3Com U.S. Robotics®

56K FAXMODEM

User’s Guide and Reference
This manual covers installation and operating instructions for the following modems:

**3Com U.S. Robotics 56K* Faxmodem External**

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

The International Telecommunication Union (ITU) decides 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 determined 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.

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

### Modulation Schemes
- ITU-T V.90
- 3Com 56K technology (Download up to 56kbps, and Upload using V.34)
- ITU-T V.34 (Inc 33600)
- ITU-T V.32 bis
- ITU-T V.32
- ITU-T V.22 bis
- 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.42 bis
- 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

### Front Channel Link Rates (Download Speeds)
- 28000, 29333, 30666, 32000, 33333, 34666, 36000, 37333, 38666, 40000, 41333, 42666, 44000, 45333, 46666, 48000, 49333, 50666, 52000, 53333, 54666, 56000
Product Features

Back Channel Link Rates (Upload Speeds)
4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800, 31200

V.34 Link Rates
4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800, 31200, 33600

V.32 bis 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

Flash ROM Upgradable
56K Faxmodem supports software download through flash memory. You can obtain the latest features by downloading updates quickly and easily.

Front Panel Lights

PWR/Power
The modem is turned on.

CD/Carrier Detect
ON if modem receives a valid data signal (carrier) from a remote modem, indicating that data transmission is possible. Always ON if CD override is ON (&C0).

RD/Received Data
Flashes when modem sends result codes or passes received data bits from remote.

SD/Send Data
Flashes when computer sends a data bit to modem.
External Modem Installation with Windows 95 and Windows 98

You will need these items from your 3Com U.S. Robotics modem box:

- modem
- phone cord
- power adaptor
- serial modem cable

Determining Your Version of Windows 95

1. Click the My Computer icon on your desktop with the right mouse button.
2. Click Properties.
3. In the “System Properties” screen, look at the system information under the General tab (circled in the screen image). The number following the text “Microsoft Windows 95” will end with “950”, “950a”, or “950b”. This indicates your version of Windows 95.
Write down your version of Windows.

Windows 95 version ______

Click OK.

How to Connect the Modem to the Computer

1. Turn off your computer and any attached devices, such as a printer, monitor, keyboard, and mouse.

2. Connect the serial cable to the modem and to the computer. When looking for your serial port on the back of your computer, look for ports labeled COM, MODEM, RS-232, or SERIAL. Do not select AUX, GAME, LPT, or PARALLEL.

3. Plug one end of the phone cord into the TELCO socket and the other end into a phone wallsocket.

The phone wall socket you use must be for an ANALOGUE phone line. Most office phones are wired through DIGITAL lines. Be sure you know which type of line you have. The modem will be damaged if you use a digital phone line.

4. Plug the power adaptor that came with the modem into a standard wall socket and insert its plug into the power socket on the modem.

5. If you want to use a telephone on the same line, use a splitter arrangement. You cannot use the modem and a phone at the same time if they share the same telephone line.
External Modem Installation with Windows 95 and Windows 98

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

7. Start Windows 95.

Installing Modem Drivers with Windows 95: Versions 950 and 950a
Moving Through the “New Hardware Found” Screens

1. When Windows 95 restarts, it should detect the modem. If it does, you will see the following screen.
Click **Driver from disk provided by hardware manufacturer**. Then click **OK**.

If this screen does not appear, refer to “If Plug and Play Does Not Detect Your Modem”.

2. When you see the **Install from Disk** screen,
   - If you have a disk that contains your modem’s drivers, insert the disk into your disk drive, usually A.
   - If you have a CD-ROM that contains your modem’s drivers, insert the CD-ROM into your CD-ROM drive, usually D.

If your disk drive or CD-ROM drive is a different letter, type that letter instead of A or D.

Click **OK**. Windows will install the drivers for your new modem.
3. Once Windows finishes loading the information from the disk or CD-ROM, verify that the modem installation was a success. When your desktop returns, click the Windows Start button and point to Settings. Then click Control Panel.

4. Double-click the Modems icon (circled in the screen image below).
5. In the “Modems Properties” screen, you should see a description for your modem. This means the installation was a success.

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

   COM Port___________

If this screen does not appear, refer to “If Plug and Play Does Not Detect Your Modem” on page 30.
7. Click **More Info**…
The modem’s status screens should appear in the box. Click **OK**.

---

Be sure to install software after the modem is installed.

Turn to “Software Installation” on page 20 for information about installing communications software.

**Congratulations!**
**You are ready to start using your 3Com U.S. Robotics Faxmodem**
Installing Modem Drivers with Windows 95: Version 950b

Using the Update Device Driver Wizard Screens

1. When you see the following screen,
   - If you have a disk that contains your modem’s drivers, insert the disk into your disk drive, usually A.
   - If you have a CD-ROM that contains your modem’s drivers, insert the CD-ROM into your CD-ROM drive, usually D.

