3Com U.S. Robotics

56K* Voice Internal PCI

Manual

P/N: 2.024.506

This manual covers installation and operating instructions for the following modems:

3Com U.S. Robotics® 56K* Voice Internal PCI

*IMPORTANT! In accordance with the ITU standard for 56K transmissions (V.90), this modem is capable of 56 Kbps downloads. However, due to varying line conditions, the actual speeds you experience may be lower. Uploads from users to server equipment travel at speeds up to 31.2 Kbps. An analogue phone line compatible with the V.90 standard and an Internet provider or corporate host site compatible with the V.90 standard are necessary for these high-speed downloads.
See **http://www.3com.com/56k** for details.

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Welcome to 56K* Information Access

The International Telecommunication Union (ITU) determines the technical protocols that communications devices must use to operate with each other. Modems that comply with ITU standards can "talk" to other standards-compliant modems and fax machines worldwide. The ITU has decided on a worldwide standard for 56K modem technology. With a 3Com U.S. Robotics modem, you can get 56K Internet access from any service provider who offers the ITU V.90 standard or 3Com 56K technology. 3Com is working with providers everywhere to quickly upgrade their service to the ITU V.90 standard.

* IMPORTANT! In accordance with the ITU standard for 56K transmissions (V.90), this modem is capable of 56 Kbps downloads. However, due to varying line conditions, the actual speeds you experience may be lower. Uploads from users to server equipment travel at speeds up to 31.2 Kbps. An analogue phone line compatible with the V.90 standard and an Internet provider or corporate host site compatible with the V.90 standard are necessary for these high-speed downloads. See **http://www.3com.com/56k** for details.

Product Features

Modulation Schemes

ITU-T V.90
ITU-T V.34 (Inc 33,600)
ITU-T V.32bis
ITU-T V.32
ITU-T V.22bis
ITU-T V.22
ITU-T V 23
ITU-T V.21

Error Control and Data Compression Schemes

ITU-T V.42
ITU-T V.42bis
MNP 2-5

Fax Modulation Schemes

ITU-T V.17
ITU-T V.29
ITU-T V.27ter
ITU-T V.21

Fax Standards

EIA 578 Class 1 FAX
EIA 592 Class 2.0 FAX

V.90 Front Channel Link Rates

28000, 29333, 30666, 32000, 33333, 34666,
36000, 37333, 38666, 40000, 41333, 42666,
44000, 45333, 46666, 48000, 49333, 50666,
52000, 53333, 54666, 56000, 57333

V.90 Back Channel Link Rates

4800, 7200, 9600, 12000, 14400, 16800,
19200, 21600, 24000, 26400, 28800, 31200

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V.34 Link Rates

4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800, 31200, 33600

V.32bis Link Rates

4800, 7200, 9600, 12000, 14400

Additional Link Rates

300, 1200/75 (V.23), 1200, 2400

Fax Link Rates

2400, 4800, 7200, 9600, 12000, 14400

Voice Product Features

If your new modem has voice capabilities, the following information will apply:

Speakerphone

With the addition of a microphone, a set of external, powered speakers (each purchased separately), and the appropriate software (included on CD-ROM), your new voice modem provides all the convenience of a full-duplex speakerphone. Unlike many half-duplex speakerphones, your modem allows you to converse normally without annoying echoes and distortion. Simply plug the speakers into the socket on the modem identified with the ((⟶ and the microphone into the socket with the ⟋ icon and you are ready to go.

Personal Voice Mail

Personal Voice Mail turns your modem into a full-featured messaging system. Enjoy the convenience of professional voice mail in your home or office. With Personal Voice Mail and the appropriate software, you can record

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custom greetings, receive messages, and set up multiple voice "mailboxes." You can even access your voice messages remotely.

Your modem will automatically detect incoming fax/data/voice calls and route them appropriately.

Hardware Installation (Read Me First)

- The modem card must only be used in data terminal equipment (DTE), e.g. computer, that has a screw down cover/lid. As unsafe voltages (TNV) exist on the modem card, disconnect the modem card from the telephone line while the cover (lid) of the DTE (computer) is removed.

- Installation of the modem card in a DTE (computer) which does not require a tool to open the cover (lid), will render the product approval permit void.

- During installation of the modem card, care must be taken. There should be at least 2mm of air gap between the modem card and other components within the DTE (computer) in which the modem card is installed.

- Please attach the label provided with the modem card to your DTE (computer). The label reads:

  Disconnect the telephone line before opening the cover (lid) of the DTE (computer). Do not connect the customer equipment (modem) to the telephone line, while the cover (lid) of the DTE (computer) is open.

Installing the modem with Windows® 95, Windows 98, and Windows NT 4.0

Plug and Play (PNP) Installation

Simply plug your new modem into your computer, power up, and be ready to work. The operating system recognizes and configures the modem for you. The modem must be installed before any software is loaded.

Your 3Com U.S. Robotics® modem is a Plug and Play device. However, Plug and Play will not work if you do not have resources available or if devices on your system are not reporting resource usage correctly. Your modem requires one COM port and one IRQ setting.

How to Insert the Modem into the Computer

Before you unplug anything, label the cords or make a sketch of how things are connected. This can be helpful when you want to plug things back in later.

> To avoid being shocked, make sure your computer and all peripheral devices are turned off and unplugged.

> Before installing your modem, write its serial number in the space provided on the first page of this manual. You will find the serial number underneath the bar code on the white label on the modem.
>
> Serial Number_____

1. Turn off your computer and unplug it from the electrical outlet.

2. Unplug any peripheral devices (printer, monitor, keyboard, mouse, etc.) from the computer.

3. Remove the cover of the computer.Refer to your computer manufacturer's manual, if you need instructions.

4. Your modem is designed as a PCI card. Hold the modem so that the black connectors are pointing at the floor and the speaker and other components (speaker, processor, etc.) are facing you.

   If the silver bracket is on the left, you have a PCI card.
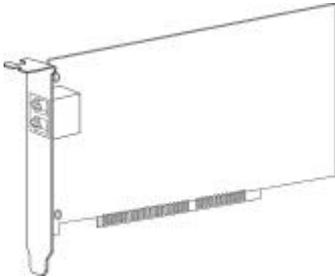
5. Find an empty PCI expansion slot that is at least as long as the silver edge of your modem. (PCI slots are white and usually shorter than ISA slots.) Unscrew and remove the expansion slot cover. It is the long narrow piece of metal that keeps dust from entering through the opening perpendicular to the slot.

ISA expansion slot
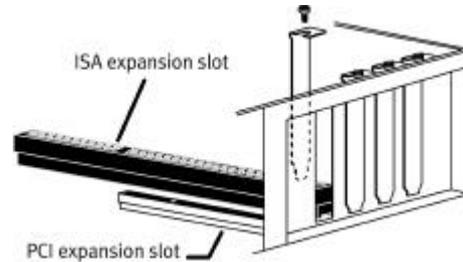
PCI expansion slot

6. Holding the modem at each corner, align the silver edge with the empty

expansion slot. Push down gently until the modem snaps into the slot.

You need to apply a little pressure to seat the modem properly. Sometimes a gentle back and forth motion helps fit the modem all the way into the slot. If you feel resistance, the modem may not be properly lined up with the slot. Do not force it. Take the modem all the way out and try again.

7. Once the modem is inserted, fasten it firmly into place using the screw that you removed in step 4.

8. Replace the cover of the computer.

9. If you currently have a phone plugged into the wall socket you plan

to use for the modem, disconnect the telephone cord from the socket.

The phone socket you use must be for an ANALOGUE phone line, the line most commonly found in homes. Most phones in office buildings are wired through digital lines. Be sure you know what type of line you have. The modem will be damaged if you use a digital phone line.

10. Plug one end of the phone cord included with the modem into the modem socket labelled

11. Plug the other end of the phone cord into the wall socket.

Note:

If you want to use a telephone on the same line as the modem when the modem is not in use, plug the telephone and modem cable into the telephone adapter supplied with the modem.

to speaker   to microphone
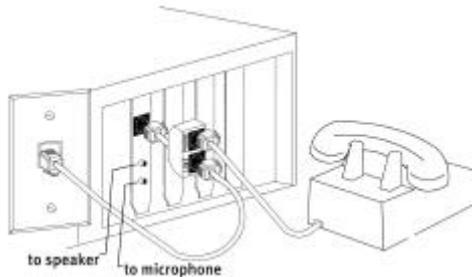
The adapter has a plug on one end and two sockets on the other end.

