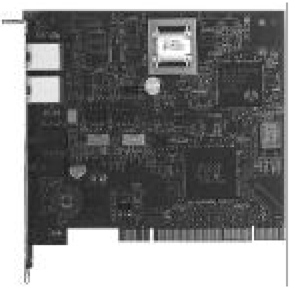
Boca WinStorm 56K PCI Modem

Fax/Data

Fax/Data/Voice

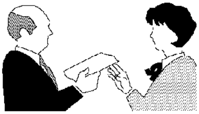


BOCA
RESEARCH

Before You Begin your Installation

The product you have purchased is designed to be easily installed into most IBM PC or compatible systems. Many products have large, easy-to-read legends to allow for the easy configuring of the product. This installation manual contains detailed instructions. Most included software has automatic installation programs to place the software correctly onto your computer. However, as all computers are configured differently, you may be required to perform some basic MS-DOS or Windows tasks. If you are not familiar with basic MS-DOS commands such as DIR, CD, or EDIT, you should check your MS-DOS manual, or seek assistance from you local computer dealer to install the product.

How to get Technical Assistance

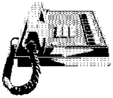


The dealer that you purchased this product or your computer from is the first place you should go for technical assistance. The dealer is usually the most qualified source of help, and is most familiar with your system and how this product should be installed. Many dealers have customer service and technical support programs, with varying levels of support offered, depending on your needs and computer knowledge. ***Please contact the dealer first whenever a problem occurs.*** **International customers will find that contacting the place of purchase for assistance will be much more efficient than contacting Boca Research directly.**

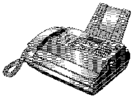
If your Dealer Can't Assist you

If you can't get assistance from your dealer, the manufacturer provides varying levels of technical assistance as summarized on the following page. **All phone numbers are based in the United States.**

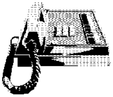
Boca BBS
561-241-1601



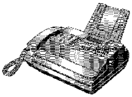
Standard Free Technical Support
561-241-8088



Automated
Fax Retrieval System
561-995-9456



Priority Service
900-555-4900
($2 per minute)



Technical Support Fax
561-997-2163

On-Line Support!
***CompuServe*: GO BOCA**
***Internet*:**
email:
support@bocaresearch.com
on the World-wide WEB:
http://www.bocaresearch.com

The Standard Free Technical Support number is for quick answers to specific inquiries on product features and technical questions (call **561-241-8088**; M-F, 8 am to 6:30 pm EST). Direct access to technical support representatives is provided on a limited basis. If you require immediate attention or in-depth help with the installation of the product, please call our 900-priority support number for service. This number gives you immediate access to senior-level technicians. The number is **900-555-4900**. You will be charged $2.00 per minute. The charges will appear on your next phone bill.

Damaged or Missing Items

We use many world-class quality assurance programs to ensure the product you purchased is of the highest caliber. Sometimes, however, a component may be missing from the box, or is damaged or corrupt in some way. If this happens, immediately return the entire package to your place of purchase so you may exchange it for a new one. Your dealer should be able to provide you with an exchange far more quickly than by contacting us directly. If for some reason you are unable to return the product directly to its place of purchase, refer to the “Servicing Your Product” and “Warranty” sections in this manual for instructions.

Using this manual...

This manual provides installation and operating instructions for your modem. The manual assumes the user has basic computer skills and is familiar with personal computers. Its primary purpose is to provide physical installation instructions and basic troubleshooting. All sections should be read carefully before beginning any installation procedures. Customer support experience has shown that many costly and time-consuming calls to technical support staff can be avoided with closer attention to the information provided here. **In addition to following the instructions provided in this manual, you will also need to consult the documentation supplied with your communications software.**

IMPORTANT NOTICE

FCC Requirements

The Federal Communications Commission (FCC) restricts the way you can use modems. Read the FCC compliance statement found in Appendix B of this manual.

Connecting the Modem

You can connect the modem to various types of telephone jacks. The acceptable phone jack types are RJ-11, RJ-12, RJ-13, RJ-41S, and RJ-45S. Most homes and businesses use one of these jacks. If your phone system does not have a modular jack, you can purchase an adapter to convert your jack into an RJ-11C jack. Adapters may be purchased from any local phone or electronics store.

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Publication Date: May, 1998
Printed in the U.S.A.

Contents

Section One: Introduction 8

Section Two: Installation (Internal Model) 13
    2.1 Installing the Modem 14
    2.2 Modem Setup for Windows 95 Users 18
    2.3 Testing the Connection 20

Section Three: Troubleshooting 21

Appendix A: Technical Specifications 26
Appendix B: Regulatory Statements 27
Appendix C: Servicing Your Product 34
Appendix D: Warranty Information 37
Appendix E: AT Command Reference 39

HOW THIS MANUAL IS ORGANIZED

Section One: Introduction. An overview of the features of your modem.

Section Two: Installation. This section provides physical installation instructions (including how to connect the phone line), and procedures for testing the connection, and installing drivers for Windows 95.

Section Three: Troubleshooting. This section provides a description of the most common problems which may be encountered during installation and operation along with possible solutions.

Appendices. These include technical specifications, FCC and DOC (Canada) compliance information as well as other regulatory statements, information on obtaining service, as well as your warranty, and a comprehensive AT command reference*.

* In most cases, your chosen communications software will handle all modem operation and settings. Working with AT command settings requires a sound knowledge of their use and should not undertaken lightly. An incorrect AT command setting may cause your modem to operate improperly.

Section One: Introduction

Congratulations on your purchase of the WinStorm 56K PCI V.90-compliant modem. Boca modems are easy to install as long as you follow the provided instructions and safety precautions. If you require more information than found in the *EZ Installation Guide*, consult this manual. Always read through all procedures before you begin installation. It is also a good idea to refer to your computer system manual to assure correct and safe installation.

Your new modem combines high-speed data and fax capability for the Microsoft Windows 95 operating system. The modem supports the V.90 / K56flex protocols, as well as V.32bis which provides high-speed data transmission with V.42bis / MNP5 (data compression) and V.42 / MNP2-4 (error control). For additional information on features, supported protocols, and technical specifications, see Appendix A.

CAUTION: Electronic components are sensitive to static electricity. To prevent damage, discharge any static electricity from your body by touching a known grounded metal surface, such as your computer's chassis before and during installation of the component. To prevent damage to your new Boca modem, avoid contact with any circuitry and only handle the modem by its edges.

Minimum System Requirements

- IBM-compatible P100 or greater system
- One available PCI expansion slot
- Windows 95
- 8MB system RAM
- Free hard disk space needed (will vary based on included options / extras)
- 2X CD-ROM drive

Voice Capabilities (speakerphone model)

The speakerphone model features automatic call recognition, auto-answer, and an embedded voice modem 'AT' command set. The modem, along with its host computer, support answering machine functions through voice and fax communications software. You can set up multiple mailboxes. The automated attendant feature allows dial-in users to check, answer, and leave messages. It also supports microphone and speaker automatic gain control, as well as headset.

Fax Capabilities

The modem offers a wide range of fax services. It supports Group 3, class 1 fax send and receive operations. It complies with ITU-TSS (formerly CCITT) V.17, V.29, V.27ter, and V.21 channel 2 international fax standards. It also implements the EIA T-30 protocol, and Class 1, Group 3.

Data Capabilities

The modem offers the widest possible range of internationally accepted standard modulation methods and protocols. It provides data throughput up to 115.2Kbps. The modem complies with ITU-TSS standards V.90, V.34, V.32bis, V.32, V.23, V.22bis, V.22A / B, and V.21, as well as Bell 212A and 103. (K56 Flex for models supporting 56Kbps). The modem implements V.42 error control with LAP-M and MNP 2-4, as well as data compression with V.42bis and MNP-5.

Ideal for Travelers

Voice features allow for remote call-in with full services to answer, route, delete, or forward messages. For example, while you are traveling, faxes are stored on your hard drive. When you call in to review a voice message, a fax forwarding function allows received faxes to be forwarded to another fax number at any location.

A Word about Simultaneous Voice and Data (SVD)

Your modem may support SVD. Simultaneous Voice and Data (SVD) is a standard allowing the simultaneous transmission of voice and data over a single telephone line. The model supporting this standard will allow you to share modem applications and talk on the phone with a single standard telephone line. When a phone call is in SVD mode, any data (e.g., images, 3D-graphics, shared applications, interactive games) can be shared with a normal phone conversation over the same analog line.

Optional Accessories (speakerphone models with microphone and speaker jacks)

The speakerphone version of the modem is equipped with microphone and speaker jacks for use with headset, speakers and microphone. **(See installation instructions: p.16-17.)** The handset can be used to record outbound messages. However, a microphone is recommended for better quality recordings. You may use a combination headphone and microphone or a separate microphone and speaker(s).

Microphone Requirements:

The microphone element must be of the electret type also known (incorrectly) as a condenser type. The microphone in most telephone handsets is of this type. This modem was designed for a microphone sensitivity of -64 dBspl. Other microphone sensitivities work equally well, with only a subjective difference in loudness. Carbon microphone elements will also work, but don’t offer the quality of the electret. Another common microphone element is the dynamic type which will NOT work with this modem.