If your disk drive or CD-ROM drive is a different letter, type that letter instead of A or D.
External Modem Installation with Windows 95 and Windows 98

2. When you see the following screen, click Finish. Windows will copy files to your hard drive.

3. When Windows is finished copying files, verify that the modem installation was a success. Click the Windows Start button and point to Settings. Then click Control Panel.
External Modem Installation with Windows 95 and Windows 98

4. Double-click the **Modems** icon (circled in the screen image below).

5. In the “Modems Properties” screen, you should see a description of your modem.

This means the installation was a success.
6. Next, click the **Diagnostics** tab at the top of the “Modems Properties” screen. Write down the COM setting for your modem in the space. You may need to know this setting when you install your communications software.

   **COM Port**

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

Be sure to install software after the modem is installed.

Turn to “Software Installation” for information about installing communications software.

**Congratulations!**
You are ready to start using your 3Com U.S. Robotics Faxmodem
Installing Modem Drivers with Windows 98

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

If this screen does not appear, refer to “If Plug and Play Does Not Detect Your Modem”.

3. When you see the following screen:
External Modem Installation with Windows 95 and Windows 98

- 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.

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.

8. In the “Modems Properties” screen, you should see a description of your modem. This means the installation was a success. Click OK.
External Modem Installation with Windows 95 and Windows 98

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

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_________

Turn to “Software Installation” for information about installing communications software. Also 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.
You will need these items from your 3Com U.S. Robotics modem box:

- modem
- phone cord
- power adaptor
- serial modem cable

How to Connect the Modem to the Computer

1. Turn off your computer and any attached devices, such as a printer, monitor, keyboard, mouse.

2. Connect the serial cable to the modem and to the computer. When looking for the serial port on the back of your computer, look for ports labeled COM, MODEM, RS-232, or SERIAL. Do not select AUX, GAME, LPT, or PARALLEL.

   Remember which serial port you selected. This information will be necessary when installing your communications software.

3. Plug one end of the phone cord into the TELCO socket and the other end into a phone wall socket.
External Modem Installation with Windows 3.x

The phone socket you are going to use must be for an ANALOGUE phone line. Most office phones 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.

4. Plug the power adaptor that came with the modem into a standard wall socket and insert its plug into the power socket on the modem.

If you want to use a telephone on the same line, use a splitter arrangement. You cannot use the modem and a phone at the same time if they share the same telephone line.

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

7. Start Windows 3.x.

Be sure to install software after the modem is installed.

Turn to “Software Installation” for information about installing communications software.

Congratulations!
You are ready to start using your 3Com U.S. Robotics Faxmodem
Fax, Data, and Telecommunications Software (communications software) allows you to send and receive faxes directly from your computer desktop. You can build your own fax directory, send faxes to specified groups of fax numbers, select individual cover pages when necessary, and send individual faxes without exiting your word processing program. Communications software allows you to change settings and issue commands to your modem.

Additionally, communications software lets you connect to Bulletin Board Systems (BBS) and other online data providers. Take advantage of this access to enter a new world of information and entertainment.

Windows 95

1. Insert the communications software disk or CD-ROM into your disk drive or CD-ROM drive.
2. Go to the Windows Start menu and select Run.
3. In the Run dialog box, type A:\install.exe or D:\install.exe and press ENTER.
   If your disk drive or CD-ROM drive is a different letter, type that letter instead of A or D.
4. Then click OK.
5. Follow the on-screen instructions to install your Fax, Data, and Telecommunications Software.

Windows 3.x

1. Insert the communications software disk or CD-ROM into your disk drive or CD-ROM drive.
2. In Program Manager, click File and select Run.
3. In the text box, type A:\install.exe or D:\install.exe and press ENTER.
   If your disk drive or CD-ROM drive is a different letter, type that letter instead of A or D.
4. Then click OK.
Software Installation

5. Follow the on-screen instructions to install your Fax, Data, and Telecommunications Software.

Refer to your software manual for the specific installation instructions. The software’s installation program will ask you questions about the modem you are using. You may need the following information when installing a communications software package.

Type of Modem

Most communications software programs will ask you to select the type of modem you are using. Select a 3Com U.S. Robotics high speed modem. If that selection is not listed, pick Courier Dual Standard, V.32 bis, or V.34.

Initialisation String

For hardware flow control, a fixed serial port rate, and full result codes, type: AT&F1 and then press ENTER.

If you must use software flow control, type: AT&F2 and then press ENTER.

Flow Control

- For hardware flow control (highly recommended), select RTS/CTS.
- For software flow control, select XON/XOFF.

Disable the type of flow control (hardware or software) that you are not using.

UART - Universal Asynchronous Receiver Transmitter (External Modems Only)

If you are running Windows 3.x or you have upgraded your system from Windows 3.x to Windows 95, you can run MSD to determine your UART setting. In DOS, type MSD at the Windows directory and then press ENTER.
Software Installation

Follow the on-screen instructions to access the COM port settings panel. In this panel you should find the UART chip used. Match the UART type listed in MSD with the serial rate listed in the chart. Select this serial rate in any fax/data programs you use.