You cannot use the modem and a phone at the same time if they share the same telephone line.

12. As your modem is a voice modem, it came with a microphone. Plug the microphone into the socket labelled 🎤. You should also attach a set of powered speakers (not included) to the socket labelled 🔊.

13. Plug the power cords, cables, and peripherals back into the computer and turn on the computer.

14. Start Windows.

15. Next you will need to install the modem's drivers.

Installing Modem Drivers with Windows 95

1. When you see this screen,
   - if you have a CD-ROM that contains your modem's drivers, insert the CD-ROM into your CD-ROM drive.
   - if you have a disk that contains your modem's drivers, insert the disk into your disk drive.

   Click **Next**.

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If this screen does not appear, refer to "Plug and Play Does Not Detect Your Modem" on page 36.

2. Click **Finish**. Windows will copy the files to your hard drive.

3. After Windows has finished copying files, the installation wizard will search for "Wave Device for Voice Modem". Click on Finish to continue and please repeat process from Step 2 above.

4. When Windows finishes copying your files, verify that the modem installation was a success.

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5. Click the Windows **Start** button and point to **Settings**. Then click **Control Panel**.

6. Double-click the **Modem** icon.

7. In the "Modems Properties" screen, you should see a description of your modem. This means the installation was a success. Click **OK.**

If you do not see your modem listed, the installation was unsuccessful. Refer to "Plug and Play Does Not Detect Your Modem" on page 36.

8. Next, click the **Diagnostics** tab at the top of the "Modems Properties" screen. Write down the COM setting for your modem in the following space. You may need to know this

setting when you install your communications software.

COM Port_____

9. Click **More Info….** The modem's status screens should appear in the box. Click **OK**.

If you do not see your modem's status screens when you click **More Info**, the installation was unsuccessful. Refer to "Plug and Play Does Not Detect Your Modem" on page 36.

You are ready to install communications software. Refer to the manual of the communications software for instructions on installation.

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After you install your communications software, you are ready to use the modem.

Installing Modem Drivers with Windows 98

1. When you see this screen, Windows has detected the modem. Click **Next**.

If this screen does not appear, go to "Plug and Play Does Not Detect Your Modem" on page 36.

2. Make sure the **Search for the best driver for your device** option is checked. Then click **Next**.

3. When you see the following screen:
   - if you have a CD-ROM that contains your modem's drivers, check **CD-ROM drives** option and insert the CD-ROM into your CD-ROM drive.

- if you have a disk that contains your modem's drivers, check the **Floppy disk drives** option and insert the disk into your disk drive.

4. The next screen tells you that Windows has found the driver for your modem. Click **Next**.

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After Windows has finished copying files, the installation wizard will look for the "Wave Device for Voice Modem". Click on "Next" to continue and please repeat process from Step 2.

5. Click Finish.

6. When Windows is finished copying files, you should verify that the modem installation was a success. Click the Windows **Start** button and point to **Settings**. Then click **Control Panel**.

7. Double-click the **Modems** icon.

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8. In the "Modems Properties" screen, you should see a description of your modem. This means the installation was a success. Click **OK**.

If you do not see your modem listed, the installation was unsuccessful. Refer to "Plug and Play Does Not Detect Your Modem" on page 36.

9. Next, click the **Diagnostics** tab at the top of the "Modems Properties" screen. Write down the COM setting for your modem in the following space. You may need to know this setting when you install your communications software.

COM Port_____

You are ready to install communications software. Refer to the manual of the communications software for instructions on installation.

After you install your communications software, you are ready to use the modem.

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Installing Modem Drivers with Windows NT 4.0 without PNP Enabled

1. After installing the modem, turn on your Windows NT workstation.

2. Insert the installation disk into the disk drive, or CD-ROM into the CD-ROM drive.

3. Click **Start** and select **Run**.

4. Type **A:\Setup** (if using a diskette) or **D:\Setup** (if using a CD-ROM) and click **OK**.

5. When the Setup program starts, click **Install**.

6. The resource page contains the configuration information of your modem in Windows NT. COM port, I/O address, and Interrupt Request Line are the three resources that may require adjustment.

   The Setup program should have detected available resources and entered them. If you want to use other settings, change them now.

7. When this is complete, click **OK**.

8. Please select the relevant country followed by OK.

9. Remove the installation disk or CD-ROM from the appropriate drive and click **Yes** to restart the computer.

If you need to uninstall the modem, rerun the **setup.exe** program from the installation disk.

You are ready to install communications software. Refer to the manual of the communications software for instructions on installation.

After you install your communications software, you are ready to use the modem.

Installing Modem Drivers with Windows NT 4.0 with PNP Enabled

1. After installing the modem, turn on your Windows NT workstation.

2. After the Windows NT login, Windows NT will auto-detect your modem hardware and the "New Hardware Found" screen appears.

3. Select **Driver from disk provided by hardware manufacturer** and click **OK**.

4. Insert the installation disk or CD-ROM into the appropriate drive. Select. **A:** for disk drive or **D:** for CD-ROM drive.

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5. Click **OK**. In the **Select Device** window your modem's model name should appear.

6. Click on your modem and then click **OK**.

7. A screen will indicate that the files are being copied.

8. When the modem window comes up, you know that the files are copied. Go to the **Resource** page.

9. The resource page contains the configuration information of your modem in Windows NT. COM port, I/O address, and Interrupt Request Line are the three resources that may require adjustment. The Setup program should have detected available resources and entered them. If you want to use other settings, change them now.

10. When this is complete, click **OK**.

11. Please select your relevant country followed by OK.

12. Windows NT will indicate that there has been a "System Settings" change and that you must restart your computer.

13. Remove the installation disk or CD-ROM from the appropriate drive and click **Yes** to restart the computer.

> If you need to uninstall the modem, rerun the **setup.exe** program from the installation disk.

You are ready to install communications software. Refer to the manual of the communications software for instructions on installation.

After you install your communications software, you are ready to use the modem.

Uninstalling the modem with Windows® 95, Windows 98, and Windows NT 4.0

The process for removing your modem from your computer differs whether your operating system is Windows 95x or Windows NT.

Windows 95 and Windows 98

1. Click Windows **Start**, point to **Settings** and click **Control Panel**.

2. Double-click the **System** icon and click the **Device Manager** tab. Double click **Modem** followed by the **56K Voice Internal PCI**.

3. Click on the **Port Settings** tab. and click on **Uninstall**.

4. Click **OK** to remove the device and click on **OK** again to complete the operation.

5. Shut down your system. Click **Start**. Click **Shut Down**. Click **Yes**.

6. When your computer is shut down, turn it off.

7. Unplug the computer's power cord from the computer.

8. Remove the computer's cover.

9. Remove the modem from its expansion slot.

10. Plug your computer's power cord back into the computer.

Windows NT 4.0

1. Click **Windows Start**, point to **Settings** and click **Control Panel**.

2. Double-click the **Winmodem** icon.

3. Click the **Uninstall** button to remove the modem.

4. Click **Yes** to uninstall the modem.

5. Click **Yes** to restart the computer now.

6. When your computer is shut down, turn it off.

7. Unplug the computer's power cord from the computer.

8. Remove the computer's cover.

9. Remove the modem from its expansion slot.

10. Plug your computer's power cord back into the computer.

Troubleshooting

Read This First!

1. Click Windows **Start**, point to **Settings**, and click **Control Panel**.
2. Double-click the **Modems** icon.
3. Click the **Diagnostics** tab.
4. Click on the **COM** port that your modem is assigned to, so that it is highlighted. If you do not see your modem on this screen, you need to shut down the computer and uninstall the modem. Reinstall your modem following the directions in the "Installing the modem with Windows 95, Windows 98, and Windows NT 4.0" chapter.
5. Click **More Info**. You should see a list of the modem's ATI commands. Click **OK** and exit out of all open screens. If the ATI commands do not appear, your modem is not properly installed. Reinstall your modem following the directions in the "Installing the modem with Windows 95, Windows 98, and Windows NT 4.0" chapter.

POSSIBLE SOLUTION

You may have a COM port/IRQ conflict.

1. Right-click the **My Computer** icon on your desktop.

2. Click **Properties**.

3. Click the **Device Manager** tab.

   - If you see a yellow exclamation point over your modem, you have a resource conflict, and it is probably an IRQ conflict. Continue with step 4.

   - If you did not see a yellow exclamation point, you may still have an IRQ conflict. Continue with the next "Possible Solution". If these possible solutions do not solve your problem, continue with step 4.

