only through application software. Consult your software manual regarding procedures on using these features.

3.2 Using Your Modem

Common modem functions (i.e. dialing, file transfer, faxing) are performed by using communication software in conjunction with the modem.

NOTE: The communications software user's manual provides a list of the modem's functions and should be studied to determine which communication needs

The modem may also perform basic communication functions (such as dialing) via the AT commands. A list and description of all AT commands appear in *Section Five*. Since the communication software is designed to shield the user from the difficult and cumbersome AT commands, we strongly suggest that all modem operations be performed via the software.

3.3 Where To Go From Here

If you have difficulties getting your modem to work, read *Section Four* to find information as well as answers to commonly asked questions and problems concerning the communication software. Sections Five through Ten contain reference material (AT commands, S-register, and Result-codes, etc.) and can be skipped.

NOTE: It is important that you familiarize yourself with the functions available from the included software by reading its manual (you may also use any other commercially available communication software). The software manual includes detailed information on all common modem functions.

Section Four - Troubleshooting Communication

Software

Your modem is designed to provide reliable and trouble-free service. Should you experience any difficulty, however, the information contained in this section will assist you in determining and resolving the source of the difficulty. If you cannot resolve your difficulty after reading this chapter, contact your dealer or vendor for assistance.

4.1 Modem does not respond to commands.

1. Make sure the modem is not configured with a conflicting COM port and IRQ setting. If another device in your system is also configured as the same COM port, it will not work. Similarly, IRQ settings may not overlap.
2. Make sure the communication software is configured with the correct COM and IRQ settings (same COM port and IRQ line as the modem). Your communication software will not be able to send-to and receive-from your modem any data if it does not have the correct COM and IRQ settings of the modem.
3. Make sure the modem is properly initialized by the communication software. Your modem may have been improperly initialized by the software because you have selected an incorrect modem type. Select "Lucent" modem type in your data communication software (select "Generic class 1" and "Lucent" in your Fax software, respectively). You may also be prompted to enter an initialization string by the software. Use AT&F as your initialization string.
4. If you are running Microsoft® Windows 95, make sure that the modem is properly configured in Windows (see Section 2.2.2)

4.2 Modem dials, but does not connect.

1. Make sure the COM port setting is identical on both the system AND the software.
2. Make sure the phone line is working properly. Annoisy line will prevent proper modem operation.

4.3 Modem makes a connection, but no data appears on your screen.

1. Make sure all communication parameters (baud rate, data, stop, and parity

- bits) are properly configured and identical on both sides. Be certain hardware flow control (RTS/CTS - default) is enabled in both the modem and the communication software.
2. Press the **ENTER** key several times. The remote system may be waiting to receive your data before it begins.
 3. Make sure the correct terminal emulation mode is being used in the software (refer to software manual).

4.4 Modem experiences errors while online with a remote modem.

1. Make sure Call Waiting is turned off.
2. Make sure RTS/CTS hardware flow control is enabled.
3. Make sure the data speed is not faster than your computer's capability. Most IBM compatibles are capable of 19,200bps under DOS and Windows 3.x. Operating at higher speeds under Windows 95 requires a faster CPU (Pentium 100MHz or better).



Section Five - AT Command Set

5.1 Executing Commands

Your modem is in Command Mode upon power-on and is ready to receive and execute "AT" commands. The modem remains in Command Mode until it makes a connection with a remote modem. Commands may be sent to the modem from an attached terminal or a PC running a communication program.

This modem is designed to operate at common DTE speeds ranging from 115.2Kbps (or 57.6Kbps) to 300bps. All commands and data must be issued to the modem using one of the valid DTE speeds.

5.2 Command Format

All commands must begin with the AT prefix, followed by the command letter and ended with the ENTER key. Spaces are allowed in the command string to increase command line readability, but are ignored by the modem during command execution. All commands may be typed in either upper or lower case, but not mixed. A command issued without any parameters is considered as specifying the same command with a parameter of "0".

Example:

ATLENTER!

This command causes your modem to lower its speaker volume.