<table>
<thead>
<tr>
<th>If this is your UART...</th>
<th>Select this serial rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>16550</td>
<td>115.2 or 57.6 Kbps</td>
</tr>
<tr>
<td>16450</td>
<td>38.4 Kbps</td>
</tr>
<tr>
<td>8250</td>
<td>19.2 Kbps</td>
</tr>
</tbody>
</table>

Do not select a 28,800, 14,400, or 12,000 bps serial port rate if offered. Your modem will not work correctly with any of these settings. Fix or lock the serial port (baud) rate. If it’s referred to as autobaud, select OFF.

Congratulations!

You are now ready to start using your 3Com U.S. Robotics 56K Faxmodem
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 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. Exit out of the Modems Properties screen by clicking Cancel. Click Start, Shut Down, select the Shut down the computer? option, and then click Yes. When your computer has shut down, turn it off and unplug it from its power outlet. Unplug its serial cable from the computer’s COM port. Reinstall your modem following the directions in the “External Modem Installation with Windows 95” chapter, but use a different COM port.
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 “External Modem Installation with Windows 95” chapter.
Troubleshooting

PROBLEM
The computer or software will not recognise the modem.

POSSIBLE SOLUTION
Make sure the modem is plugged in and turned on. Use only the power adaptor included with your modem.

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
The COM port may not be enabled. Refer to your computer’s manual for information about enabling COM ports (usually involves altering the bios settings, motherboard jumpers, and the operating system).

POSSIBLE SOLUTION
You may be using the wrong serial cable with your external faxmodem. Make sure you are using an RS-232 modem cable. You will need to make sure you are using a 25-pin male to 25-pin female if your COM port is a 25-pin port, or a 25-pin male to 9-pin female if your COM port is a 9-pin port.
Troubleshooting

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
phone socket 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 wall 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.
Troubleshooting

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 initialisation string to permanently enable auto answer.

POSSIBLE SOLUTION
You may be using the wrong power adaptor for your modem. Use only the power adaptor that came with your modem.

<table>
<thead>
<tr>
<th>PROBLEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both modems sound like they are exchanging carrier signals, but fail to establish a connection.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>POSSIBLE SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your 56K modem cannot achieve a 56K Internet connection.</td>
<td>Your modem is capable of receiving data at speeds up to 56 Kbps and sending data at speeds up to 31.2 Kbps. However, the download speeds you experience may be lower due to varying line conditions. An analogue phone line compatible with ITU-T V.90 or 3Com 56K technology, and an Internet provider or corporate host site compatible with ITU-T V.90 or 3Com 56K technology are necessary for these high-speed downloads. Check <a href="http://www.3com.com/56k">http://www.3com.com/56k</a> for a list of ISPs that observe ITU-T V.90 and/or offer 3Com 56K technology. Your phone line may not be capable of transferring data at the full 56K, but V.90 and 3Com 56K technology operate at a range of speeds and will use the highest speed possible. You may have devices between the modem and the wall socket. There should be no line splitters, fax machines, or other devices between the modem and the wall socket.</td>
</tr>
</tbody>
</table>
### Troubleshooting

**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&F&H3&I2&R2S7=90` then press **ENTER**.

**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 9600, 7200, or 4800.

**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.
Troubleshooting

<table>
<thead>
<tr>
<th>PROBLEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your communications software fails to initialise the modem.</td>
</tr>
</tbody>
</table>

**POSSIBLE SOLUTION**
Your software’s port settings may be incorrect. Make sure the software’s port settings match those for your modem.

**POSSIBLE SOLUTION**
Make sure the modem is plugged in and turned on. Use only the power adaptor included with the modem.
Troubleshooting

PROBLEM
If Plug and Play (PNP) does not detect your modem. You have installed the modem and Windows has started, 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.
   - If you do not see the new hardware screens, continue with step 6.
6. Click Windows **Start**
Troubleshooting

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 customer support 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 customer support 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 customer support for technical assistance.
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.

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.

autodial
A process where your modem dials a call for you. The dialling process is initiated by sending an ATDT (dial tone) or ATDP (dial pulse) command followed by the telephone number to dial. Autodial 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.
Glossary

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.

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 MNP5 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 Equipment (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.
Glossary

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.

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.22 bis.
Glossary

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.

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 the 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.
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 signaling 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.
Glossary

V.17
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.22 bis
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.
Glossary

V.32 bis
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 28,800 bps and 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.42 bis
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.
## Front Panel Lights

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWR</td>
<td>Power</td>
<td>The modem is turned on.</td>
</tr>
<tr>
<td>CD</td>
<td>Carrier Detect</td>
<td>ON if modem receives a valid data signal (carrier) from a remote modem, indicating that data transmission is possible. Always ON if CD override is ON (&amp;C0).</td>
</tr>
<tr>
<td>RD</td>
<td>Received Data</td>
<td>Flashes when modem sends result codes or passes received data bits from remote.</td>
</tr>
<tr>
<td>SD</td>
<td>Send Data</td>
<td>Flashes when computer sends a data bit to modem.</td>
</tr>
</tbody>
</table>
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.