4. Click the modem's name to select it.

5. Click **Remove**.

6. You will be asked if you are sure you wish to remove the device. Click **OK**.

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7. When the "Confirm Device Removal" screen disappears, shut down Windows and turn off your computer.

8. Unplug the computer from its electrical outlet.

9. Remove the cover of the computer, physically remove the modem from its expansion slot, and replace the cover.

10. Plug the computer back into the electrical outlet, and turn it on.

11. When Windows restarts, once again right-click **My Computer** on your desktop and click **Properties**. Click the **Device Manager** tab. Double-click **Computer**. Make sure the **Interrupt request (IRQ)** radio button is checked. You can determine which IRQ settings are free on your system by looking for numbers that are not listed in the Setting column.

12. After you have made these changes, reinstall your modem following the directions in the "Installing the modem with Windows 95, Windows 98, and Windows NT" chapter. Once your modem is properly installed, make sure you have the correct COM port and IRQ settings in your software and/or in the Windows Device Manager.

POSSIBLE SOLUTION

You may not be entering modem commands in the proper manner. Type in all upper case (AT) or all lower case (at).

POSSIBLE SOLUTION

You may not be using fully Windows-based communications software. The modem requires fully Windows based software. Some Windows-based communications and Internet software use a DOS-based dialer. Check with the software company.

PROBLEM
The modem will not go off hook to dial or does not answer the phone.

POSSIBLE SOLUTION

You may have plugged your modem's phone cord into a digital line. Plugging your modem's phone cord into a digital phone line can damage the modem. Call your phone company if you are unsure whether or not your phone line is digital.

POSSIBLE SOLUTION

You might have a bad phone cord connection to your modem. The phone cord should be plugged into the socket labelled ⬚ on the modem and the wall phone socket. The phone cord should be no longer than 12 feet in length. Use the phone cord included with your modem if possible.

POSSIBLE SOLUTION

You may have devices between the modem and the phone socket. There should be no line splitters, fax machines, or other devices between the modem and the wall socket.

POSSIBLE SOLUTION

You may have a poor line connection. Place the call again. Calls are routed differently each time.

POSSIBLE SOLUTION

If you have voice mail, your dial tone may be altered because messages are waiting. Retrieve your voice mail messages to restore your normal dial tone.

POSSIBLE SOLUTION

Your software may not have auto answer enabled. Enable the auto answer feature. In your communication software's terminal mode, type **ATS0=1** and press **ENTER**. You need to enable auto answer before every session unless you alter your software's initialization string to permanently enable auto answer.

PROBLEM
Both modems sound like they are exchanging carrier signals, but fail to establish a connection.

POSSIBLE SOLUTION

You may have a poor line connection. Place the call again. Calls are routed differently each time.

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PROBLEM
Your 56K modem cannot achieve a 56K Internet connection.

POSSIBLE SOLUTION

This modem is capable of 56 Kbps downloads. However, due to varying line conditions, the actual speeds you experience may be lower. Uploads from users to server equipment travel at speeds up to 31.2 Kbps. An analogue phone line compatible with the V.90 standard and an Internet provider or corporate host site compatible with the V.90 standard are necessary for these high-speed downloads.

POSSIBLE SOLUTION

The phone lines in your area may not be 56K compatible. Call your phone company to find out if your phone line is compatible with the ITU standard for 56K and/or is compatible with 3Com 56K technology.

POSSIBLE SOLUTION

You may have devices between the modem and the phone socket. There should be no line splitters, fax machines, or other devices between the modem and the wall socket.

PROBLEM
Errors are constantly occurring in your V.17 fax transmissions.

POSSIBLE SOLUTION

Your modem initialisation string may be insufficient for fax transmissions. In terminal mode, type the following initialisation string: **AT&H3&I2&R2S7=90S36=0** then press **ENTER**. The standard string for faxing is **AT&F1S36=0**.

POSSIBLE SOLUTION

There may be a Terminate and Stay Resident (TSR) program (such as a screen saver or virus scanner) running in the background, disrupting data communications. Disable any Terminate and Stay Resident (TSR) programs running in the background. If you have software running as a TSR, check the software's manual for information about disabling its ability to operate as a TSR.

POSSIBLE SOLUTION

Your baud rate may be set too high. In your communications software, lower the baud rate to 19200, 9600, 7200, or 4800.

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POSSIBLE SOLUTION

You may be trying to fax a compressed file. Decompress the file using the application with which it was compressed. Then open it in the application with which it was created. Select your fax software as the printer and then print the file.

PROBLEM
Your communications software fails to initialize the modem.

POSSIBLE SOLUTION

Your software's port settings may be incorrect. Make sure the software's port settings match those for your modem.

PROBLEM

Plug and Play (PNP) does not detect your modem. You have installed the modem and Windows has restarted, but you see only your normal desktop. You do not see any screens indicating new hardware has been detected.

POSSIBLE SOLUTION

The Plug and Play installation was not successful. Try the following:

1. Click **Start** and click **Shut Down**.
2. When asked if you wish to shut down your computer, click **Yes**.

3. When Windows indicates that it is safe to turn off your computer, turn it off.

4. Wait 15 seconds before turning the computer back on.

5. Windows may detect your modem upon this restart, even if it did not detect the modem during the initial installation.

   - If you see screens indicating that new hardware has been detected by Windows, follow the on-screen instructions to install the modem.

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- If you do not see the new hardware screens, continue with step 6.

6. Click Windows **Start**

7. Point to **Settings**

8. Click **Control Panel**.

9. Double-click the **System** icon.

10. Click the **Device Manager** tab on the "System Properties" screen.

11. Look for "Other Devices" or "Unknown Devices" in the list that appears.
- If you do not see either of these options in the list, contact your computer manufacturer for technical assistance.

- If you do see one of these options, double-click the option and continue with step 12.

12. If the description that appears matches the modem you are trying to install, click **Remove**. If it does not, contact your computer manufacturer for technical assistance.

13. Click **OK** when Windows asks if you wish to remove the device.

14. Restart the computer and continue with the on-screen instructions. If the computer does not detect the modem after this second restart, contact your computer manufacturer for technical assistance.

Glossary

Cross references are printed in **boldface**. Cross references with items in the Data Commands found in the "Technical Reference" section are printed in *italics*.

analogue loopback
A modem self-test in which data from the keyboard or an internal test pattern is sent to the modem's transmitter, turned into analogue form, looped back to the receiver, and converted back into digital form.

analogue signals
A variety of signals and wavelengths that can be transmitted over communications lines such as the sound of a voice over the phone line. These signals are in contrast with **digital signals**.

answer mode
The mode used by your modem when answering an incoming call from an originating modem. The transmit/receive frequencies are the reverse of the originating modem, which is in **originate mode**.

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application
A computer program designed to perform a specific function, such as a word processing or organizing data into a spreadsheet.

ARQ
Automatic Repeat reQuest is a general term for a function that automatically allows your modem to detect flawed data and retransmit it. See **MNP** and **V.42**.

ASCII
American Standard Code for Information Interchange is a code used to represent letters, numbers, and special **characters,** such as $, !, and /.

asynchronous transmission
Data transmission in which the length of time between transmitted **characters** may vary. Since the time lapses between transmitted characters are not uniform, the receiving modem must be signaled as to when the data bits of a character begin and then they end. The addition of **start/stop bits** to each character serves this purpose.

auto-answer

In this setting the modem can pick up the phone line when it detects a certain number of rings. See S-register S0 in the "Technical Reference" section.

auto-dial

A process where your modem dials a call for you. The dialing process is initiated by sending an *ATDT* (dial tone) or *ATDP* (dial pulse) command followed by the telephone number to dial. Auto dial is used to dial voice numbers. See command *Dn*.

baud rate

A term used to measure the speed of an analogue transmission from one point to another. Although not technically accurate, baud rate is commonly used to mean **bit rate**.

binary digit

A 0 or 1, which reflects the use of the binary numbering system. It is used because the computer recognizes either of two states, OFF or ON. The shortened form of binary digit is bit.

bit rate

This refers to the number of **binary digits**, or bits, transmitted per second (**bps**). It is also referred to as transmission rate. Communications

channels using telephone channel modems are established at set bit rates, commonly 2400, 4800, 9600, 14,400, 28,800 and higher.

bits per second (bps)
This is the bits (**binary digits**) per second rate. Thousands of bits per second are expressed as kilobits per second or kbps.

buffer
A memory area set aside to be used as temporary storage during input and output operations. An example is the modem's command buffer.

byte
A group of **binary digits** stored and operated upon as a unit. In user documentation, the term usually refers

to 8-bit units or **characters**. One kilobyte (KB) is equal to 1,024 bytes or characters; 640 KB indicates 655,360 bytes or characters.

carrier
A tone signifying a connection the modem can alter to communicate data across telephone lines.