Speaker Requirements:

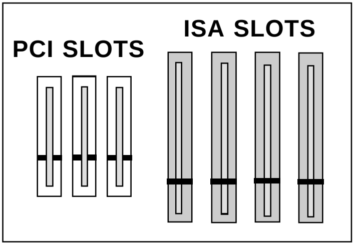
You can attach the modem to a high-quality amplified external speaker or the earpiece of a handset. The external speaker must have an impedance rating of 8 ohms or more.

Section Two: Installation

This section explains how to install the internal modem in your computer. Review the contents of your package to make sure all items are present. **If any items are missing or damaged, contact the dealer from whom you purchased the modem for assistance. Also note that phone cable configuration will vary for international settings. The diagrams which follow depict the speakerphone version of the modem.**

IMPORTANT NOTES ON PCI CONFIGURATION

The modem must be installed in a PCI-bus compatible connector. PCI expansion slots are shorter than standard ISA slots.



PCI slots are configured by the system BIOS, or by jumpers on the motherboard. Refer to your computer's documentation for more information.

2.1 Installing the Modem

NOTE: If your computer came with an internal modem, you must physically remove it or disable it through your computer's BIOS setup. Consult your computer's manual or manufacturer for specific instructions.

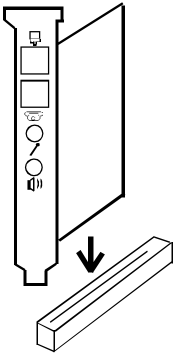
1. Turn off your computer and disconnect any attached devices and power cords. Remove any diskettes.

2. Remove the computer's cover and locate an available 16-bit expansion slot. Remove that expansion slot cover and save the screw.

3. Remove the modem from its anti-static bag, handling it by its edges and retaining bracket. Be careful not to touch the edge connector or any components on the card.

4. Carefully insert the modem into the expansion slot you selected, applying pressure to the upper board edge until it is seated in the slot.

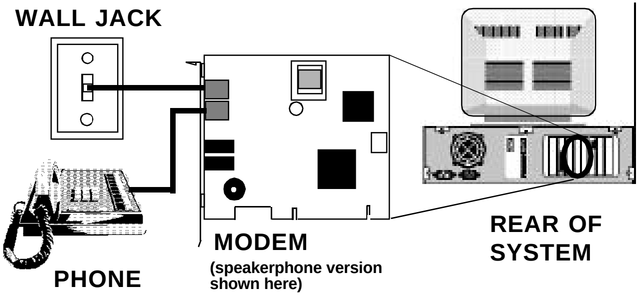
5. Secure the modem into place by aligning its metal retaining bracket with the hole in the top edge of the system's rear panel. Fasten the modem's metal bracket with the screw removed from step 2.



(speakerphone version shown here)

6. Disconnect your present phone cord from the wall jack. Plug one end of the phone cord that came with the modem into the wall jack, and the other end into the jack either labeled **LINE** or marked with the symbol (☎) on the back of the modem. Plug

the phone into the jack either labeled **PHONE** or marked with the symbol (☎) on the back of the modem (not supported in international settings). See illustration below. *Note: A telephone is not necessary for the proper operation of this product.*


WALL JACK
PHONE
MODEM
(speakerphone version shown here)
REAR OF SYSTEM

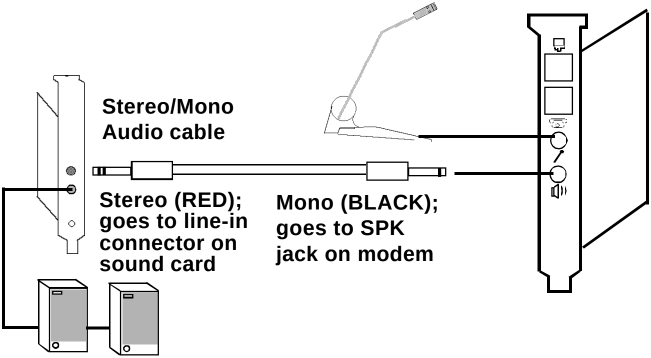
7. Replace the system cover and reconnect any detached devices and power cords. Now, you may use your stereo / mono cable to attach to other devices (if supported by your modem) as explained in step 8 on the next page, or power up your computer. **If you are running Windows 95**, the modem should be recognized at power-up.

8. Connect devices to microphone and speaker jacks.

a. If you have an existing sound card, continue below. If you do NOT have a sound card, skip to step b.

- Attach a microphone to the jack labelled **MIC** or marked with the symbol (🎤) (to record outgoing messages; in addition, the microphone serves as a transmitter for your speakerphone) on the modem.
- Attach the mono-end of a stereo-mono cable to the jack labelled **SPK** or marked (🔈) on the modem (to listen to phone messages through your sound board). E.g., playback, call monitoring.
- Attach the stereo-end of a stereo-mono cable to the line-in connector on your sound card. If your sound card does not have a line-in connector, you will need to attach a speaker(s) to the speaker jack, labelled **SPK** or marked with the symbol (🔈) on the modem.

SOUND CARD CONNECTION

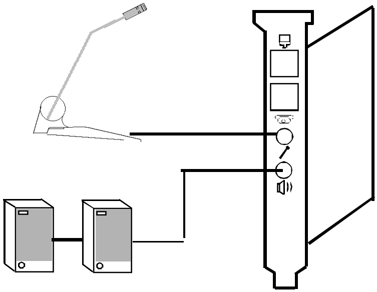

Stereo/Mono
Audio cable
Stereo (RED); goes to line-in connector on sound card
Mono (BLACK); goes to SPK jack on modem

b. If you do NOT have an existing sound card:

- Connect a microphone to the jack labelled **MIC** or marked with the symbol (🎤) on the modem (to record outgoing messages; in addition, the microphone serves as a transmitter for your speakerphone).

- Connect a speaker(s) to the jack labelled **SPK** or marked with the symbol (🔈) (to listen to incoming messages; in addition, the speaker serves as a receiver for your speakerphone) on the modem.

MICROPHONE AND SPEAKER CONNECTION



Line connection is complete. Power up your computer. **If you have Windows 95**, the modem should be recognized at power-up.

2.2 Modem Setup for Windows 95 Users

Depending on the version of Windows 95 you have, devices are detected and installed in slightly different ways. When the modem is physically installed, start Windows 95 as you normally would.

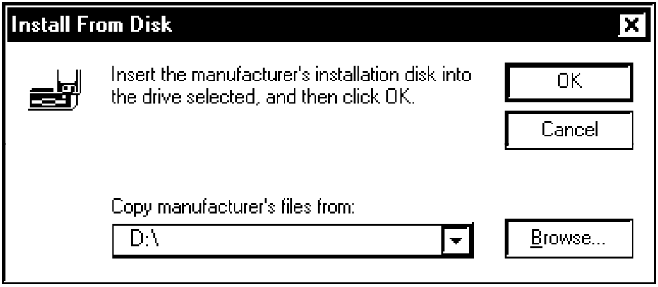
NOTE: Some versions of Windows 95 may prompt you for the path of your modem drivers on your CD-ROM. Type in your CD-ROM drive path (e.g., D:\). You will be prompted with either:

- the **Update Device Driver Wizard** (in this case, simply insert the MegaMedia CD, click **Next**, then **Finish**). The Wizard will automatically locate the correct drivers and install them. Continue with *Completing Driver Installation* below. OR

- the **New Hardware Found** dialog box. Here, you are asked what driver files are associated with the new hardware. Do the following:

1. From the choices given, select **Driver from disk provided by hardware manufacturer**.

2. Windows 95 then displays the **Install from Disk** dialog box. Here, you are asked for the location of the driver files.



Insert the manufacturer's installation disk into the drive selected, and then click OK.

Copy manufacturer's files from:

D:\

3. Insert the CD and type the path for the location of the drivers (usually D:\). If 'D:' is not the CD-ROM drive letter, substitute the correct letter. Continue with the printed EZ Installation Guide to install the suite of software provided on the CD.

Completing Driver Installation

NOTE: After Windows 95 finishes copying files, it will detect other devices. Simply repeat the instructions above, depending on your version of Windows 95. When complete, continue with MegaMedia CD Installation on the next page.

To verify that your modem has been installed, go to **Control Panel, Modem**. Select the **Diagnostics Tab**, then highlight the modem. Next, select the More Info button. If your modem fails to respond, return to **Control Panel**. Select **System**, then **Device Manager** to check modem resources. Refer to your Windows 95 documentation for additional instructions.

2.3 Testing the Connection

1. Install and start your communications software. Then place it in terminal mode. Refer to the program’s documentation if you require assistance. **If you are not in terminal mode, AT commands typed in at the DOS prompt will result in a “Bad Command or File Name” message**.

2. Type in **ATZ** followed by ENTER and the modem will respond with OK after a few seconds. If the modem does not respond OK, refer to *Troubleshooting (Section Three).*

3. Type **ATH1** followed by ENTER and you should hear a dial tone from the modem speaker. To adjust speaker volume, refer to your communications software’s on-line help.