Bn U.S./ITU-T answer sequence

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

Dn 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 at position n (n = 0–3). Phone numbers are stored with the &Zn=s command
T Tone dial

Dn (Continued)

, (Comma) Pause, see the definition of the S8 register to which it is linked
; (Semicolon) Return to Command mode after dialling
! (Exclamation point) Flashes the switch hook
/ (Back Slash) Delays for 125 ms. before proceeding with dial string
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
Technical Reference

**En**
Sets local echo
- **E0**  Echo OFF
- **E1**  *Modem displays keyboard commands*

**Fn**
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*

**Hn**
Controls ON/OFF hook
- **H0**  Hangs up (goes on hook)
- **H1**  Goes off hook

**In**
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**  Stored memory settings
- **I6**  Link diagnostics
- **I7**  Product configuration
- **I9**  Plug and Play information
- **I11**  Extended link diagnostics

**Ln**
Speaker Volume
- **L0**  Lowest Speaker Volume
- **L1**  Low Speaker Volume
- **L2**  Medium Speaker volume
- **L3**  High Speaker Volume

**Mn**
Operates speaker
- **M0**  Speaker always OFF
- **M1**  *Speaker ON until CONNECT*
- **M2**  Speaker always ON
Technical Reference

M3 Speaker ON after dial, until CONNECT

On Returns online
O0 Returns online
O1 Returns online and retrained

Qn Displays/suppresses result codes
Q0 Displays result codes
Q1 Quiet mode; no result codes
Q2 Displays result codes only in Originate mode

Sr.b=n Sets bit .b of register r to n (0/OFF or 1/ON)

Sr=n Sets register r to n

Sr? Displays contents of S-Register r

S$ Displays a list of the S-Registers

Vn Displays verbal/numeric result codes
V0 Numeric codes
V1 Verbal codes
**Xn Sets result code displayed, default is X4**

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

*Requires @ in dial string; replaces NO CARRIER
### Technical Reference

**Xn (Continued)**

<table>
<thead>
<tr>
<th>Result Codes</th>
<th>X0</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
</tr>
</thead>
<tbody>
<tr>
<td>91/CONNECT 21600</td>
<td></td>
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<tr>
<td>99/CONNECT 24000</td>
<td></td>
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<tr>
<td>103/CONNECT 26400</td>
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<tr>
<td>107/CONNECT 28800</td>
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<tr>
<td>151/CONNECT 31200</td>
<td></td>
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<tr>
<td>155/CONNECT 33600</td>
<td></td>
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<tr>
<td>256/CONNECT 28000</td>
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<tr>
<td>260/CONNECT 29333</td>
<td></td>
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<tr>
<td>264/CONNECT 30666</td>
<td></td>
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<tr>
<td>268/CONNECT 32000</td>
<td></td>
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<td></td>
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<tr>
<td>180/CONNECT 33333</td>
<td></td>
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<tr>
<td>272/CONNECT 34666</td>
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<tr>
<td>276/CONNECT 36000</td>
<td></td>
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<tr>
<td>184/CONNECT 37333</td>
<td></td>
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<tr>
<td>280/CONNECT 38666</td>
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<tr>
<td>284/CONNECT 40000</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>188/CONNECT 41333</td>
<td></td>
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</tr>
</tbody>
</table>
## Technical Reference

**Xn (Continued)**

<table>
<thead>
<tr>
<th>Result Codes</th>
<th>X0</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
</tr>
</thead>
<tbody>
<tr>
<td>192/CONNECT 42666</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>196/CONNECT 44000</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>200/CONNECT 45333</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>204/CONNECT 46666</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>208/CONNECT 48000</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>212/CONNECT 49333</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>216/CONNECT 50666</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>220/CONNECT 52000</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>224/CONNECT 53333</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>228/CONNECT 54666</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>232/CONNECT 56000</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

Adaptive Dialling

Wait for 2nd Dial Tone (W)

Wait for Answer (@)

Fast Dial
**Technical Reference**

<table>
<thead>
<tr>
<th>Yn</th>
<th>Selects power-on/reset default configuration</th>
<th>Z</th>
<th>Resets modem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y0</td>
<td>Use profile 0 setting in NVRAM</td>
<td>Z0</td>
<td>Resets modem to profile selected by Y command</td>
</tr>
<tr>
<td>Y1</td>
<td>Use profile 1 setting in NVRAM</td>
<td>Z1</td>
<td>Resets modem to profile 0</td>
</tr>
<tr>
<td>Y2</td>
<td>Use factory configuration 0 (&amp;F0)</td>
<td>Z2</td>
<td>Resets modem to profile 1</td>
</tr>
<tr>
<td>Y3</td>
<td>Use factory configuration 1 (&amp;F1)</td>
<td>Z3</td>
<td>Resets modem to factory default profile 0 (&amp;F0)</td>
</tr>
<tr>
<td>Y4</td>
<td>Use factory configuration 2 (&amp;F2)</td>
<td>Z4</td>
<td>Resets modem to factory default profile 1 (&amp;F1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z5</td>
<td>Resets modem to factory default profile 2 (&amp;F2)</td>
</tr>
</tbody>
</table>
Extended Data Commands