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character

A representation, coded in **binary digits**, of a letter, number, or other symbol.characters per second (CPS) A data transfer rate generally estimated from the **bit rate** and the **character** length. For example, at 2400 bps, 8-bit characters with **start/stop bits** (for a total of ten bits per character) will be transmitted at a rate of approximately 240 characters per second (cps). Some **protocols**, such as error-control protocols, employ advanced techniques such as longer transmission **frames** and **data compression** to increase cps.

class 1 and 2.0

International standards used between fax **application** programs and faxmodems for sending and receiving faxes.

cyclic redundancy checking (CRC)

An error-detection technique consisting of a test performed on each block, or **frame,** of data by both sending and receiving modems. The sending modem inserts the results of its tests in each data block in the form of a CRC code. The receiving modem compares its results with the received CRC
code and responds with either a positive or negative acknowledgment.

data communications

A type of communications in which computers are able to exchange data over an electronic medium.

data compression table
A table containing values assigned for each **character** during a call under **MNP**5 data compression. **Default** values in the table are continually altered and built during each call: The longer the table, the more efficient **throughput** gained.

data mode
The mode in which the faxmodem is capable of sending and receiving data files. A standard modem without fax capabilities is always in data mode.

DCE

Data Communications (or Circuit-Terminating) **Equipment** is equipment such as dial-up modems that establish and control the data link via the telephone network.

default
Any setting assumed, at startup or reset, by the computer's software and attached devices. The computer or software will use these settings until changed by the user or other software.

detect phase
In the **ITU-T** V.42 error-control
protocol, the first stage in establishing if
both modems attempting to connect
have **V.42** capability.

dictionary
The term used for compression codes
built by the **V.42***bis* data compression
algorithm.

digital loopback
A test that checks the modem's RS-232
interface and the cable that connects the
terminal (computer) and the modem.
The modem receives data (in the form of
digital signals) from the computer or
terminal, and immediately returns the
data to the screen for verification.
digital signals

Signals that are discrete and uniform. In
this manual, the term refers to the
binary digits 0 and 1. These signals are
in contrast with **analogue signals**.

DTE
Data Terminal (or Terminating)
Equipment is a computer that generates
or is the final destination of data.

duplex
Duplex indicates a communications channel capable of carrying signals in both directions. See **half duplex**, **full duplex**.

Electronic Industries Association (EIA)
This association is a group which defines electronic standards in the U.S.

error control
A variety of techniques that check the reliability of **characters** (**parity**) or blocks of data. **V.42** and **MNP** error-control **protocols** use error detection (**CRC**) and retransmission of flawed **frames** (**ARQ**).

facsimile
A method for transmitting the image on a page from one point to another. This is commonly referred to as fax.

fax mode
The mode in which the faxmodem is capable of sending and receiving files in a **facsimile** format. See definitions for **V.17, V.27ter, V.29**.

flow control
A mechanism that compensates for differences in the flow of data into and out of a modem or other device. See commands *&Hn, &In, &Rn*.

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frame
A **data communications** term for a block of data with header and trailer information attached. The added information usually includes a frame number, block size data, error-check codes, and Start/End indicators.

full duplex
These signals will flow in both directions at the same time over one line. In microcomputer communications, may refer to the suppression of the online **local echo**.

half duplex
These signals will flow in both directions, but only one way at a time. In microcomputer communications, may refer to activation of the online **local echo**, which causes the modem to send a copy of the transmitted data to the screen of the sending computer.

Hz
Hertz is a frequency measurement unit used internationally to indicate cycles per second.

ITU-T
An international organization that defines standards for telegraphic and telephone equipment. For example, the Bell 212A standard for 1200 bps communication in North America is observed internationally as ITU-T **V.22**. For 2400 bps communication, most U.S. manufacturers observe V.22bis.

LAPM
Link Access Procedure for Modems is an error-control **protocol** defined in **ITU-T** Recommendation V.42. Like the **MNP** protocols, LAPM uses **cyclic redundancy checking** (**CRC**) and retransmission of corrupted data (**ARQ**) to ensure data reliability.

local echo
A modem feature that enables the modem to display keyboard commands and transmitted data on the screen. See command *En*.

MNP
Microcom Networking Protocol is an error-control **protocol** developed by Microcom, Inc., and now in the public domain. There are several different MNP protocols, but the most commonly used one ensures error-free transmission through error detection (**CRC**) and retransmission of erred **frames**.

modem
A device that transmits/receives computer data through a communications channel such as radio or telephone lines. It also changes signals received from the phone line back to **digital signals** before passing them to the receiving computer.

nonvolatile memory (NVRAM)
A user-programmable random access memory which retains data when power is turned off. On some modems, it includes four stored phone numbers and the modem settings.

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off/on hook
Modem operations that are the equivalent of manually lifting a phone receiver (taking it off-hook) and replacing it (going on-hook).

online fall back/fall forward
A feature that allows a high-speed, error-control modem to monitor line quality and fall back to the next lower speed in a defined range if line quality diminishes. As line conditions improve, the modem switches up to the next higher speed.

originate mode
The mode used by your modem when initiating an outgoing call to a destination modem. The transmit/receive frequencies are the reverse of the called modem, which is in **answer mode**.

parity
A simple error-detection method that checks the validity of a transmitted **character**. Character checking has been surpassed by more reliable and efficient forms of error checking, including **V.42** and **MNP 2-4 protocols**. Either the same type of **parity** must be used by two communicating computers, or both may omit parity.

protocol

A system of rules and procedures governing communications between two or more devices. Protocols vary, but communicating devices must follow the same protocol in order to exchange data. The format of the data, readiness to receive or send, error detection and error correction are some of
e operations that may be defined in protocols.

RAM
Random Access Memory is memory that is available for use when the modem is turned on, but that clears of all information when the power is turned off. The modem's RAM holds the current operational settings, a **flow control buffer**, and a command **buffer**.

remote digital loopback
A test that checks the phone link and a remote modem's transmitter and receiver.

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remote echo
A copy of the data received by the remote system, returned to the sending system, and displayed on the screen. Remote echoing is a function of the remote system.

ROM
Read Only Memory is permanent memory, which is not user-programmable.

serial transmission
The consecutive flow of data in a single channel. Compare it to parallel transmissions where data flows simultaneously in multiple channels.

start/stop bits
These signalling bits are attached to a **character** before and after the character is transmitted during **asynchronous transmission**.

terminal
A device whose keyboard and display are used for sending and receiving data over a communications link. This device differs from a microcomputer or a mainframe in that it has little or no internal processing capabilities.

terminal mode
Software mode that allows direct communication with the modem. This mode is also known as command mode.

throughput
The amount of actual user data transmitted per second without the overhead of **protocol** information such as **start/stop bits** or **frame** headers and trailers. Compare it with **characters per second**.

V.8
The **ITU-T** standard specification that covers the initial handshaking process.

V.17 fax
An **ITU-T** standard for making **facsimile** connections at 14,400 bps, 12,000 bps, 9600 bps, and 7200 bps.

V.21
An **ITU-T** standard for modems operating in asynchronous mode at speeds up to 300 bps, **full-duplex**, on public switched telephone networks.

V.22
An **ITU-T** standard for modem communications at 1200 bps, compatible with the Bell 212A standard observed in the U.S. and Canada.

V.22bis
An **ITU-T** standard for modem communications at 2400 bps. The standard includes an automatic link negotiation fallback to 1200 bps and compatibility with Bell 212A/V.22 modems.

V.23
An **ITU-T** standard for modem communication at 1200 bps with a 75 bps back channel.

V.27ter
An **ITU-T** standard for **facsimile** operations that specifies modulation at 4800 bps, with fallback to 2400 bps.

V.29
An **ITU-T** standard for **facsimile** operations that specifies modulation at 9600 bps, with fallback to 7200 bps.

V.32
An **ITU-T** standard for modem communications at 9600 bps and 4800 bps. V.32 modems fall back to 4800 bps when line quality is impaired.

V.32bis
An **ITU-T** standard that extends the V.32 connection range: 4800, 7200, 9600, 12,000, and 14,400 bps. V.32*bis* modems fall back to the next lower speed when line quality is impaired, fall back further as necessary, and also fall

forward (switch back up) when line conditions improve.
See **online fall back/fall forward**.