4. Type **ATH** followed by ENTER to put the modem “on-hook”. This confirms that the modem has been successfully installed into the computer.

5. Your modem is now ready for use. Continue now with your communications software and documentation.

Section Three: Troubleshooting

This section lists common problems that may be encountered and their possible solutions. **NOTE: All “AT” commands must be typed from your communication software’s terminal screen.**

SYMPTOM	POSSIBLE REMEDY
No dial tone.	■ Verify that you have cables plugged in correctly as instructed in Section Two or Three. ■ Connect a telephone set directly to the wall jack and check for a dial tone. If no dial tone is heard, the telephone line is not working. Contact the telephone company. ■ The telephone line may be in use at a different extension
Modem will not connect to another modem.	■ Check the connections between the modem and the computer, and the modem and the telephone line. ■ Make sure the telephone jack is operational as described above. ■ Perhaps the number you have called does not reach a modem, or the remote modem may not be set up to respond.
No response when you type in AT commands	■ There may be a conflicting port address. Re-configure the modem’s COM port address.

SYMPTOM	POSSIBLE REMEDY
No response when you type in AT commands (contd)	■ Verify that the communication software is set to the same communications port where your modem is attached (e.g., COM1, COM2). Check IRQ settings in your software and on the modem. ■ Try typing AT&F to reset the modem to its factory defaults.
AT commands not visible.	■ Make sure the echo command is set to ON. Change to echo with the ATE1 command.
After data connection is established, data is displayed as garbled characters.	■ Make sure the local (yours) and remote modem configurations are compatible. ■ Verify that both modems are operating with the same settings, speed, data, parity, and stop bits. ■ The software may not be set for correct terminal emulation. Configure software to correct type. ANSI terminal emulation is most commonly used. ■ Power down your system and re-run your communications software. Check software settings. ■ Exit the communications program and restart it.

SYMPTOM	POSSIBLE REMEDY
The modem does not answer an incoming call.	■ You may not have enabled auto-answer. Use your software to enable this function. ■ If you have an answering machine, it may be answering before the modem can. Turn the answering machine off, or, use the software to set auto-answer to respond in fewer rings than the answering machine.
Modem disconnects while on-line.	■ Check for any loose connections. ■ Re-try the connection by dialing the number several times. You may be experiencing line interference. ■ An incoming call may have broken the connection if a call-waiting feature was enabled. Disable call-waiting and try again.

SYMPTOM	POSSIBLE REMEDY
I am having trouble getting my init string to work.	■ Init strings are primarily personal preferences. Use the most basic one that can get the job done. An &Q6 (which disables error control) is optional.
Connection Errors	■ Try connecting at a lower speed (e.g., 14,400 or 9600bps). ■ Turn off error correction / compression with an **+ES=1,0,1+DS=0,0,,** command. ■ Noisy / poor line conditions may prohibit connection. Have your phone company test your lines. ■ Verify that the modem at the other end is up to date and compliant with current CCITT-ITU and Bell standards.
Problem Connecting to On-line subscription services.	■ Some on-line services require that your modem be configured to run with error correction and data compression turned **OFF**. The easiest way to accomplish this is by using the command **+MS=1,0,1** and setting the communication software to the correct baud rate for the service you are calling (e.g., 2400, 9600bps).

SYMPTOM	POSSIBLE REMEDY
Problem Connecting to On-line subscription services (contd).	If you still have problems connecting, try forcing the modem to connect up at the slower speed with the command **+MS=V32,0,9600,9600** for 9600 baud services.
Microphone fails to work.	■ Make sure attached microphone is working and conforms to necessary specifications. See Section One. ■ Make sure microphone is plugged into correct jack.
Speaker fails to work.	■ Make sure attached speaker is working and conforms to necessary specifications. See Section One. ■ Make sure speaker is plugged into correct jack.

Appendix A: Technical Specifications

Data

- V.90*, K56Flex*,28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, 2400, 1200, 300
- V.34, V.32bis, V.32, V.23, V.22bis, V.22, V.22A/B, and V.21; Bell 212A and 103 DTE data rate up to 230.4bps
- Parallel 16C550A UART
- Industry standard AT command set
- Supports Error Correction V.42 LAPM, MNP 2-4, MNP10-EC
- Supports Data Compression V.42bis, MNP5

Fax

- Fax speeds of 14400, 12000, 9600, 7200, 4800, 2400
- ITU-T V.17, V.29, V.27ter, V.21 ch2
- Class 1, Group 3 fax support

Audio Data Rate: 7.2KHz sample rate (speakerphone models only)

Diagnostics:
- Local/remote digital and analog loopback.
- Automatic power-on self-test.

Power

+5V, 1.2 watts (maximum)
+/-12V, 0.5 watts (maximum) (from host computer power supply)

Dimensions

4.75 inches x 4.25 inches (12.07cm x 10.80cm)

*** (for models supporting 56K only; also supports intermediate connect rates of 54000, 52000, 48000, 46000, 44000, 42000, 40000, 38000, 36000, 34000, 32000)**

Appendix B: Regulatory Statements

FCC Statement:

“This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

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

THIS UNIT COMPLIES WITH FCC PART 68 AS OF DATE OF MANUFACTURE.
This equipment has been tested and found to comply with the limits for a **Class B** digital device, pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

Note: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to insure compliance.

Note: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user’s authority to operate the equipment.”

Notification to the Telephone Company

Notification to the telephone company is no longer required prior to connecting the registered equipment but upon request from the telephone company the user shall tell the telephone company which line the equipment is connected to as well as the registration number and the ringer equivalence of the registered protective circuitry. In most, but not all areas, the sum of all RENs should be 5.0 or less. The FCC Registration number and Ringer Equivalence number are printed on the main chip in the center of the internal modem board.

Malfunction of the Equipment

In the event that the modem should fail to operate properly, the customer shall disconnect the equipment from the telephone line to determine if it is the customer’s equipment which is not working properly, or if the problem is with the modem, the user shall discontinue use until it is repaired. In the event service is needed the user should contact the vendor from whom you purchased the modem.

Telephone Connection Requirements

Except for telephone company-provided ringers, all connections to the telephone network shall be made through standard plugs and standard telephone company-provided jacks, or equivalent, in such a manner as to allow for easy and immediate disconnection of the terminal equipment. Standard jacks shall also be arranged that, if the plug connected thereto is withdrawn, no interference to the operation of the equipment at the customer’s premises which remains connected to the telephone network, shall occur by reason of such withdrawal.

Incidence of Harm

Should terminal equipment or protective circuitry cause harm to the telephone network, the telephone company shall, where practical, notify the customer that temporary discontinuance of service may be required; however, where prior notices are not practical, the telephone company may temporarily discontinue service if such action is deemed reasonable in the circumstances. In the case of such temporary discontinuance, the telephone company shall promptly notify customers and will be given the right to bring a complaint to the FCC if they feel the disconnection is not warranted.

Changes in Telephone Company Equipment or Facilities

The telephone company may make changes in its communications facilities, equipment, operations, or procedures, where such action is reasonably required and proper in its business. Should any such changes render the customer's terminal equipment incompatible with the telephone company facilities, the customer shall be given adequate notice to make modifications to maintain uninterrupted service.

General

The FCC prohibits customer-provided terminal equipment be connected to party lines or to be used in conjunction with coin telephone service.

Installation

The modem is equipped with a USOC RJ-11 standard miniature modular jack and is designed to plug directly into a modular jack.

NOTICE ON FAX TRANSMISSIONS

The *Telephone Consumer Protection Act of 1991* makes it unlawful for any person to use a computer or other electronic device, including fax machines, to send any message **unless such message clearly contains in a margin at the top or bottom of each transmitted page or on the first page of the transmission, the date and time it is sent and an identification of the business or other entity, or other individual sending the message and the telephone number of the sending machine or such business, other entity, or individual.** (The telephone number provided may not be a 900 number or any other number for which charges exceed local or long-distance transmission charges.)Consult the procedures in the documentation for the fax software you are using with this modem product for the best way to accomplish the above requirements.

CANADIAN STANDARDS ASSOCIATION

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouiller du Canada.

Industry Canada Information

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective operational and safety requirements. The Department does not guarantee the equipment will operate to the user’s satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations. Repairs to certified equipment should be made by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunction, may give the telecommunications company cause to request the user to disconnect the equipment.

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

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

NOTICE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consists of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence numbers of all the devices does not exceed 5.

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

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the load numbers of all the devices does not exceed 100. The Load number appears on the underside of the modem.

To be installed in UL-listed and CSA-certified computers with instructions on how to add/remove expansion cards.

The RAL number of this equipment is 0.7. This number denotes the number of items that may be attached to a telephone line. The sum of all the items connected to a line should not exceeed a sum of 5.

This device is not intended to be used in parallel with other devices. The operation of this equipment on the same lines as telephones or other equipment with audible warning devices or automatic ring detectors may give rise to bell tinkle or noise and may cause trupping of the ring detector. The user should not report such occurrences as faults.