5.3 AT Commands

All default settings are printed in bold text.

| <u>Command</u> | <u>Function</u> |
|----------------|---|
| A | Answer incoming call |
| A/ | Repeat last command. Do not precede A/ with AT or follow with ENTER |
| B0 | CCITT mode @ 1200 bps |
| B1 | Bell mode @ 1200 bps |
| B15 | CCOTT mode @ 300 bps |
| B16 | Bell mode @ 300 bps |
| D_ | 0 - 9, A-D, # and * |
| L | last number redial |

| | |
|------|---|
| DS=n | Dial one of the four stored phone numbers (n=0-3) in the modem's nonvolatile memory |
| E0 | Commands echo disabled |
| E1 | Commands echo enabled |
| +++ | Escape Characters - switch from Data Mode to Command Mode |
| H0 | Modem on-hook (hang up) |
| H1 | Modem off-hook (make busy) |
| D | Firmware & Device ID |
| H | Checksum code |
| R | ROM test |
| B | Firmware & Device ID |
| L0 | Low speaker volume |
| L1 | Low speaker volume |
| L2 | Medium speaker volume |
| L3 | High speaker volume |
| M0 | Speaker always off |
| M1 | Speaker on until carrier detected |
| M2 | Speaker always on |
| N0 | Automode Disabled, Modem handshake speed specified by S37 |
| O0 | Return to Data Mode |
| O1 | Initiate an equalizer retrain and return to Data Mode |
| P | Pulse dial |
| Q0 | Result codes enabled |
| Q1 | Result codes disabled |
| P | pulse dial |
| T | tone dial |
| W | wait for second dial tone |
| V | Switch to speakerphone mode |
| . | pause |
| @ | wait for five seconds of silence |
| ! | flash |
| : | return to Command Mode after dialing |

| | |
|------|---|
| SR? | Read S-register r, where r = 0-95 |
| SR=n | Set S-register to value n (r=0-95; n=0-255) |
| T | Tone Dial |
| V0 | Numeric responses |
| V1 | Text responses |
| X0 | Hayes Smartmodem 300 compatible responses/blind dialing |
| X1 | Same as X0 plus all CONNECT responses/blind dialing |
| X2 | Same as X1 plus dial tone detection |
| X3 | Same as X1 plus busy signal detection/blind dialing |
| X4 | All responses and dial tone and busy signal detection |
| Z | Reset and recall user profile |
| N1 | Automode Enabled, Modem handshake |

5.4 Extended AT Commands

| <u>Command</u> | <u>Function</u> |
|----------------|--|
| &C0 | Carrier Detect (CD) always on |
| &C1 | Turn on CD when remote carrier is present |
| &D0 | DTR signal ignored |
| &D1 | Modem returns to Command Mode after DTR toggle |
| &D2 | Modem hangs up and returns to the Command Mode after DTR toggle |
| &D3 | Modem resets after DTR toggle |
| &F | Load factory default configuration |
| &G0 | Guard tone disabled |
| &G1 | Guard tone disabled |
| &G2 | 1800 Hz guard tone enabled |
| &M0 | Asynchronous operation |
| &P0 | 39%-61% make/break ratio @ 10 pps (33%-67% make/break ratio @ 10 pps for Japan only) |

5.5 V.42bis Commands

| <u>Command</u> | <u>Function</u> |
|----------------|--|
| &S0 | (33%-67% make/break ratio @ 20 pps for Japan only) |
| &S1 | DSR always ON |
| &T0 | DSR is off in command mode, on in online mode |
| &T1 | Terminate test in progress |
| &T6 | Run Local Analog Loopback |
| &V | Run Remote Digital Loopback Test |
| | View Active Profiles |
| &K0 | Disable flow control |
| &K3 | Enable RTS/CTS hardware flow control (data mode default) |
| &K4 | Enable XON/XOFF software flow control |
| &Q0 | Normal mode data link only (same as \N0) |
| &Q5 | V.42 data link with fallback options |
| &Q6 | Normal mode (speed buffering) data link only (same as \N0) |
| %C0 | Data compression disable |
| %C1 | V.42bis/MNP5 data compressions enabled |
| \N0 | Normal mode (speed buffering) only |
| \N1 | Direct mode only |
| \N2 | MNP mode only |
| \N3 | V.42MNP/Normal automode |
| \N4 | V.42 mode only |
| \Q0 | Disable flow control (Same as &K0) |
| \Q1 | Enable XON/XOFF flow control (Same as &K4) |
| \Q3 | Enable CTS/RTS flow control (Same as &K3) |
| \V0 | Disable protocol result code appended to DCE speed |
| \V1 | Enable protocol result code appended to DCE speed |

Section Six - S Register Summary

Your modem has 16 registers, designated S0 through S89. Table 6-1 shows the registers, their functions, and their default values. Some registers can have their values changed by commands. If you use a command to change a register value, the command remains in effect until you turn off or reset your modem. Your modem then reverts to the operating characteristics specified in its nonvolatile memory. Refer to Section Five for information on how to use the AT commands to manipulate the S registers.