V.34
An **ITU-T** standard that currently allows data rates as high as 33,600 bps.

V.42
An **ITU-T** standard for modem communications that defines a two-stage process of detection and negotiation for **LAPM error control**.

V.42bis
An extension of **ITU-T** V.42 that defines a specific data compression scheme for use during V.42 connections.

V.90

The ITU-T standard for 56 Kbps modem communications.

Xmodem
The first of a family of **error control** software **protocols** used to transfer files between modems. These protocols are in the public domain and are available from many bulletin board services.

XON/XOFF
Standard **ASCII** control **characters** used to tell an intelligent device to stop/resume transmitting data.

Ymodem
An error-checking **protocol** that can send several files of data at a time in 1024-**byte** (1K) blocks.   This protocol

can use either checksums or CRC for error checking.

Ymodem G
This is similar to the **Ymodem**, except it relies on the modem for error checking, which makes it faster.

Zmodem
This is similar to **Xmodem** and **Ymodem**, except it includes batch transfer, the ability to recover from a partially complete transfer, an autostart feature, and improved efficiency.

Technical Reference

Typing Commands

- In terminal mode, type commands in either upper or lower case, not a combination. Use the Backspace key to delete errors. (You cannot delete the original AT command because it is stored in the modem buffer.)
- If a command has numeric options and you do not include a number, zero is assumed. For example, if you type **ATB**, the command ATB0 is assumed.
- Every command except **A/**, **+++**, and **A>** must begin with the AT prefix and be entered by pressing **ENTER**.
- The maximum command length is 58 characters. This does not include the AT prefix, carriage returns, or spaces.

All defaults are based on the &F1—Hardware Flow Control template loaded in NVRAM when the modem is shipped. Defaults are listed in italics.

Basic Data Commands

\<control key>S

Stop or restart help screens.

\<control key>C *or*
\<control key>K

Stop help screens.

$ Use in conjunction with *D*, *S*, or *&* commands (or just AT) to display a basic command list; online help.

A Manual Answer: goes off hook in answer mode. Pressing any key aborts the operations.

A/ Re-executes the last issued command. Used mainly to redial. This does not require the AT prefix or a Carriage Return.

A> Re-executes the last issued command continuously, until the user intervenes or the command is executed forever. Does not require the AT prefix or a Carriage Return.

Any key Aborts off-hook dial/answer operation and hangs up.

AT Required command prefix, except with A/, +++, and A>. Use alone to test for OK result code.

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B_n_ **U.S./ITU-T answer sequence**

    B0   *ITU-T answer sequence*
    B1   U.S. answer tone

D_n_ **Dials the specified phone number, includes the following:**

    0-9   Numeric digits
    #, *   Extended touch-tone pad tones
    L   Dials the last dialled number
    P   Pulse (rotary) dial
    R   Originates call using answer (reverse) frequencies
    Sn   Dials the phone number string stored in NVRAM at position n (n = 0–3). Phone numbers are stored with the &Zn=s command

    T   Tone dial
    ,   (Comma) Pause, see the definition of the S8 register to which it is linked
    ;   (Semicolon) Return to Command mode after dialling

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W	Waits for second dial tone (X2 or X4); linked to S6 register
@	(At Symbol) Dials, waits for quiet answer, and continues (X3 or higher)
$	(Dollar Sign) Displays a list of Dial commands

E*n* **Sets local echo**

E0	Echo OFF
E1	*Modem displays keyboard commands*

F*n* **Sets online local echo of transmitted data ON/OFF**

F0	Local echo ON; modem sends a copy of data, it sends to the remote system to your screen
F1	*Local echo OFF; receiving system may send a remote echo of data it receives*

H*n* **Controls ON/OFF hook**

H0	Hangs up (goes on hook)
H1	Goes off hook

I*n* **Displays the following information:**

I0   Four-digit product code
I1   Results of ROM checksum
I2   Results of RAM checksum
I3   Product type
I4   Current modem settings
I5   Nonvolatile memory (NVRAM) settings
I6   Link diagnostics
I7   Product configuration
I9   Plug and Play information
I10   VXD Configuration Screen
I11   Extended link diagnostics

L*n* **Controls speaker volume (available on internal modems only)**

L0   Lowest volume
L1   Low volume
L2   *Medium volume*
L3   High volume

M*n* **Operates speaker**

M0   Speaker always OFF
M1   *Speaker ON until CONNECT*
M2   Speaker always ON
M3   Speaker ON after dial, until CONNECT

O*n* **Returns online**

O0   Returns online

O1	Returns online and retrains	**S*r.b*=*n***	**Sets bit .*b* of register *r* to *n* (0/OFF or 1/ON)**
Qn	**Displays/suppresses result codes**	**S*r*=*n***	**Sets register *r* to *n***
Q0	*Displays result codes*	**S*r*?**	**Displays contents of S-Register *r***
Q1	Quiet mode; no result codes	**S$**	**Displays a list of the S-Registers**
Q2	Displays result codes only in Originate mode	**V*n***	**Displays verbal/numeric result codes**
		V0	Numeric codes
		V1	*Verbal codes*

X*n*   Sets result code displayed, default is X4

Result Codes	X*n* Setting				
	X0	X1	X2	X3	X4
0/OK	•	•	•	•	•
1/CONNECT	•	•	•	•	•
2/RING	•	•	•	•	•
3/NO CARRIER	•	•	•	•	•
4/ERROR	•	•	•	•	•
5/CONNECT 1200		•	•	•	•
6/NO DIAL TONE			•		•
7/BUSY				•	•
8/NO ANSWER*				•	•
9/Reserved					
10/CONNECT 2400		•	•	•	•
13/CONNECT 9600		•	•	•	•
18/CONNECT 4800		•	•	•	•
20/CONNECT 7200		•	•	•	•
21/CONNECT 12000		•	•	•	•
25/CONNECT 14400		•	•	•	•
43/CONNECT 16800		•	•	•	•
85/CONNECT 19200		•	•	•	•

*Requires @ in dial string; replaces NO CARRIER

X*n* (Continued)   X*n* Setting

Result Codes	X0	X1	X2	X3	X4
91/CONNECT 21600		●	●	●	●
99/CONNECT 24000		●	●	●	●
103/CONNECT 26400		●	●	●	●
107/CONNECT 28800		●	●	●	●
151/CONNECT 31200		●	●	●	●
155/CONNECT 33600		●	●	●	●
256/CONNECT 28000		●	●	●	●
260/CONNECT 29333		●	●	●	●
264/CONNECT 30666		●	●	●	●
268/CONNECT 32000		●	●	●	●
180/CONNECT 33333		●	●	●	●
272/CONNECT 34666		●	●	●	●
276/CONNECT 36000		●	●	●	●
184/CONNECT 37333		●	●	●	●

X*n* (Continued)   X*n* Setting

Result Codes	X0	X1	X2	X3	X4
280/CONNECT 38666		●	●	●	●
284/CONNECT 40000		●	●	●	●
188/CONNECT 41333		●	●	●	●
192/CONNECT 42666		●	●	●	●
196/CONNECT 44000		●	●	●	●
200/CONNECT 45333		●	●	●	●
204/CONNECT 46666		●	●	●	●
208/CONNECT 48000		●	●	●	●
212/CONNECT 49333		●	●	●	●
216/CONNECT 50666		●	●	●	●
220/CONNECT 52000		●	●	●	●
224/CONNECT 53333		●	●	●	●
228/CONNECT 54666		●	●	●	●
232/CONNECT 56000		●	●	●	●
236/CONNECT 57333		●	●	●	●

X*n* (Continued)   X*n* Setting

Result Codes	X0	X1	X2	X3	X4
Adaptive Dialling			•	•	•
Wait for 2nd Dial Tone (W)			•		•
Wait for Answer (@)				•	•
Fast Dial			•		•

Y*n* **Selects power-on/reset default configuration**

Y0 *Use profile 0 setting in NVRAM*

Y1 Default is profile 1 setting in NVRAM

Y2 Use factory configuration 0

Y3 Use factory configuration 1

Y4 Use factory configuration 2

Z **Resets modem**

Z0 Resets modem to NVRAM profile selected by Y command

Z1 Resets modem to NVRAM profile 0

Z2 Resets modem to NVRAM profile 1

Z3 Resets modem to factory default profile 0 (&F0)

Z4 Resets modem to factory default profile 1 (&F1)

Z5 Resets modem to factory default profile 2 (&F2)