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

\&An Enables/disables additional result code subsets, see Xn
\&A0 ARQ result codes disabled
\&A1 ARQ result codes enabled
\&A2 Modulation indicator added
\&A3 Protocol indicators added—LAPM/MNP/NONE (error control) and V.42 bis/MNP5 (data compression)

\&Bn 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

\&Cn Controls Carrier Detect (CD) signal
\&C0 CD override
\&C1 Normal CD operations

\&Dn Controls Data Terminal Ready (DTR) operations
\&D0 DTR override
\&D1 DTR toggle causes online Command mode
\&D2 Normal DTR operations
\&D3 Resets on receipt of DTR

\&Fn Loads a read-only (non-programmable) factory configuration
\&F0 Generic template; no flow control
\&F1 Hardware flow control template
\&F2 Software flow control template
### Technical Reference

<table>
<thead>
<tr>
<th>&amp;Gn</th>
<th>Sets Guard Tone</th>
</tr>
</thead>
<tbody>
<tr>
<td>&amp;G0</td>
<td>No guard tone, U.S. and Canada</td>
</tr>
<tr>
<td>&amp;G1</td>
<td>550 Hz guard tone, some European countries, requires B0 setting</td>
</tr>
<tr>
<td>&amp;G2</td>
<td>1800 Hz guard tone, U.K., requires B0 setting</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>&amp;Hn</th>
<th>Sets Transmit Data (TD) flow control, see also &amp;Rn</th>
</tr>
</thead>
<tbody>
<tr>
<td>&amp;H0</td>
<td>Flow control disabled</td>
</tr>
<tr>
<td>&amp;H1</td>
<td>Hardware flow control, Clear to Send (CTS)</td>
</tr>
<tr>
<td>&amp;H2</td>
<td>Software flow control, Xon/Xoff</td>
</tr>
<tr>
<td>&amp;H3</td>
<td>Hardware and software flow control</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>&amp;In</th>
<th>Sets Receive Data (RD) software flow control, see also &amp;Rn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&amp;Rn</td>
</tr>
<tr>
<td>&amp;I0</td>
<td>Software flow control disabled</td>
</tr>
<tr>
<td>&amp;I1</td>
<td>Xon/Xoff signals to your modem and remote system</td>
</tr>
<tr>
<td>&amp;I2</td>
<td>Xon/Xoff signals to your modem only</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>&amp;Kn</th>
<th>Enables/disables data compression</th>
</tr>
</thead>
<tbody>
<tr>
<td>&amp;K0</td>
<td>Data compression disabled</td>
</tr>
<tr>
<td>&amp;K1</td>
<td>Auto enable/disable</td>
</tr>
<tr>
<td>&amp;K2</td>
<td>Data compression enabled</td>
</tr>
<tr>
<td>&amp;K3</td>
<td>MNP5 compression disabled</td>
</tr>
</tbody>
</table>
**Technical Reference**

&Mn  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

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

Note: &N17 through &N39 apply only to V.90 products.

&N0  Connection speed is determined by the remote modem

<table>
<thead>
<tr>
<th>&amp;N</th>
<th>Connect Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>300 bps</td>
</tr>
<tr>
<td>1</td>
<td>1200 bps</td>
</tr>
<tr>
<td>2</td>
<td>2400 bps</td>
</tr>
<tr>
<td>3</td>
<td>4800 bps</td>
</tr>
<tr>
<td>4</td>
<td>7200 bps</td>
</tr>
<tr>
<td>5</td>
<td>9600 bps</td>
</tr>
<tr>
<td>6</td>
<td>12,000 bps</td>
</tr>
<tr>
<td>7</td>
<td>14,400 bps</td>
</tr>
<tr>
<td>8</td>
<td>16,800 bps</td>
</tr>
<tr>
<td>9</td>
<td>19,200 bps</td>
</tr>
<tr>
<td>10</td>
<td>21,600 bps</td>
</tr>
<tr>
<td>11</td>
<td>24,000 bps</td>
</tr>
</tbody>
</table>
&Nn (Continued)
&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
&N23 36,000 bps
&N24 37,333 bps
&N25 38,666 bps
&N26 40,000 bps
&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

&Pn Sets pulse (rotary) dial make/break ratio
&P0 U.S./Canada ratio, 39%/61%
&P1 U.K. ratio, 33%/67%

&Rn Sets Receive Data (RD) hardware flow control, Request to Send (RTS), see also &Hn
&R0 Reserved
&R1 Modem ignores RTS
&R2 Received Data to computer only on RTS

&Sn Controls Data Set Ready (DSR) operations
&S0 DSR override; always ON
&S1 Modem controls DSR
&Tn  Begins test modes
&T0   Ends testing
&T1  Analogue 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  Analogue Loopback with self-test and error detector
Technical Reference

&U\text{n} \quad \text{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.