When relocating the equipment, always disconnect the telecomm line connection before the power, and reconnect the power first.

NOTE THAT FAILURE TO MEET THE ABOVE REQUIREMENTS MAY NEGATE THE USER RIGHTS UNDER THE TELECOMM TERMS OF SERVICE

WARNING / ATTENTION

#1“**CAUTION:** THIS MODEM CARD IS INTENDED TO BE INSTALLED IN CSA CERTIFIED EQUIPMENT IN THE FIELD BY THE USER IN THE MANUFACTURER’S DEFINED OPERATOR ACCESS AREA. CHECK THE EQUIPMENT OPERATING / INSTALLATION INSTRUCTIONS AND / OR EQUIPMENT MANUFACTURER TO VERIFY / CONFIRM IF YOUR EQUIPMENT IS SUITABLE FOR USER-INSTALLED APPLICATION CARDS.”

“**ATTENTION**: CETTE CARTE MODEM EST DESTINEE A ETRE INSTALLEE PAR L’UTILISATEUR, SUR PLACE ET A L’INTERIEUR DE LA ZONE DEFINIE PAR LA FABRICANT, DANS UN APPAREIL CERIFIE CSA. CONSULTER LE MODE D’EMPLOI OU LE FABRICANT DE L’APPAREIL POUR VERIFIER OU CONFIRMER SI L’UTILISATEUR PEUT Y INSTALLER LUI-MEME DES CARTES PERIPHERIQUES.”

#2“**CAUTION**: ALWAYS DISCONNECT MODEM BOARD (THE ONE WITH THE TELEPHONE / PLUG JACK) FROM THE TELEPHONE SYSTEM WHEN INSTALLING OR WHEN COVERS ARE REMOVED FROM THE HOST PRODUCT.”

“**ATTENTION**: TOUJOURS DEBRANCHER LA LIGNE TELEPHONIQUE DE LA CARTE MODEM (MUNIE D’UNE PRISE OR D’UNE FICHE) AVANT DE PROCEDER A L’INSTALLATION DANS L’APPAREIL OU LORSQUE LE COUVERCLE DE CELUI-CI EST RETIRE.”

#3“**CAUTION**: APPLY THE ENCLOSED ADHESIVE WARNING LABEL TO THE OUTSIDE OR INSIDE OF THE EQUIPMENT ENCLOSURE ADJACENT TO THE MODEM CARD.”

“**ATTENTION**: APPOSER L’ETIQUETTE AUTOCOLLANTE DE MISE EN GARDE CI-INCLUSE SURE LE PAROI EXTERIEURE OU INTERIEURE DU BOITIER DE L’APPAREIL PRES DE LA CARTE MODEM.

CAUTION: Telecommunications voltages and currents can exceed the limits of safety extra low voltage (SELV), resulting in personal injury. Do not touch any components on the modem’s printed circuit board when power is applied, or the telephone cable is plugged in.

Avoid installing, handling the telephone cable, or changing the jumper settings on the modem during any weather activity where lightning strikes may occur.

This unit is intended for installation in computing devices that are non-operator accessible. Installation is to be performed by qualified service personnel only

COMPLIANCE INFORMATION STATEMENT

We,

Boca Research, Inc.
1377 Clint Moore Road
Boca Raton, FL 33487

declare under our sole responsibility that the product,

Type of Equipment: Modems
Model Numbers: **M56HI, MD56HI**

to which this declaration relates is in conformity with the title 47 of the US Code of Federal Regulations, Part 15, covering Class B personal computers and peripherals.

Operation is subject the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Appendix C: Servicing Your Product

If your product requires service, first contact the authorized dealer from whom you purchased the modem. If the dealer is unable to assist you, and you must contact Boca Research, Inc., please follow the instructions below.

Our electronic BBS is available 24 hours a day at (561) 241-1601 and will support data transmission speeds up to 33.6Kbps with settings of N, 8, 1. Once your modem is functional, the BBS may be helpful (especially during off hours) if you have a question about product settings, or if you wish to download special software or utilities.

If the Troubleshooting section did not resolve your problem, you may call our technical support staff for assistance. If you haven't referred to the Troubleshooting sections, do so now.

NOTE: CALLING TECHNICAL SUPPORT WITHOUT COMPLETE AND ACCURATE INFORMATION CONCERNING YOUR PROBLEM MAY BE BOTH TIME-CONSUMING AND FRUSTRATING FOR YOU.

1. When calling Boca Research Technical Support, have the following information available:

- **Board name and part number**
- **Computer manufacturer**
- **Computer Model**
- **Peripherals in system**
- **Operating system and version**

If you suspect a problem with a specific program or software package, make note of the name, version or release number, and manufacturer of the software.

2. Call our Technical Support Department between the hours of 8:00 a.m. and 6:30 p.m. EST Monday through Friday at (561) 241-8088. A technician will be available to discuss the problem(s) you are experiencing.

   If factory service is required, you will be given a Return Merchandise Authorization (RMA) number. Please place this number on the outside of the package when you return the item(s) for service and reference it on any correspondence included in the package. Boca Research, Inc. will return any product which is not accompanied by an RMA number.

3. Refer to the Warranty Statement if the product is covered under the five-year Boca Research, Inc. Limited Warranty.

4. Certain parts will not be covered under the Boca Research, Inc. Limited Warranty. Dealer installed parts are warranted by the dealer. Parts which you have installed yourself are covered only by the supplier's warranties. In these cases, Boca Research, Inc. can identify which parts are defective, but will not replace such parts until specific written authorization is received from you. The cost of parts and labor involved in making such repairs will be billed to you C.O.D.

5. When sending the product to Boca Research, Inc. for repairs, please be sure to include:

- **the modem *(board or external case only)***
- **your name**
- **your return street address (for UPS purposes)**
- **phone number**
- **the RMA number mentioned above**

Package the product securely in a container equivalent to the original packaging, and insure the package to protect against loss or damage during transit. Shipping charges must be prepaid; C.O.D. shipments will not be accepted. Please use the address below for all correspondence:

Boca Research, Inc.
RMA Department - RMA # ____________
6500 West Rogers Circle
Boca Raton, FL 33487-2841

NOTE ON INTERNATIONAL SHIPMENTS: Customer is responsible for all charges associated with shipping product directly to Boca Research's facility. This includes but is not limited to freight charges, customs charges, freight forwarding fees, storage fees, handling fees, documentation fees, duties, taxes, port charges, etc. Boca Research will NOT pay charges on freight which is not correctly routed directly to Boca Research's facility.

6. If the repairs performed on your modem were covered by the warranty, Boca Research, Inc. will return it prepaid via UPS.

Appendix D: Warranty Information

Limited Lifetime Warranty

Boca Research, Inc. (BRI) warrants to the original buyer of this BRI product that the hardware is free of defects in materials and workmanship for a limited lifetime period from the date of purchase from BRI or its authorized dealer. Should the product fail to be in good working order at any time during the limited lifetime period, BRI, will at its option, repair or replace this product as described below. This warranty does not cover defects resulting from misuse, abuse, negligence, accident, repairs, or alterations made by either the customer or another party. Boca Research reserves full rights to determine whether a defective product falls into this category.

The entire risk as to the quality and performance of the product rests with the customer. Any written or oral information or advice given by Boca Research dealers, distributors, agents, or employees will in no way increase the scope of this warranty. This warranty applies only to the product described in this manual and not to any other value-added software which may be included.

All products will be serviced and returned via UPS-ground at no charge to customers. All customers are required to demonstrate proof of purchase when requesting a Return Merchandise Authorization (RMA). The period of service commences on the date of purchase. A copy of the sales slip must be included with the returned merchandise.

Products which require Limited Warranty service during the warranty period should be delivered to BRI at the address in the Appendix (Servicing Your Boca Product) with proof of purchase and the Return Merchandise Authorization (RMA) number provided by BRI Technical Support. Refer to the Appendix in your manual. Replacement parts or complete products will be furnished on an exchange basis only. Replaced parts and/or products become the property of BRI.

If the returned product is sent by mail, the purchaser agrees to prepay shipping charges, insure the product or assume the risk of loss or damage which may occur in transit, and to use a shipping container equivalent to the original packaging. ALL EXPRESS AND IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OF PURPOSE FOR THE PRODUCT ARE LIMITED IN DURATION TO THE ABOVE PERIOD.

UNDER NO CIRCUMSTANCES (WHETHER BASED IN CONTRACT OR TORT) SHALL BOCA RESEARCH BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL, INDIRECT, SPECIAL, OR PUNITIVE DAMAGES OF ANY KIND, OR FOR LOSS OF REVENUE, LOSS OF BUSINESS, OR OTHER FINANCIAL LOSS AS A RESULT OF THE SALE, INSTALLATION, MAINTENANCE, USE, PERFORMANCE, FAILURE, OR DISRUPTION OF ITS PRODUCTS.

Boca's products are manufactured from new and serviceable used parts tested to Boca Research's quality assurance standards. If the product proves to be defective, Boca Research will bear the costs of labor and materials for hardware replacement or repair during the above specified warranty period. Boca Research or its Authorized Service Providers shall have the option to replace any defective part(s) with new part(s) or, at the option of Boca Research, with serviceable used parts that are equivalent to new parts in performance. Boca Research shall also have the option to replace any defective product(s) with functionally equivalent product(s).