Extended Data Commands

&$ **Displays a list of ampersand (&) commands**

&A*n* **Enables/disables additional result code subsets, see X*n***

&A0 ARQ result codes disabled

&A1 ARQ result codes enabled

&A2 Modulation indicator added

&A3 *Protocol indicators added¾ LAPM/MNP/NONE (error control) and*

*V42*bis*/MNP5 (data compression)*

&B*n* **Manages modem's serial port rate**

&B0 Variable, follows connection rate

&B1 *Fixed serial port rate*

&B2 Fixed in ARQ mode, variable in non-ARQ mode

&C*n* **Controls Carrier Detect (CD) signal**

&C0 CD override

&C1 *Normal CD operations*

&D*n* **Controls Data Terminal Ready (DTR) operations**

&D0 DTR override

&D1 DTR toggle causes online Command mode

&D2 *Normal DTR operations*

&F*n* **Loads a read-only (non-programmable) factory configuration**

&F0 Generic template; no flow control

&F1 *Hardware flow control template*

&F2 Software flow control template

&G*n* **Sets Guard Tone**

&G0 No guard tone, U.S. and Canada

&G1 *550 Hz guard tone, some European countries, requires B0 setting*

&G2 *1800 Hz guard tone, U.K., requires B0 setting*

&H*n* **Sets Transmit Data (TD) flow control, see also &R*n***

&H0 Flow control disabled

&H1 *Hardware flow control, Clear to Send (CTS)*

&H2 Software flow control, XON/XOFF

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&H3   Hardware and software
       flow control

**&I*n*   Sets Receive Data (RD)
     software flow control,
     see also &R*n***

*&I0   Software flow control
       disabled*

&I1   XON/XOFF signals to
       your modem and remote
       system

&I2   XON/XOFF
       signals to your
       modem only

**&K*n*   Enables/disables data
      compression**

&K0   Data compression
       disabled

*&K1   Auto
       enable/disable*

&K2   Data compression
       enabled

&K3   MNP5 compression
       disabled

**&M*n* Sets Error Control (ARQ) for
     connections at 1200 bps and
     higher**

&M0   Normal mode, error
       control disabled

&M1   Reserved

&M2   Reserved

&M3   Reserved

&M4   Normal/ARQ
&M5   ARQ mode

&N*n* **Sets connect speed, if connection cannot be made at this speed, the modem will hang up. When used in conjunction with &U***n*** and &U***n*** is greater than 0, &N***n*** sets the ceiling connect speed. &U***n*** sets the floor connect speed. (See also the table in the &U***n*** section.)**

&N0   *Connection speed is determined by the remote modem*
&N1   300 bps
&N2   1200 bps

&N3   2400 bps
&N4   4800 bps
&N5   7200 bps
&N6   9600 bps
&N7   12,000 bps
&N8   14,400 bps
&N9   16,800 bps
&N10 19,200 bps
&N11 21,600 bps
&N12 24,000 bps
&N13 26,400 bps
&N14 28,800 bps
&N15 31,200 bps
&N16 33,600 bps
&N17 28,000 bps
&N18 29,333 bps
&N19 30,666 bps
&N20 32,000 bps
&N21 33,333 bps

&N22	34,666 bps		**&P***n*	**Sets pulse (rotary) dial make/break ratio**
&N23	36,000 bps			
&N24	37,333 bps		&P0	U.S./Canada ratio, 39%/61%
&N25	38,666 bps			
&N26	40,000 bps		*&P1*	*U.K. ratio, 33%/67%*
&N27	41,333 bps			
&N28	42,666 bps			
&N29	44,000 bps			
&N30	45,333 bps			
&N31	46,666 bps			
&N32	48,000 bps			
&N33	49,333 bps			
&N34	50,666 bps			
&N35	52,000 bps			
&N36	53,333 bps			
&N37	54,666 bps			
&N38	56,000 bps			
&N39	57,333 bps			

&R*n* **Sets Receive Data (RD) hardware flow control, Request to Send (RTS), see also &H*n***

&R0   Reserved
&R1   Modem ignores RTS
&R2   *Received Data to computer only on RTS*

&S*n* **Controls Data Set Ready (DSR) operations**

&S0   *DSR override; always ON*
&S1   Modem controls DSR

&T*n* **Begins test modes**

&T0   Ends testing
&T1   Analog Loopback
&T2   Reserved
&T3   Local Digital Loopback
&T4   Enables Remote Digital Loopback
&T5   *Prohibits Remote Digital Loopback*
&T6   Initiates Remote Digital Loopback
&T7   Remote Digital with self-test and error detector
&T8   Analog Loopback with self-test and error detector

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&U*n* **When set above 0, the value chosen from the table sets the floor connect speed (the lowest acceptable connect speed). If a connection cannot be made at or above this speed, the modem will hang up. This command can also be used in conjunction with &Nn. Note: &U17 through &U39 apply only to V.90 products.**

	&N=0	**&N>0**
&U=0	Connects at best possible speed between your modem and the remote modem.	Attempts to connect at the speed defined by &N*n*.
	Note: These factory default settings should be sufficient for most users.	
&U>0	Connects at any speed faster than the value &U*n*.	Connects at any speed between &N*n*. and &U*n*.

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&U0	*No restrictions on the minimum speed for the connection*	&U16	33,600 bps
&U1	300 bps	&U17	28000 bps
&U2	1200 bps	&U18	29333 bps
&U3	2400 bps	&U19	30666 bps
&U4	4800 bps	&U20	32000 bps
&U5	7200 bps	&U21	33,333 bps
&U6	9600 bps	&U22	34666 bps
&U7	12,000 bps	&U23	36000 bps
&U8	14,400 bps	&U24	37,333 bps
&U9	16,800 bps	&U25	38666 bps
&U10	19,200 bps	&U26	40000 bps
&U11	21,600 bps	&U27	41,333 bps
&U12	24,000 bps	&U28	42,666 bps
&U13	26,400 bps	&U29	44,000 bps
&U14	28,800 bps	&U30	45,333 bps
&U15	31,200 bps	&U31	46666 bps
		&U32	48000 bps

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&Un (Continued)

&U33 49333 bps
&U34 50666 bps
&U35 52000 bps
&U36 53333 bps
&U37 54666 bps
&U38 56000 bps
&U39 57333 bps

&W*n* Writes current configuration to NVRAM templates

&W0 Modifies the NVRAM 0 template (Y0)
&W1 Modifies the NVRAM 1 template (Y1)

&Y*n*   Sets break handling

&Y0 Destructive, but does not send break
&Y1 Destructive, expedited
&Y2 Nondestructive, expedited
&Y3 Nondestructive, unexpedited

&Z*n*=*s*Writes phone number string *s* to NVRAM at position *n* (*n* = 0–3)

&Z*n*=L Writes last executed dial string to NVRAM at position n (n = 0–3)

&Z*n*? **Displays the phone number stored at position n (n = 0−3)**

&ZL? **Displays the last executed dial string**

+++ Escapes to online-command mode

S-Registers

To change a setting, use the ATSr=n command, where r is the register and n is a decimal value from 0 – 255 (unless otherwise indicated).

Register	Default	Function
S0	0	Sets the number of rings on which to answer in Auto Answer Mode
		When set to 0, Auto Answer is disabled
S1	0	Counts and stores the number of rings from an incoming call
		S0 must be greater than 0
S2	43	Stores the ASCII decimal code for the escape code character
		Default character is +
		A value of 128 – 255 disables the escape code
S3	13	Stores the ASCII code for the Carriage Return character
		Valid range is 0 – 127
S4	10	Stores the ASCII decimal code for the Line Feed character
		Valid range is 0 – 127
S5	8	Stores the ASCII decimal code for the Backspace character. A value of
		128–255 disables the Backspace key's delete function

Register	Default	Function
S6	2	Sets the number of seconds the modem waits before dialling If Xn is set to X2 or X4, this is the time-out length if there is not a dial tone
S7	60	Sets the number of seconds the modem waits for a carrier May be set for much longer duration if, for example, the modem is originating an international connection
S8	2	Sets the duration, in seconds, for the pause (,) option in the Dial command
S9	6	Sets the required duration, in tenths of a second, of the remote modem's carrier signal before recognition by the modem
S10	14	Sets the duration, in tenths of a second, that the modem waits to hang up after loss of carrier. This guard time allows the modem to distinguish between a line disturbance from a true disconnect (hang up) by the remote modem. **Note:** If you set S10 = 255, the modem will not hang up when carrier is lost