<table>
<thead>
<tr>
<th>&amp;N=0</th>
<th>&amp;N&gt;0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>&amp;U=0</strong></td>
<td><strong>&amp;U&gt;0</strong></td>
</tr>
<tr>
<td>Connects at best possible speed between your modem and the remote modem.</td>
<td>Connects at any speed faster than the value &amp;U.</td>
</tr>
<tr>
<td>Attempts a connection at the speed defined by &amp;Nn.</td>
<td>Connects at any speed between &amp;Nn. and &amp;U.</td>
</tr>
</tbody>
</table>

Note: These factory default settings should be sufficient for most users.
### Technical Reference

<table>
<thead>
<tr>
<th>&amp;Un (Continued)</th>
<th>&amp;U0</th>
<th>No restrictions on the minimum speed for the connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>&amp;U1</td>
<td>300 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U2</td>
<td>1200 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U3</td>
<td>2400 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U4</td>
<td>4800 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U5</td>
<td>7200 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U6</td>
<td>9600 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U7</td>
<td>12,000 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U8</td>
<td>14,400 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U9</td>
<td>16,800 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U10</td>
<td>19,200 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U11</td>
<td>21,600 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U12</td>
<td>24,000 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U13</td>
<td>26,400 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U14</td>
<td>28,800 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U15</td>
<td>31,200 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U16</td>
<td>33,600 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U17</td>
<td>28,000 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U18</td>
<td>29,333 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U19</td>
<td>30,666 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U20</td>
<td>32,000 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U21</td>
<td>33,333 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U22</td>
<td>34,666 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U23</td>
<td>36,000 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U24</td>
<td>37,333 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U25</td>
<td>38,666 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U26</td>
<td>40,000 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U27</td>
<td>41,333 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U28</td>
<td>42,666 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U29</td>
<td>44,000 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U30</td>
<td>45,333 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U31</td>
<td>46,666 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U32</td>
<td>48,000 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U33</td>
<td>49,333 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U34</td>
<td>50,666 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U35</td>
<td>52,000 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U36</td>
<td>53,333 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U37</td>
<td>54,666 bps</td>
<td></td>
</tr>
<tr>
<td>&amp;U38</td>
<td>56,000 bps</td>
<td></td>
</tr>
</tbody>
</table>
&Wn  Writes current configuration to NVRAM templates
 &W0  Modifies the NVRAM 0 template (Y0)
 &W1  Modifies the NVRAM 1 template (Y1)

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

&Zn=s Writes phone number string s at position n (n = 0–3)

&Zn=L  Writes last executed dial string at position n (n = 0–3)

&Zn?  Displays the phone number stored at position n (n = 0–3)

&ZL?  Displays the last executed dial string

#CID=n  Controls Caller ID feature
 #CID=0  Caller ID disabled
 #CID=1  Caller ID enabled with formatted information
 #CID=2  Caller ID enabled with unformatted information

+++  Escapes to online-command mode
**S-Registers**

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

<table>
<thead>
<tr>
<th>Register</th>
<th>Default</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>S0</td>
<td>0</td>
<td>Sets the number of rings on which to answer in Auto Answer Mode. When set to 0, Auto Answer is disabled.</td>
</tr>
<tr>
<td>S1</td>
<td>0</td>
<td>Counts and stores the number of rings from an incoming call. ( S0 ) must be greater than 0.</td>
</tr>
<tr>
<td>S2</td>
<td>43</td>
<td>Stores the ASCII decimal code for the escape code character. Default character is (+). A value of 128–255 disables the escape code.</td>
</tr>
<tr>
<td>S3</td>
<td>13</td>
<td>Stores the ASCII code for the Carriage Return character. Valid range is 0–127.</td>
</tr>
<tr>
<td>S4</td>
<td>10</td>
<td>Stores the ASCII decimal code for the Line Feed character. Valid range is 0–127.</td>
</tr>
<tr>
<td>S5</td>
<td>8</td>
<td>Stores the ASCII decimal code for the Backspace character. A value of 128–255 disables the Backspace key’s delete function.</td>
</tr>
<tr>
<td>S6</td>
<td>2</td>
<td>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.</td>
</tr>
</tbody>
</table>
Register Default Function

S7  60  Sets the number of seconds the modem waits for a carrier
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
Dropping DTR hangs up the modem
S11 72  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)

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>Reset when DTR drops</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>Reset non-MNP transmit buffer from 1.5K to 128 bytes*</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>Set backspace key to delete</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>On DTR signal, autodial the number stored at position 0</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>At power on/reset, autodial the number stored at position 0</td>
</tr>
</tbody>
</table>
### Technical Reference