Boca Research reserves the right to make periodic changes or enhancements to any Boca Research product without prior notification, but has no obligation to modify or update products once sold. This warranty gives you specific legal rights, and you have other rights which may vary from state to state. This warranty is valid only in the United States.

Appendix E: AT Command Reference

DATA COMMANDS

The modem will respond to the commands detailed below. Parameters applicable to each command are listed with the command description. The defaults shown correspond to default values provided in the Product Configuration File (PCF).

Generic Modem Control

Z - Reset to Default Configuration

This command instructs the modem to reset to default values as altered by non-volatile parameter storage. If the modem is connected to the line, it will be disconnected from the line, terminating any call in progress. All of the functions of the command are completed before the modem issues the result code. The DTE should not include additional commands on the same command line after the **Z** command because such commands are ignored.

Syntax

Z

Result Code

OK

&F - Set to Factory-Defined Configuration

This command instructs the modem to set all parameters to factory default values defined in the product Configuration Table
The modem loads the factory default configuration (profile). The factory defaults are identified for each command and in the S-Parameter descriptions. A configuration (profile) consists of a subset of S-Parameters.

Syntax

&F

Result Code

OK

I - Request Identification Information

This command causes the modem to report one or more lines of product information text as provided by the Product Configuration File, as selected by the <value> subparameter, followed by a final result code.

Syntax

I[<value>]

Defined Values

<value>	Decimal number corresponding to the selected information.

0	<value> 0 report.
1	<value> 1 report.
2	<value> 2 report.
3	<value> 3 report.
4	<value> 4 report.
5	<value> 5 report.
6	<value> 6 report.
7	<value> 7 report.

Result Codes

OK	<value> = 0 to 7.
ERROR	Otherwise.

+GMI - Request Manufacturer Identification

This command causes the modem to report the modem product manufacturer as provided by the Product Configuration File.

Syntax

```
+GMI
```

Response

```
ROCKWELL
OK
```

+GMM - Request Model Identification

This command causes the modem to report the modem product model as provided by the Product Configuration File.

Syntax

```
+GMM
```

Typical Response

```
RC56HCF
OK
```

+GMR - Request Revision Identification

This command causes the modem to report the modem version, revision level or date as provided by the Product Configuration File.

Syntax

```
+GMR
```

Typical Response

```
RC56HCF R6775 V2.0 5/29/97
OK
```

DTE-Modem interface commands

The parameters defined in this section control the operation of the interface between the DTE and modem.

E - Command Echo

The modem enables or disables the echo of characters to the DTE according to the parameter supplied.

Syntax

```
E[value>]
```

Defined Values

<value>	Decimal number corresponding to the selected option.

0	Disables command echo.
1	Enables command echo. (Default.)

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

Q - Quiet Results Codes Control

The command enables or disables the sending of result codes to the DTE according to the parameter supplied. The parameter value, if valid, is written to S14 bit 2.

Syntax

O[value>]

Defined Values

<value>	Decimal number corresponding to the selected option.

0	Enables result codes to the DTE. (Default.)
1	Disables result codes to the DTE.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

V - Result Code Form

This command selects the sending of short-form or long-form result codes to the DTE.

Syntax

V[value>]

Defined Values

<value>	Decimal number corresponding to the selected option.

0	Enables short-form (terse) result codes. Line feed is not issued before a short-form result code.
1	Enables long-form (verbose) result codes. (Default.)

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

X - Extended Result Codes

This command selects which subset of the result messages will be used by the modem to inform the DTE of the results of commands. Blind dialing is enabled or disabled by country parameters. If the user wishes to enforce dial tone detection, a “W” can be placed in the dial string (see D command). Note that the information below is based upon the default implementation of the X results table.

Syntax

X[<value>]

Defined Values

<value>	Decimal number corresponding to the selected option.

0	CONNECT result code is given upon entering online data state. Dial tone and busy detection are disabled.
1	CONNECT <text> result code is given upon entering online data state. Dial tone and busy detection are disabled.
2	CONNECT <text> result code is given upon entering online data state. Dial tone detection is enabled, and busy detection is disabled.

3	CONNECT <text> result code is given upon entering online data state. Dial tone detection is disabled, and busy detection is enabled.
4	CONNECT <text> result code is given upon entering online data state. Dial tone and busy detection are both enabled. (Default.)

Result Codes

OK	<value> = 0 to 4.
ERROR	Otherwise.

&C - RLSD Behavior

This parameter determines how the state of the Received Line Signal Detector (RLSD) output relates to the detection of received line signal from the distant end. Changing the parameter will take effect immediately in both the command and online command states. In &C1 mode of operation, RLSD is not turned off until all data previously received from the remote modem is delivered to the local DTE. However, such buffered data will be discarded and RLSD will be turned off if the DTE turns off DTR (if &D1 or &D2 is set).

Syntax

&C[<value>]	<value> = 0 or 1.

Defined Values

<value>	Decimal number corresponding to the selected option.

0	RLSD is always ON.
1	RLSD follows the state of the carrier. (Default.)

Result Code

OK	<value> = 0 or 1
ERROR	Otherwise.

&D - DTR Behavior

This parameter determines how the modem responds when the Data Terminal Ready (DTR) input is changed from the ON to the OFF condition during online data state.

Syntax

&D[<value>] <value> = 0 - 2.

Defined Values

<value>	Decimal number corresponding to the selected option.

0	Modem ignores DTR.
1	Upon an on-to-off transition of DTR, the modem enters online command state and issues an OK result code; the call remains connected.
2	Upon an on-to-off transition of DTR, the modem instructs the underlying modem to perform an orderly cleardown of the call. The disposition of any data in the modem pending transmission to the remote modem is controlled by the +ETBM parameter; otherwise, this data is sent before the call is cleared, unless the remote modem clears the call first (in which case pending data is discarded). The modem disconnects from the line. Automatic answer is disabled while DTR remains off.

Result Code

OK	<value> = 0 or 2
ERROR	Otherwise.

+IFC - DTE-Modem Local Flow Control

This extended-format compound parameter controls the operation of local flow control between the DTE and the modem during the data state when V.42 error control is used, or when fallback to non-error control mode is specified to include buffering and flow control. It accepts two numeric subparameters.

Syntax

+IFC=[<modem_by_DTE>[,<DTE_by_modem>]]

Defined Values

<modem_by_DTE>	Specifies the method to be used by the DTE to control the flow of received data from the modem.	
	0 =	None.
	1 =	XON/XOFF on transmitted data (XON/XOFF on transmit data); do not pass XON/XOFF characters to the remote modem.
	2 =	Circuit 133 (Ready for Receiving). (Default.)
	3 =	XON/XOFF on transmitted data with XON/XOFF characters being passed through to the remote modem in addition to being acted upon for local flow control.
<DTE_by_modem>	Specifies the method to be used by the modem to control the flow of transmitted data from the DTE.	

0 =	None.
1=	XON/XOFF on received data.
2 =	CTS/RTS. (Default.)

Reporting Current or Selected Values

Command: +IFC?

Response: +IFC: <modem_by_DTE>,<DTE_by_modem>

Example: +IFC: 2,2 for the defaults.

Reporting Supported Range of Parameter Values

Command: +IFC=?

Response: +IFC: (<modem_by_DTE> range),(<DTE_by_modem> range)

Example: +IFC: (0-3),(0-2)

+ILRR - DTE-Modem Local Rate Reporting

This extended-format numeric parameter controls whether or not the extended-format +ILRR:<rate> information text is transmitted from the modem to the DTE.

Syntax

+ILRR=<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Disables reporting of local port rate (+ILRR: is not transmitted).
1	Enables reporting of local port rate (+ILRR: is transmitted).

Reporting Current or Selected Values

Command: +ILRR?

Response: +ILRR: <current value>

Example: +ILRR: 0 For the default setting

Reporting Supported Range of Parameter Values

Command: +ILRR=?

Response: +ILRR: (<value> range)

Example: +ILRR: (0,1)

Reported Rate

The <rate> reported represents the current (negotiated or renegotiated) DTE-modem rate. If enabled, the intermediate result code is transmitted after any modulation, error control or data compression reports are transmitted, and before any final result code (e.g., CONNECT) is transmitted. The <rate> is applied after the final result code is transmitted.

The DTE-modem port rate will change only if neither buffered mode nor error controlled means are enabled (+ES=x,0) and if the negotiated carrier rate (+MRR) does not match the current DTE-modem port rate (autodetected from the previous command line).

Syntax

```
+ILRR: <rate>[,<rx_rate>]
```

Defined Values

<rate>	Decimal value representing the current (negotiated or renegotiated) DTE-modem rate: 0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200
<rx_rate>	Optional decimal value reporting the RXD rate, if it is different from the TXD rate: 0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200

Example

```
+ILRR: 19200
```

+H - Enable/Disable Video Ready Mode

This command enables or disables Rockwell Video Ready Mode.