Register	Default	Function
		Dropping DTR hangs up the modem
S11	70	Sets the duration and spacing, in milliseconds, for tone dialling
S12	50	Sets the duration, in fiftieths of a second, of the guard time for the escape code sequence (+++)
S13	0	Bit-mapped register

Select the bit(s) you want on and set S13 to the total of the values in the Value column

For example: ATS13 = 17 enables bit 0 (value is 1) and bit 4 (value is 16)

Bit	Value	Result
0	1	Reset when DTR drops
1	2	Reset non-MNP transmit buffer from 1.5K to 128 bytes*
2	4	Set backspace key to delete
3	8	On DTR signal, auto dial the number stored in NVRAM at position 0

Register	Default	Function		

S13 (Continued)

		4	16	At power on/reset, Auto Dial the number stored in NVRAM at position 0
		5	32	Reserved
		6	64	Disable quick retrains
		7	128	Disconnect on escape code

*The 1.5K-byte non-ARQ buffer allows data transfer with Xmodem- and Ymodem- type file transfer protocols without using flow control.
The 128-byte option lets remote users with slower modems keep data you are sending from scrolling off their screens
When remote users send your computer an XOFF (Ctrl-S) and you stop transmitting, the data in transit from your modem's buffer does not exceed the size of their screen
This is also helpful when a remote modem/printer application is losing characters

S14	0	Reserved		

Register	Default	Function
S15	0	Bit-mapped register setup
		To set the register, see instructions for S13

Bit	Value	Result
0	1	Disable ARQ/MNP for V.22
1	2	Disable ARQ/MNP for V.22bis
2	4	Disable ARQ/MNP V.32/V.32bis
3	8	Disable MNP handshake
4	16	Disable MNP level 4
5	32	Disable MNP level 3
6	64	MNP incompatibility
7	128	Disable V.42 operation

To disable V.42 detect phase, select the total of the values for bits 3 and 7. (S15=136{the sum of values 8 and 128})

Register	Default	Function
S16	0	Reserved
S17	0	Reserved

Register	Default	Function
S18	0	Test timer for &T loopback testing
		Sets the time in seconds of testing before the modem automatically times out and terminates the test
		When set to 0, the timer is disabled
		Valid range is 1-255
S19	0	Sets the duration, in minutes, for the inactivity timer
		The timer activates when there is no data activity on the phone line; at time-out the modem hangs up
		S19 = 0 disables the timer
S20	0	Reserved
S21	10	Sets the length, in 10-millisecond units, of breaks sent from the modem to the computer; applies to MNP or V.42 mode only
S22	17	Stores the ASCII decimal code for the XON character
S23	19	Stores the ASCII decimal code for the XOFF character
S24	0	Reserved

Register	Default	Function
S25	20	Sets the duration, in hundredths of a second, that DTR must be dropped so that the modem does not interpret a random glitch as a DTR loss
		Most users will want to use the default
		This register is useful for setting compatibility with older systems running under older operating software
S26	0	Reserved
S27	0	Bit-mapped register setup
		To set the register, see instructions for S13

Bit	Value	Result
0	1	Enables ITU-T V.21 modulation at 300 bps
1	2	Enables unencoded (non-trellis coded) modulation in V.32 mode
2	4	Disables V.32 modulation

Register	Default	Function
S27 (Continued)		

Bit	Value	Result
3	8	Disables 2100 Hz answer tone to allow two V.42 modems to connect faster
4	16	Enables V.23 fallback mode
5	32	Disables V.32*bis* mode
6	64	Disable V.42 selective reject
7	128	Software compatibility mode
		This setting disables the codes and displays the 9600 code instead
		The actual rate of the call can be viewed on the ATI6 screen
		Used for unusual software incompatibilities
		Some software may not accept 7200, 12,000, and 14,400 bps or greater result codes

Register	Default	Function
S28	0	Eliminates the V.32 answer tones for a faster connection
	8	Default item, all times are in tenths of seconds
	255	Disables all connections except V.32 at 9600 bps
S29	20	Sets the duration, in tenths of a second, of the V.21 answer mode fallback timer
S30	0	Reserved
S31	128	Reserved
S32	2	Bit-mapped register setup

To set the register, see the instructions for S13

Bit	Value	Result
0	1	V.8 Call Indicate enabled
1	2	Enables V.8 mode
2	4	Reserved
3	8	Disable V.34 modulation
4	16	Disable V.34+ modulation
5	32	Disable x2 modulation

Register	Default	Function		
S28 (Continued)				
		6	64	Disable V.90 modulation.
		7	128	Reserved.
S33	0	Bit-mapped register setup		
		To set the register, see the instructions for S13		

Bit	Value	Result
0	1	Disable 2400 symbol rate
1	2	Disable 2743 symbol rate
2	4	Disable 2800 symbol rate
3	8	Disable 3000 symbol rate
4	16	Disable 3200 symbol rate
5	32	Disable 3429 symbol rate
6	64	Reserved
7	128	Disable shaping

Register	Default	Function
S34	0	Bit-mapped register setup
		To set registers, see instructions for S13

Register	Default	Function

S34 (Continued)

Bit	Value	Result
0	1	Disable 8S-2D trellis encoding
1	2	Disable 16S-4D trellis encoding
2	4	Disable 32S-2D trellis encoding
3	8	Disable 64S-4D trellis encoding
4	16	Disable non-linear coding
5	32	Disable TX level deviation
6	64	Disable Pre-emphasis
7	128	Disable Pre-coding

S35-S37   Reserved

Register	Default	Function
S38		Sets an optional delay, in seconds, before a forced hang-up and clearing of the Transmit buffer when DTR drops during an ARQ call. This allows time for a remote modem to acknowledge receipt of all transmitted data before it is disconnected. The modem immediately hangs up when DTR drops. This option only applies to connections terminated by dropping DTR. If the modem receives the ATH command, it ignores S38 and immediately hangs up.
S39-S40		Reserved
S41	0	Reserved
S42	0	Reserved

Fax Commands

+FCLASS=*n* Sets the mode of operation
> *FCLASS=0   Data mode*
> FCLASS=1   Group 3 Facsimile Service Class 1mode
> FCLASS=2.0   Group 3 Facsimile Service Class 2.0 mode

FCLASS?   Displays the current FCLASS mode
> (see mode descriptions above)

+FCLASS=? Displays the FCLASS mode options
> (see mode descriptions above)

+FTS=*n*   Stops the fax transmission. Then the modem waits for a specified time before **OK** appears on screen. The pause is set in 10 millisecond intervals. *n* is the number of 10 millisecond intervals that pass before **OK** appears. (*n*=0-255)

Fax Commands (Continued)

+FRS=*n*   **Makes the modem wait for a specified length of silence before sending OK to the screen.** The pause is set in10 millisecond intervals. *n* is the number of 10   millisecond intervals that pass before **OK** appears.(*n*=0-255)

Note: This command terminates with **OK** when either the specified amount of silence is detected or when the user types anything (which is ignored).

+FTM=*n*   Transmits data using the modulation specified by *n*.(*n* = 3, 24, 48, 72, 96, 97, 98, 121, 122, 145, or 146)
Note: See the "Screen Messages" table at the end of this section for an explanation of messages that appear in response to this command.

Fax Commands (Continued)

+FRM=*n*   Receives data using the modulation specified by*n*.(*n* = 3, 24, 48, 72, 96,   97, 98, 121, 122, 145, or 146)
Note: See the "Screen Messages" table at the end of this section for an   explanation of messages that appear in response to this command.

+FTH=*n*   Transmits data framed in the HDLC protocol using the modulation specified by *n*.(*n* = 3, 24, 48, 72, 96, 97, 98, 121, 22, 145, or 146)
Note: See the "Screen Messages" table at the end of this section for an explanation of messages that appear in response to this command.

+FRH=*n*   Receives data framed in the HDLC protocol using the modulation specified by   *n*.(*n* = 3, 24, 48, 72, 96, 97, 98, 121, 122, 145, or 146)
Note: See the "Screen Messages" table at the end of this section for an explanation of messages that appear in response to this command.

Screen Messages

Numeric   Text

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Message	Message	Description
0	OK	The previous command has been processed successfully.
1	CONNECT	The modem has just connected to another modem.
2	RING	Reports the receipt of a network altering ring.
3	NO CARRIER	No carrier is being received from the modem.
4	ERROR	The previous command line has not been recognized or was completed abnormally.
5	NO DIAL TONE	(Opt.) Dial tone was not received within the time-out period.
6	BUSY	(Optional) A busy signal was detected.
64	CONNECT/FAX	(Optional) The modem has established a fax connection. This response is used only when the fax mode is selected.