Table 6-1 S - Registers

| Register | Function | Range/units | Default |
|----------|--------------------------------|---------------------|---------|
| S0 | Auto-answer/Ring | 0-255/rings | 0 |
| S1 | Ring counter | 0-255/rings | 0 |
| S2 | Escape code character | 0-255/ASCII | 43 |
| S3 | Carriage return character | 0-127/ASCII | 13 |
| S4 | Linefeed character | 0-127/ASCII | 10 |
| S5 | Backspace character | 0-127/ASCII | 8 |
| S6 | Dial tone wait time | 2-255/seconds | 2 |
| S7 | Remote carrier wait time | 1-255/seconds | 50 |
| S8 | Comma pause time | 0-255/seconds | 2 |
| S10 | Carrier loss time | 1-254/0.1 second | 20 |
| S11 | Touch-tone dialing speed | 50-255/milliseconds | 95 |
| S12 | Escape character guard time | 0-255/0.02 second | 50 |
| S28 | V.34 Modulation enable/disable | 0-255/ASCII | 1 |
| S35 | Data calling tone | 0-255/ASCII | 0 |
| S37 | Connection speed | Bit-mapped register | 0 |
| S89 | Sleep mode timer | 0-5-255 | 10 |

Section Seven - Result Code Summary

| | | | |
|--------------------|----|-------------------|----|
| OK | 0 | CONNECT | 1 |
| RING | 2 | NO CARRIER | 3 |
| ERROR | 4 | CONNECT 1200 EC* | 5 |
| NODIALTONE | 6 | BUSY | 7 |
| NO ANSWER | 8 | CONNECT 2400 EC* | 10 |
| CONNECT 4800 EC* | 11 | CONNECT 9600 EC* | 12 |
| CONNECT 14400 EC* | 13 | CONNECT 19200 EC* | 14 |
| CONNECT 57600 EC* | 18 | CONNECT 7200 EC* | 24 |
| CONNECT 12000 EC* | 25 | CONNECT 38400 EC* | 29 |
| CONNECT 300 EC* | 40 | CONNECT 21600 EC* | 55 |
| CONNECT 24000 EC* | 56 | CONNECT 26400 EC* | 57 |
| CONNECT 28800 EC* | 58 | CONNECT 31200 EC* | 59 |
| CONNECT 33600 EC* | 60 | CONNECT 16800 EC* | 86 |
| CONNECT 115200 EC* | 87 | DELAYED | 88 |
| BLACKLISTED | 89 | BLACKLISTFULL | 90 |

NOTE: EC only appears when AT & A3 and a setting of ATX1 or greater is enabled. EC is replaced by one of following symbols, depending upon the error control method used:

- /LAPM V.42 error correction only
- /LAPM/V42BIS V.42 error correction and V.42bis data compression
- MNP MNP error correction only
- MNP/MNP5 MNP error correction and MNP5 data compression

Section Eight - Specifications

| | |
|-------------------|--|
| Modulation std.: | V. 90, K56flex, V. 34+, V. 34, V. 32bis, V. 32, V. 29, V. 27ter, V. 22bis, V. 23, V. 22, V. 21, V. 17, Bell 212/103, |
| Compression: | V. 42bis, MNP Class 5 |
| Error Correction: | V. 42, MNP Classes 2-4 |
| FAX Group: | Group III |
| FAX Command: | TIA/EIA 578 class 1 |
| Transmit level: | -12 dBm +/- 1 dB (vary with country) |
| Sensitivity: | -43 dBm |
| UART: | 16550 compatible |
| Power: | .75 W max |
| Temperature: | 0 to 55 degrees C, operating; -20 to 80 degrees C, non-operating |

INFORMATION TO THE USER

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device. Pursant 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 or television reception. Which can be determined by turning the equipment off and on the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate 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.

This booklet is available from the US government Printing Office
*Washington, DC 20402, Stock NO. 004-000-00345-4.

CAUTION: Any changes of modifications not expressly approved by the grantee of this device could void the users authority to operate the equipment.