Syntax

+H[<value>]

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Disable video ready mode.
	16	Enable video ready mode.

Result Codes

OK	<value> = 0 or 16.
ERROR	Otherwise.

Call Control

D - Dial

This command directs the modem to go on-line, dial according to the entered string and attempt to establish a connection. If no dial string is supplied, the modem will go on-line and attempt the handshake in originate mode. In W-class models, the action of going off-hook is affected by the status of the Line Current Sense input, if line current sensing is enabled, and by the blacklist and delayed list.

NOTE: If the ATD command is issued before the S1 register has cleared, the modem will respond with the NO CARRIER result code.

If +FCLASS=0 is selected, the modem will behave as a data modem and will attempt to connect to another data modem. The modem will have up to the period of time specified by register S6 or S7 to wait for carrier and complete the handshake. If this time expires before the modem can complete the handshake, the modem will go on-hook with the NO CARRIER response. This command will be aborted upon receipt of any DTE character before completion of the handshake.

If +FCLASS=1 or 1.0 is selected, the modem will behave as a facsimile modem and attempt to connect to a facsimile machine (or modem) by entering the HDLC V.21 channel 2 receive state (as if +FRH=3 had been issued). This command will be aborted upon receipt of any DTE character if the modem has not finished dialing. In this case, the modem will go on-hook and return to command mode after displaying the NO CARRIER message. If the modem finishes dialing, it will proceed as if the +FRH=3 command is issued. (Refer to the +FRH command to determine how the modem behaves following this stage.)

Syntax

D<modifier>

Defined Values

<modifier>	The valid dial string parameters (modifiers) are described below. Punctuation characters may be used for clarity, with parentheses, hyphen, and spaces ignored.
0-9	DTMF digits 0 to 9.
A-D	DTMF digits A, B, C, and D. Some countries may prohibit sending of these digits during dialing.
L	Re-dial last number: the modem will re-dial the last valid telephone number. The L must be immediately after the D with all the following characters ignored).
P	Select pulse dialing: pulse dial the numbers that follow until a “T” is encountered. Affects current and subsequent dialing. Some countries prevent changing dialing modes after the first digit is dialed.

T	Select tone dialing: tone dial the numbers that follow until a “P” is encountered. Affects current and subsequent dialing. Some countries prevent changing dialing modes after the first digit is dialed.
W	Wait for dial tone: the modem will wait for dial tone before dialing the digits following “W”. If dial tone is not detected within the time specified by S7 (US) or S6 (W-class), the modem will abort the rest of the sequence, return on-hook, and generate an error message.
*	The ‘star’ digit (tone dialing only).
#	The ‘gate’ digit (tone dialing only).
+	
!	Flash: the modem will go on-hook for a time defined by the value of S29. Country requirements may limit the time imposed.
@	Wait for silence: the modem will wait for at least 5 seconds of silence in the call progress frequency band before continuing with the next dial string parameter. If the modem does not detect these 5 seconds of silence before the expiration of the call abort timer (S7), the modem will terminate the call attempt with a NO ANSWER message. If busy detection is enabled, the modem may terminate the call with the BUSY result code. If answer tone arrives during execution of this parameter, the modem will handshake.
$	Wait for credit card dialing tone before continuing with the dial string. If the tone is not detected within the time specified by S7 (US models) or S6 (W-class models), the modem will abort the rest of the sequence, return on-hook, and generate an error message.

&	Wait for credit card dialing tone before continuing with the dial string. If the tone is not detected within the time specified by S7 (US models) or S6 (W-class models), the modem will abort the rest of the sequence, return on-hook, and generate an error message.
,	Dial pause: the modem will pause for a time specified by S8 before dialing the digits following “,”.
;	Return to command state. Added to the end of a dial string. This causes the modem to return to the command state after it processes the portion of the dial string preceding the “;”. This allows the user to issue additional commands while remaining off-hook. The additional commands may be placed in the original command line following the “;” and/or may be entered on subsequent command lines. The modem will enter call progress only after an additional dial command is issued without the “;” terminator. Use “H” to abort the dial in progress, and go back on-hook.
^	Toggles calling tone enable/disable: applicable to current dial attempt only.
( )	Ignored: may be used to format the dial string.
-	Ignored: may be used to format the dial string.
<space>	Ignored: may be used to format the dial string.

T - Set Tone Dial Default

This command forces DTMF dialing until the next P dial modifier or P command is received. The modem will set an S-Parameter bit to indicate that all subsequent dialing should be conducted in tone mode. Note that the DP command will override this command. Clears S14 bit 5.

This command may not be permitted in some countries. (See P.)

Syntax

T

Result Codes

OK

P - Set Pulse Dial Default

This command forces pulse dialing until the next T dial modifier or T command is received. Sets S14 bit 5.

As soon as a dial command is executed which explicitly specifies the dialing mode for that particular call (e.g., ATDT..), this command is overridden so that all future dialing will be tone dialed. (See T command.)

This command may not be permitted in some countries.

A - Answer

The modem will go off-hook and will attempt to answer an incoming call if correct conditions are met. Upon successful completion of answer handshake, the modem will go on-line in answer mode. This command may be affected by the state of Line Current Sense, if enabled. (Most countries do not require Line Current Sense.) Operation is also dependent upon +FCLASS command and country-specific requirements.

If +FCLASS=0 is selected, the modem will enter the connect state after exchanging carrier with the remote modem. If no carrier is detected within a period specified in register S7, the modem will hang up. Any character entered during the connect sequence will abort the connection attempt.

If +FCLASS=1.0 is selected, the modem will go off-hook in V.21 answer mode. It will generate the V.21 2100 Hz answer tone for 3 ± 0.5 seconds. Following a delay of 70 ms, it will proceed as if the

+FTH=3 command were issued. At any stage up to (but excluding) the +FTH=3 command state, any character will abort the communication. (See the description of the +FTH command for details.)

H - Disconnect (Hang-Up)

This command initiates a hang up sequence. This command may not be available for some countries due to PTT restrictions.

Syntax

H[<value>]

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	The modem will release the line if the modem is currently on-line.
	1	If on-hook, the modem will go off-hook and remain in command mode.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

O - Return to On-Line Data Mode

This command specifies that the modem will enter the on-line data mode from the on-line command mode with or without a retrain. If in the off-line command mode when this command is entered, the modem reports ERROR.

Syntax

O[<value>]

Defined Values

<value>	Decimal number corresponding to the selected option.

0	Enters on-line data mode from the on-line command mode without a retrain. Handling is determined by the Call Establishment task. Generally, if a connection exists, this command connects the DTE back to the remote modem after an escape (+++).
1	Performs a retrain then enters on-line data mode from the on-line command mode.

Result Codes

OK	<value> = 0 or 1 and a connection exists.
ERROR	Otherwise or no connection exists.

L - Speaker Volume

This command sets the speaker volume control according to the parameter supplied.

Syntax

L[<value>]

Defined Values

<value> Decimal number corresponding to the selected option.

0	Off.
1	Low volume. (Default.)
2	Medium volume.
3	High volume.

Result Codes

OK	<value> = 0 to 3.
ERROR	Otherwise.

M - Speaker Control

This command controls speaker on or off according to the supplied parameter.

Syntax

M[<value>]

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Speaker off.
	1	Speaker on during call establishment, but off when receiving carrier. (Default.)
	2	Speaker on.
	3	Speaker is off when receiving carrier and during dialing, but on during answering.

Result Codes

OK	<value> = 0 to 3.
ERROR	Otherwise.

&G - Select Guard Tone

This command causes the modem to generate the guard tone selected by this command according to the parameter supplied (DPSK modulation modes only). This command may not be permitted in some countries.

Syntax

&G[<value>]	n = 0 - 2.

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Disables guard tone. (Default for U.S.)
	1	Disables guard tone.

2	Selects 1800 Hz guard tone. (Default for W-Class.)

Result Code

OK	<value> = 0 to 2.
ERROR	Otherwise.

&P - Select Pulse Dial Make/Break Ratio

This command determines the make/break ratio used during pulse dialing. It is only effective if the appropriate bit to enable this command is set through the Product Configuration File. If enabled, it will override the make/break ratios in the OEM parameters in the Product Configuration File. The default is country-dependent. The parameter value, if valid, is written to S28 bits 3 and 4.

Syntax

&P[<value>]

Defined Values

<value>	Decimal number corresponding to the selected information.

0	Selects 39%-61% make/break ratio at 10 pulses per second. (Default.)
1	Selects 33%-67% make/break ratio at 10 pulses per second.
2	Selects 39%-61% make/break ratio at 20 pulses per second.
3	Selects 33%-67% make/break ratio at 20 pulses per second.

Result Codes

OK	<value> = 0 to 3.
ERROR	Otherwise.

&V - Display Current Configuration and Stored Profile

This command reports the current (active) configuration and the stored (user) profiles.