<table>
<thead>
<tr>
<th>Register</th>
<th>Default</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>S13 (Continued)</td>
<td></td>
<td><strong>Bit Value Result</strong></td>
</tr>
<tr>
<td></td>
<td>Bit</td>
<td>5 32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 64</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 128</td>
</tr>
</tbody>
</table>

*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 very helpful in situations when a remote modem/printer application is losing characters.

| S14 | 0   | Reserved                                   |
| S15 | 0   | Bit-mapped register setup                  |

To set the register, see instructions for S13.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>Disable ARQ/MNP for V.22</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>Disable ARQ/MNP for V.22 bis</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>Disable ARQ/MNP V.32/V.32 bis</td>
</tr>
</tbody>
</table>
Technical Reference

<table>
<thead>
<tr>
<th>Register Default</th>
<th>Bit</th>
<th>Value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>S15 (Continued)</td>
<td>3</td>
<td>8</td>
<td>Disable MNP handshake</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>16</td>
<td>Disable MNP level 4</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>32</td>
<td>Disable MNP level 3</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>64</td>
<td>MNP incompatibility</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>128</td>
<td>Disable V.42 operation</td>
</tr>
</tbody>
</table>

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})

<table>
<thead>
<tr>
<th>Register Default</th>
<th>Bit</th>
<th>Value</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>S16</td>
<td>0</td>
<td></td>
<td>Reserved</td>
</tr>
<tr>
<td>S17</td>
<td>0</td>
<td></td>
<td>Reserved</td>
</tr>
<tr>
<td>S18</td>
<td>0</td>
<td></td>
<td>Test timer for &amp;T loopback testing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sets the time in seconds of testing before the modem automatically times out and terminates the test</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>When set to 0, the timer is disabled</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Valid range is 1-255</td>
</tr>
<tr>
<td>S19</td>
<td>0</td>
<td></td>
<td>Sets the duration, in minutes, for the inactivity timer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The timer activates when there is no data activity on the phone line; at time-out the modem hangs up</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S19 = 0 disables the timer</td>
</tr>
<tr>
<td>S20</td>
<td>0</td>
<td></td>
<td>Reserved</td>
</tr>
<tr>
<td>S21</td>
<td>10</td>
<td></td>
<td>Sets the length, in 10-millisecond units, of breaks sent from the modem to the computer; applies to MNP or V.42 mode only</td>
</tr>
</tbody>
</table>
## Technical Reference

<table>
<thead>
<tr>
<th>Register</th>
<th>Default</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>S22</td>
<td>17</td>
<td>Stores the ASCII decimal code for the Xon character</td>
</tr>
<tr>
<td>S23</td>
<td>19</td>
<td>Stores the ASCII decimal code for the Xoff character</td>
</tr>
<tr>
<td>S24</td>
<td>0</td>
<td>Reserved</td>
</tr>
<tr>
<td>S25</td>
<td>20</td>
<td>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.</td>
</tr>
<tr>
<td>S26</td>
<td>0</td>
<td>Reserved</td>
</tr>
<tr>
<td>S27</td>
<td>0</td>
<td>Bit-mapped register setup To set the register, see instructions for S13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>Enables ITU-T V.21 modulation at 300 bps for UK calls</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>Enables unencoded (non-trellis coded) modulation in V.32 mode</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>Disables V.32 modulation</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>Disables 2100 Hz answer tone to allow two V.42 modems to connect faster</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>Enables V.23 fallback mode</td>
</tr>
<tr>
<td>5</td>
<td>32</td>
<td>Disables V.32 <em>bis</em> mode</td>
</tr>
</tbody>
</table>
### Technical Reference

<table>
<thead>
<tr>
<th>Register</th>
<th>Default</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>S27 (Continued)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bit</td>
<td>Value</td>
<td>Result</td>
</tr>
<tr>
<td>6</td>
<td>64</td>
<td>Disable V.42 selective reject</td>
</tr>
<tr>
<td>7</td>
<td>128</td>
<td>Software compatibility mode</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>V.8 Call Indicate enabled</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>Enables V.8 mode</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>Reserved</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>Disable V.34 modulation</td>
</tr>
</tbody>
</table>
## Technical Reference

### Register Default Function

<table>
<thead>
<tr>
<th>Register</th>
<th>Default</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>S32 (Continued)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bit</td>
<td>Value</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>128</td>
</tr>
<tr>
<td>S33</td>
<td>0</td>
<td>Bit-mapped register setup</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To set the register, see the instructions for S13</td>
</tr>
<tr>
<td></td>
<td>Bit</td>
<td>Value</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>128</td>
</tr>
<tr>
<td>S34</td>
<td>0</td>
<td>Bit-mapped register setup</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To set registers, see instructions for S13</td>
</tr>
<tr>
<td></td>
<td>Bit</td>
<td>Value</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
## Register  Default  Function