Compliance Information

Compliance Warning

Applications software shall be configured so that no more than 3 attempts are made to
establish a connection to a given number.
(**Note:** If the modem can detect service tones, up to ten attempts can be made.) There must be at least 2
seconds between call attempts. If the call sequence is unsuccessful, there shall be a delay of at least 30
minutes before attempting to call the number again.

Use of factory default settings will result in the modem being operated in a non-compliant manner.
Failure to set the modem and any application software used with the modem, to the values mentioned in
the command restrictions paragraph, will result in the modem being operated in a non-compliant
manner. Consequently, there would be no permit in force for this equipment and the
Telecommunications Act 1991 prescribes a penalty of $12,000 for the connection of non-permitted
equipment.

Interconnecting Ports

Interconnection circuits should be such that the equipment continues to comply
with the requirements of AS3260 1.2.8.5 for SELV circuits.

Command Restrictions

The modem commands shown below have their default values and range limits set to meet ACA
approval requirements. These settings are different from the ones listed in the "Technical Quick
Reference" section of the *User's Guide & Reference* found on our support Web page.
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Command	Description	Default	Range
B	Bell/ITU-T	B0	B0 only
&G	Guard Tone	&G2	&G2 only
&P	Pulse Dial Ratio	&P2	&P2 only
S0	Auto Answer	3	0, 2-5
S6	Pre-Dial Pause	2	2-5
S7	Wait for Carrier	60	20-255
S8	Dial Pause	2	2-255
S11	Tone Dial Speed	75	75-255
S27	Bit-Mapped Register	1	0-255

Regulatory Information

Installation of modem in host PC

The user should ensure that the power drawn by the modem together with any auxiliary apparatus drawing power from the host lies within the rating of the host power supply.

The power requirements are:
+5 VDC +/- 5% 250mA
+12 VDC +/- 10% 50mA
-12 VDC +/- 10% 10mA

Network Compatibility Declaration

This equipment is designed to work satisfactorily on all European Union PSTN networks. This equipment is supplied with a suitable PSTN connector for the country in which it was supplied. If it is required to use this equipment on a different network to the one for which it was supplied, the user is advised to contact the vendor for guidance regarding connection.

Note:

Although this equipment can use either loop disconnect or DTMF signaling, only the performance of the DTMF signaling is subject to regulatory requirements for correct operation. It is therefore strongly recommended that the equipment is set to use DTMF signaling, which also provides faster call set up.

USER WARNING

To avoid the risk of electrical shock, ALWAYS disconnect the phone cord marked from the modem before removing the cover of the computer. Additionally, unplug the power to the computer and all attached peripherals before removing the cover of the computer.

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CE Compliance

For connection to the Public Switched Telephone Network

Electromagnetic Compatibility
This device complies with the following standards in accordance with the European Directives 89/336/EEC.

This device complies with the requirements of European Directives 1995/5/EC.
Immunity EN 50082-1 06/92
Emission EN 55022 class B 08/87

Safety (Low Voltage Directive)
This device complies with the following standards in accordance with European Directives 91/263/EEC and 73/23/EEC:

EN 60950/A4 3/97

The ports on this modem have the following safety status:
Telephone line connector = TNV-3
All other ports = SELV

These definitions are classified as per safety standard: EN 60950/A4 3/97
SELV: Safety Extra Low Voltage
TNV-3: Telecommunications Network Voltage

Operation of pan-European approved modems

If your particular modem has pan-European approval, as indicated by the approval label on the bottom of the modem being as shown below:

CE0560X (prior to April 8, 2001)

CE   (after April 8, 2001)

then the following notice should be observed:

This equipment has been approved to CTR 21 for pan-European single terminal connection to the Public Switched Telephone Network (PSTN). However, due to differences between the individual PSTNs provided in different countries the approval does not, of itself, give an unconditional assurance of successful operation on every PSTN network termination point.

In the event of problems, you should contact your equipment supplier in the first instance.

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Warranty

HARDWARE: 3Com Corporation warrants its hardware products to be free from defects in workmanship and materials, under normal use and service, for the following lengths of time from the date of purchase from 3Com or its authorized reseller:

56K Voice Internal PCI	5 years
Other hardware products	One year*
* unless otherwise specified above	
Spare parts and spares kits	90 days

If a product does not operate as warranted above during the applicable warranty period, 3Com shall, at its option and expense, repair the defective product or part, deliver to Customer an equivalent product or part to replace the defective item, or refund to Customer the purchase price paid for the defective product. All products that are replaced will become the property of 3Com. Replacement products may be new or reconditioned. Any replaced or repaired product or part has a ninety (90) day warranty or the remainder of the initial warranty period, whichever is longer.

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SOFTWARE: 3Com Corporation warrants that the software programs licensed from it will perform in substantial conformance to the program specifications therefor for a period of ninety (90) days from the date of purchase from 3Com or its authorized reseller. 3Com warrants the media containing software against failure during the warranty period. No updates are provided. 3Com's sole obligation with respect to this express warranty shall be (at 3Com's discretion) to refund the purchase price paid by Customer for any defective software products, or to replace any defective media with software which substantially conforms to applicable 3Com published specifications. Customer assumes responsibility for the selection of the appropriate applications program and associated reference materials. 3Com makes no warranty or representation that its software products will meet Customer's requirements or work in combination with any hardware or applications software products provided by third parties, that the operation of the software products will be uninterrupted or error free, or that all defects in the software products will be corrected. For any third party products listed in the 3Com software product documentation or specifications as being compatible

3Com will make reasonable efforts to provide compatibility, except where the non-compatibility is caused by a "bug" or defect in the third party's product.

YEAR 2000 WARRANTY. In addition to the Hardware Products Warranty and Software Products Warranty identified above, 3Com warrants that all Heritage 3Com products sold or licensed to Customer on and after January 1, 1998 that are date sensitive will continue performing properly with regard to such date data on and after January 1, 2000, provided that all other products used by Customer in connection or combination with the 3Com products, including hardware, software, and firmware, accurately exchange date data with the 3Com products, with the exception of those products identified at 3Com's Web site, **http://www.3com.com**, as not meeting this standard. A product is considered a "Heritage 3Com product" if it is a member of a product family which was manufactured by 3Com prior to its merger with US Robotics Corporation. This Year 2000 limited warranty does not apply to Heritage US Robotics Corporation products. If it appears that any such product does not perform properly with regard to such date data on and after January 1, 2000, and Customer notifies 3Com before the later of April 1, 2000, or ninety (90) days after purchase of the product from 3Com or its authorized reseller, 3Com shall, at its option and expense, provide a software update which would effect the proper performance of such product, repair such

product, deliver to Customer an equivalent product to replace such product, or if none of the foregoing is feasible, refund to Customer the purchase price paid for such product.

Any software update or replaced or repaired product will carry a Year 2000 Warranty for ninety (90) days or until April 1, 2000, whichever is later.

OBTAINING WARRANTY SERVICE: Customer must contact 3Com's Corporate Service Center or an Authorized 3Com Service Center within the applicable warranty period to obtain warranty service authorization. Dated proof of purchase may be required. Products returned to 3Com's Corporate Service Center must be pre-authorized by 3Com with a Return Material Authorization (RMA) number marked on the outside of the package, and sent prepaid and packaged appropriately for safe shipment, and it is recommended that they be insured. The repaired or replaced item will be shipped to Customer, at 3Com's expense, not later than thirty (30) days after receipt of the defective product by 3Com.

Dead- or Defective-on-Arrival. In the event a product completely fails to function or exhibits a defect in materials or workmanship within the first forty-eight (48) hours of installation but no later than thirty (30) days after the date of purchase, and this is

verified by 3Com, it will be considered dead- or defective-on-arrival (DOA) and a replacement shall be provided by advance replacement. The replacement product will normally be shipped not later than three (3) business days after 3Com's verification of the DOA product, but may be delayed due to export or import procedures. When an advance replacement is provided and Customer fails to return the defective product to 3Com within fifteen (15) days after shipment of the replacement, 3Com will charge Customer for the replacement product, at list price.

3Com shall not be responsible for any software, firmware, information, or memory data of Customer contained in, stored on, or integrated with any products returned to 3Com for repair, whether under warranty or not.

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GOVERNING LAW: This Limited Warranty shall be governed by the laws of the State of California, U.S.A. excluding its conflicts of laws principles and excluding the United Nations Convention on Contracts for the International Sale of Goods.

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