Syntax

&V

Result Code

OK

Example:

```
AT&V
ACTIVE PROFILE:
B0 E1 L1 M1 N1 QO T V1 W0 X4 Y0 &C0 &D0 &G2 &J0 &K3 &Q5 &R1
&S0 &T4 &X0 &Y0
S00:002 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:030
S08:002 S09:006
S10:014 S11:255 S12:050 S18:000 S25:005 S26:001 S36:007 S37:000
S38:020 S46:138
S48:007 S95:000

STORED PROFILE:
B0 E1 L1 M1 N1 QO T V1 W0 X4 Y0 &C0 &D0 &G2 &J0 &K3 &Q5 &R1
&S0 &T4 &X0
S00:002 S02:043 S06:002 S07:030 S08:002 S09:006 S10:014 S11:095
S12:050 S18:000
S36:007 S37:000 S40:105 S41:003 S46:138 S95:000

OK
```

&W - Store Current Configuration

This command saves the current (active) configuration (profile), including S-Parameters, in Product Configuration File. The current configuration is comprised of a list of storable parameters illustrated in the &V command. These settings are restored to the active configuration upon receiving an Z command or at power up.

Syntax

&W

Result Code

OK

Modulation Control Commands

+MS - Modulation Selection

This extended-format compound parameter controls the manner of operation of the modulation capabilities in the modem. It accepts six subparameters:

Syntax

+MS=[<carrier>[,<automode>[,<min_tx_rate>[,<max_tx_rate>[,<min_rx_rate>[,<max_rx_rate>]]]]]]

Defined Values

<carrier> A string which specifies the preferred modem carrier to use in originating or answering a connection. <carrier> values are strings of up to eight characters, consisting only of numeric digits and upper case letters. <carrier> values for ITU standard modulations take the form: <letter><1-4 digits><other letters as needed>. Defined values are:

B103	For Bell 103
B212	For Bell 212
V21	For V.21
V22	For V.22
V22B	For V.22bis
V23C	For V.23
V32	For V.32
V32B	For V.32bis
V34	For V.34
K56FLEX	For K56flex

The modem may also automatically switch to another modulation (automode), subject to several constraints:

1. The modem may not support some other modulations, regardless of the automode mechanism supported.

2. The modem may not be able to automatically switch from the current modulation <carrier> to some other modulations, restricted by the selected modulation standard and by the modem manufacturer's technology. For example, there is no standard way to automode from V.32bis to V.27ter.
3. The DTE may disable automode operation, see <automode> below.
4. The DTE may constrain the range of modulations available, see <min_rate> and <max_rate> below.
5. The DTE may selectively disable some modulations by reading, editing and writing the +MA parameter.

If the DTE issues a +MS=<carrier> command to the modem, and if the modem supports the +MA parameter, the modem will reinitialize the +MA parameter.

<automode>

An optional numeric value which enables or disables automatic modulation negotiation (e.g., ITU-T V.32*bis* Annex A or V.8). The default value is enabled if it is defined for the associated modulation (e.g., ITU-T V.32*bis*, V.8 for V.34); however, there are modulations for which there is no automatic negotiation defined (e.g., V.26*bis*).

0 = Automode disabled.

1 = Automode enabled, with V.8 or V.32bis Annex where applicable. (Default.)

For <automode> = 0 (automode disabled, i.e., fixed modulation):

1. If <max_rate> is within the rates supported by the selected modulation, the selected rate is that specified by <max_rate>. For example:

+MS=V32B,0,1200,4800
selects V.32 bis 4800 bps
fixed rate.

2. If <max_rate> is greater than the highest speed supported by the modulation specified by <mod>, the starting rate is the highest rate supported by the selected modulation. For example:

   +MS=10,0,2400,14400
   selects V.32 bis 14400,
   12000, 9600, 7200, or 4800
   bps.

For <automode> = 1 (automode enabled, i.e., automatically selected speed and modulation):

1. The modem connects at the highest possible rate in accordance with V.8 bis/V.8, or V.32 bis Annex A if V.8 bis/V.8 is not supported by the remote modem.
2. If <max_rate> is greater than the highest rate supported by the modulation specified by <mod>, the modem automodes down from the highest rate of the selected modulation. For example:

   +MS=V32B,1,1200,14400
   selects automoding down
   from V.32 bis 14400 bps.

<min_rate> and

<min_rx_rate> Optional numeric values which specify the lowest value at which the modem may establish a connection. If unspecified (set to 0), they are determined by the modulation means selected in the <carrier> and <automode> settings. Values for this subparameter are decimal encoded, in units of bit/s. The value range is 75-56000 in the following increments: 75, 300, 600, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800,

	31200, 33600, 32000, 34000, 36000, 38000, 40000, 42000, 44000, 46000, 48000, 50000, 52000, 54000, or 56000, as permitted for the associated carrier. (Default = Lowest rate supported by the selected carrier.)
<max_rate> and <max_rx_rate>	Optional numeric values which specify the highest value at which the modem may establish a connection. If unspecified, (set to 0) they are determined by the modulation means selected in the <carrier> and <automode> settings and by the current DTE-modem rate. Non-zero values for this subparameter are decimal encoded, in units of bit/s. The value range is 75-56000 in the following increments: 75, 300, 600, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800, 31200, 33600, 32000, 34000, 36000, 38000, 40000, 42000, 44000, 46000, 48000, 50000, 52000, 54000, or 56000, as permitted for the associated carrier. (Default = Highest rate supported by the selected carrier.)
<min_rx_rate> and <max_rx_rate>	May be used to condition distinct limits for the receive direction as distinct from the transmit direction. For example, these can be used to select either direction for asymmetric modulations like V.23 with constant carrier. The value range is 75-56000 in the following increments: 75, 300, 600, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800, 31200, 33600, 32000, 34000, 36000, 38000, 40000, 42000, 44000, 46000, 48000, 50000, 52000, 54000, or 56000, as permitted for the associated carrier. (Default = 0.)

Reporting Current or Selected Values

Command: +MS?

Response: +MS:
<carrier>,<automode>,<min_rate>,<max_rate>,<min_rx_rate>,<max_rx_rate>

Note: The current active settings are reported under control of the +MR parameter.

Example: +MS: K56FLEX,1,300,56000,0,0 For default values.

Example: +MS: K56FLEX,1,300,56000 For K56flex, automode, explicit limits, but no distinct receive and transmit rate limits.

Example: +MS: V32B,1,1200,33600 For V.32bis, automode, explicit limits, but no distinct receive and transmit rate limits.

Reporting Supported Range of Parameter Values

Command: +MS=?

Response: +MS: (< carrier> range),(<automode> range),(<min_rate> range),(<max_rate> range),(<min_rx_rate> range),(<max_rx_rate> range)

Example: +MS: (V21,V22,V22B,V32,V32B),(0,1),(75, 300, 600, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800, 31200, 33600, 32000, 34000, 36000, 38000, 40000, 42000, 44000, 46000, 48000, 50000, 52000, 54000, or 56000), (75, 300, 600, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800, 31200, 33600, 32000, 34000, 36000, 38000, 40000, 42000, 44000, 46000, 48000, 50000, 52000, 54000, or 56000)
For V.21, V.22, V.22bis, V.32 and V.32bis, with Automode.

The modem may also automatically switch to another modulation (automode), subject to the following constraints:

a. The modem may not be able to automatically switch from the current modulation (specified by <mod>) to some other modulation. For example, there is no standard way to automode from Bell 103 to V.23.

b. The DTE may disable automode operation (see <automode>).

c. The DTE may constrain the range of modulations available by specifying the lowest and highest rates (see <min_rate> and <max_rate> below).

Result Code

OK	Valid subparameter string
ERROR	Otherwise.

+MR - Modulation Reporting Control

This extended-format numeric parameter controls whether or not the extended-format +MCR:<carrier> and +MRR:<rate> intermediate result codes are transmitted from the modem to the DTE. If enabled, +MCR:<carrier> and +MRR:<rate> intermediate result codes represent the current (negotiated or renegotiated) modulation <carrier> and <rate> that are transmitted at the point during connect negotiation (handshaking) at which the modem has determined which modulation and rate will be used, i.e., before any Error Control or Data Compression reports are transmitted, and before any final result code (e.g., CONNECT) is transmitted.

Syntax

+MR=[<value>]

Defined Values

<value>	A decimal number corresponding to the selected option:	
	0 =	Disables reporting of modulation connection (+MCR: and +MRR: are not transmitted).
	1 =	Enables reporting of modulation connection (+MCR: and +MRR: are transmitted). (Default.)

Reporting Current or Selected Values

Command:	+MR?	
Response:	+MR: <current value>	
Example:	+MR: 1	For default setting

Reporting Supported Range of Parameter Values

Command: +MR=?

Response: +MR: (<value>range)

Example: +MR: (0,1)

The format of this information text is:

+MCR: Report Syntax

Response: +MCR: <carrier>

<carrier>	Alphanumeric code corresponding to the reported carrier. Defined values are:

B103	For Bell 103
B212	For Bell 212
V21	For V.21
V22	For V.22
V22B	For V.22bis
V23C	For V.23
V32	For V.32
V32B	For V.32bis
V34	For V.34
K56FLEX	For K56flex

+MRR: Report Syntax

Response: +MRR: <tx_rate>,<rx_rate>

<tx_rate>	Decimal transmit rate in bits/s.
<rx_rate>	Decimal receive rate in bits/s.