<table>
<thead>
<tr>
<th>Register</th>
<th>Default</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>S34 (Continued)</td>
<td>Bit</td>
<td>Value</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>S35-S37</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>S38</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>S39-S40</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>S41</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>S42</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Fax Commands

+FCLASS=n  Sets the mode of operation
  
  \( FCLASS = 0 \)  Data mode
  \( FCLASS = 1 \)  Group 3 Facsimile Service Class 1 mode
  \( FCLASS = 2.0 \)  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.  \((n=0-255)\)

+FRS=n  Makes the modem wait for a specified length of silence before sending OK to
the screen
  The pause is set in 10 millisecond intervals. \( n \) is the number of 10 millisecond
  intervals that pass before OK appears.  \((n=0-255)\)
  
  Note: This command terminates with OK when either the specified amount of
  silence is detected or when the user types anything (which is ignored).
Fax Commands (Continued)

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

+FRM=n  Receives data using the modulation specified by $n$
        
        ($n = 3, 24, 48, 72, 96, 97, 98, 121, 122, 145, \text{ or } 146$)
        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 $n$
        
        ($n = 3, 24, 48, 72, 96, 97, 98, 121, 122, 145, \text{ or } 146$)
        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 $n$
        
        ($n = 3, 24, 48, 72, 96, 97, 98, 121, 122, 145, \text{ or } 146$)
        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

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

The serial interface is a standard developed by the Electronic Industries Association (EIA). It defines the signals and voltages used when data is exchanged between a computer and a modem or serial printer.

The entire standard covers many more functions than are used in most data communications applications. Data is transmitted between the devices over a shielded serial cable with a 25-pin male (DB-25) connector to the modem and a 25-pin, 9-pin, 8-pin, or custom-built connector to the computer.

The use of a shielded cable when connecting a modem to a computer is recommended to ensure minimal interference with radio and television.

Pin assignments are factory-set in the U.S. Robotics modem to match the standard DB-25 assignments in the following table. DB-9 connectors for IBM/AT-compatible computers should be wired at the computer end of the cable as shown in the DB-9 column.
## Serial Interface Pin Definitions

<table>
<thead>
<tr>
<th>DB-25</th>
<th>DB-9</th>
<th>Circuit</th>
<th>Function</th>
<th>Signal Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>—</td>
<td>AA</td>
<td>Chassis Ground</td>
<td>Both</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>BA</td>
<td>Transmitted Data</td>
<td>Computer</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>BB</td>
<td>Received Data</td>
<td>Modem</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>CA</td>
<td>Request to Send</td>
<td>Computer</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>CB</td>
<td>Clear to Send</td>
<td>Modem</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>CC</td>
<td>Data Set Ready</td>
<td>Modem</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>AB</td>
<td>Signal Ground</td>
<td>Both</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>CF</td>
<td>Carrier Detect</td>
<td>Modem</td>
</tr>
<tr>
<td>12</td>
<td>—</td>
<td>SCF</td>
<td>Speed Indicate</td>
<td>Modem</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
<td>CD</td>
<td>Data Terminal Ready</td>
<td>Computer</td>
</tr>
<tr>
<td>22</td>
<td>9</td>
<td>CE</td>
<td>Ring Indicate</td>
<td>Modem</td>
</tr>
</tbody>
</table>
Regulatory Information

CE Compliance

Electromagnetic Compatibility

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

• 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
• EN 41003 08/93

The ports on this modem have the following safety status:

• Telephone line connector = TNV-2
• All other ports = SELV

These definitions are classified as per safety standard: EN 60950/A4 3/97

• SELV: Safety Extra Low 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:

![CE 168X]

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.
Limited 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 Faxmodem: Lifetime
- Network Interface Cards: Lifetime
- Other hardware products: One year*
- Spare parts and spares kits: 90 days

* unless otherwise specified above

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.

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.
Limited Warranty

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.
Limited Warranty

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.

WARRANTIES EXCLUSIVE: IF A 3COM PRODUCT DOES NOT OPERATE AS WARRANTED ABOVE, CUSTOMER'S SOLE REMEDY FOR BREACH OF THAT WARRANTY SHALL BE REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE PAID, AT 3COM'S OPTION. TO THE FULL EXTENT ALLOWED BY LAW, THE FOREGOING WARRANTIES AND REMEDIES ARE
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3COM SHALL NOT BE LIABLE UNDER THIS WARRANTY IF ITS TESTING AND EXAMINATION DISCLOSE THAT THE ALLEGED DEFECT IN THE PRODUCT DOES NOT EXIST OR WAS CAUSED BY CUSTOMER'S OR ANY THIRD PERSON'S MISUSE, NEGLECT, IMPROPER INSTALLATION OR TESTING, UNAUTHORIZED ATTEMPTS TO REPAIR OR MODIFY, OR ANY OTHER CAUSE BEYOND THE RANGE OF THE INTENDED USE, OR BY ACCIDENT, FIRE, LIGHTNING, OR OTHER HAZARD.

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Limited Warranty

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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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