Example: +MRR: 28600, 48000

+ER - Error Control Reporting

This extended-format numeric parameter controls whether or not the extended-format “+ER: “ intermediate result code is transmitted from the modem to the DTE.

+ER=[<value>]

Syntax

+ER=[<value>]

Defined Values

<value>	A decimal number corresponding to the selected error control option:	
	0 =	Error control reporting disabled (no +ER intermediate result code transmitted).
	1 =	Error control reporting enabled (+ER intermediate result code transmitted). (Default.)

Reporting Current or Selected Values

Command:	+ER?	
Response:	+ER: <current value>	
Example:	+ER: 1	for the default setting

Reporting Supported Range of Parameter Values

Command:	+ER=?
Response:	+ER: (<value> range)
Example:	+ER: (0,1)

+ER: <type>

The +ER: <type> reported represents the current (negotiated or renegotiated) modem-modem error control type. If enabled, the intermediate result code is transmitted at the point during error control negotiation (handshaking) at which the modem has determined which error control protocol will be used (if any), before the final result code (e.g., CONNECT) is transmitted. The format of this result code is:

The +ER intermediate result code, if enabled, is issued after the Modulation report (+MCR and +MRR) and before the Data Compression Report (+DR).

Syntax

+ER: <type>

Defined Values

<type>	An alphanumeric code corresponding to the selected protocol.

NONE	Error control is not in use.
LAPM	V.42 LAPM protocol is in use.
ALT	MNP is in use.

Example

```
+ER: LAPM
```

Data Compression Commands

This section contains parameters to condition modem use of standard ITU-T V.42*bis* Data Compression Procedures.

+DS - Data Compression

This extended-format compound parameter controls the V.42bis data compression function if provided in the modem. It accepts four numeric subparameters:

Syntax

```
+DS=[<direction>[,<compr_neg>[,<max_dict>[,<max_string>]]]]
```

Defined Values

<direction>	Specifies the desired direction(s) of operation of the data compression function; from the DTE point of view.	
	0 =	Negotiated; no compression (V.42bis P0=0).
	3 =	both directions, accept any direction (V.42bis P0=11). (Default.)
<compr_neg>	Specifies whether or not the modem should continue to operate if the desired result is not obtained.	
	0 =	Do not disconnect if V.42bis is not negotiated by the remote modem as specified in <direction>.
<max_dict>	Specifies the maximum number of dictionary entries (2048 entries) which should be negotiated (may be used by the DTE to limit the codeword size transmitted, based on its knowledge of the nature of the data to be transmitted).	
<max_string>	Specifies the maximum string length (32 bytes) to be negotiated (V.42bis P2).	

Reporting Current or Selected Values

Command: +DS?

Response: +DS: <direction>,<compr_neg>,<max_dict>,<max_string>

Example: +DS: 3,0,2048,32

for the defaults and 2048 entry max dictionary.

Reporting Supported Range of Parameter Values

Command: +DS=?

Response: +DS: (<direction> range),(< compr_neg > range),(<max_dict> range),(<max_string> range)

Example: +DS: (0,3),(0),(2048),(32)

+DR - Data Compression Reporting

This extended-format numeric parameter controls whether or not the extended-format "+DR: " intermediate result code is transmitted from the modem to the DTE.

Syntax

```
+DR=[<value>]
```

Defined Values

<value>	decimal number corresponding to the selected option:	
	0 =	Data compression reporting disabled (no +DR result code transmitted).
	1 =	Data compression reporting enabled (+DR result code transmitted). (Default.)

Reporting Current or Selected Values

Command: +DR?

Response: +DR: <current value>

Example: +DR: 1 For the default setting.

Reporting Supported Range of Parameter Values

Command: +DR=?

Response:	+DR: (<value> range)
Example:	+DR: (0,1)

+DR: <type> Intermediate Result Code

The +DR: <type> reported represents the current (negotiated or renegotiated) modem-modem data compression type. If enabled, the intermediate result code is transmitted at the point after error control negotiation (handshaking) at which the modem has determined which data compression technique will be used (if any) and the direction of operation. The +DR intermediate result code, if enabled, is issued after the Error Control Report (+ER) and before the final result code (e.g., CONNECT).The format of this result code is:

Result Code Syntax

+DR: <type>

Defined Values

<type> An alphanumeric code corresponding to the selected option:

NONE	Data compression is not in use.
V42B	V.42bis is in use in both directions.
ALT	MNP 5 compression.

Example

+DR: V42B

%E - Enable/Disable Line Quality Monitor, Auto-Retrain, and Auto-Rate Renegotiation

This command controls whether or not the modem will automatically monitor the line quality and request a retrain (%E1) or a rate renegotiation when line quality merits a change. If enabled, the modem attempts to retrain for a maximum of 30 seconds.

Syntax

%E[<value>]

Defined Values

<value>	A decimal number corresponding to the selected option:
	0 = Disable line quality monitor, auto-retrain, and auto-rate renegotiation.
	1 = Enable line quality monitor, auto-retrain, and auto-rate renegotiation. (Default.)

Result Code

OK	<value> = 0 and 1
ERROR	Otherwise.

%L - Line Signal Level

This command returns a value which indicates the received signal level. The value returned is a direct indication (DAA dependent) of the receive level at the modem data pump (MDP), **not** at the telephone line connector. For example, 009 = -9 dBm, 043 = -43 dBm, and so on.

Syntax

```
%L
```

Example:

```
%L
015
```

Result Code

OK

%Q - Line Signal Quality

This command returns a value which indicates the line signal quality (DAA dependent). Returns the higher order byte of the EQM value. Based on the EQM value, retrain or rate renegotiation may be initiated if enabled by %E1.

Example:

%Q

015

Result Code

OK	If connected.
ERROR	If not connected, or connected in 300 bps, V.23, or fax modes.

S-PARAMETERS

The supported S-Parameters are summarized in the table below.

Register	Function	Range	Units	Saved
S0	Number of Rings to Automatic Answer	0-255	rings	*
S1	Ring Counter	0-255	rings	
S2	Escape Character	0-255	ASCII	*
S3	Line Termination Character	0-127	ASCII	
S4	Command Line Editing Character	0-127	ASCII	
S5	Command Line Editing Character	0-255	ASCII	
S6	Wait Time for Dial Tone	2-255	s	*
S7	Wait Time for Carrier	1-255	s	*
S8	Pause Time for Dial Delay Modifier	0-255	s	*
S10	Carrier Loss Disconnect Time	1-255	0.1 s	*
S11	DTMF Tone Duration	50-255	0.001 s	*
S12	Escape Prompt Delay	0-255	0.02 s	*
S29	Flash Dial Modifier Time	0-255	10 ms	

* Parameter value may be stored in the Product Configuration File with the &W command.

** Default values may be modified using the Product Configuration File.

AT=x - Write to Selected S-Parameter

This command writes the value x to the currently selected S-Parameter. An S-Parameter can be selected by using the ATSn command. All of the S-Parameters will return the OK response if x is a number. Some registers may not be written due to country specific PTT limitations.

Syntax

S=x

Result Codes

OK	For all arguments.

AT? - Read Selected S-Parameter

This command reads and displays the selected S-Parameter. An S-Parameter can be selected by using the ATSn command.

Syntax

S=?

Result Codes

OK	For all arguments.

Sn - Read/Write S-Parameter

The modem selects an S-Parameter, performs an S-Parameter read or write function, or reports the value of an S-Parameter.

n	Establishes S-Parameter n as the last register accessed.
n=v	Sets S-Parameter n to the value v.
n?	Reports the value of S-Parameter n.

The parameter n can be omitted, in which case the last S-Parameter accessed will be assumed. The S can be omitted for AT= and AT?, in which case the last S-Parameter accessed will be assumed.

For example:	ATS7 establishes S7 as the last accessed register.
	AT=40 sets the contents of the last register accessed to 40.
	ATS=20 sets the contents of the last register accessed to 20.

If the number “n” is beyond the range of the S-Parameters available, the modem will return the ERROR message. The value “v” is “MOD”ed with 256. If the result is outside the range permitted for a given S-Parameter the values will still be stored, but functionally the lower and higher limits will be observed. Input and output are always in decimal format. Note that some S-Parameters are read-only.

In some cases, writing to the S-Parameter will appear to be accepted but the value will not actually be written.

Factory Defaults

The factory default values are stored in Product Configuration File and are loaded into the active configuration at power up or by the Z command. In addition, the default profile is subsequently loaded, and may change some of the factory default values.
The default values in Product Configuration File may be loaded at any time by entering the &F command.

S-Parameter Definitions

S0 - Number of Rings to Automatic Answer
S0 sets the number of the rings required before the modem automatically answers a call. Setting this register to zero disables auto-answer mode.

Range:	0-255 rings
Default:	0

S1 - Ring Counter
S1 is incremented each time the modem detects a ring signal on the telephone line. S1 is cleared if no rings occur over an eight second interval.

Range:	0-255 rings
Default:	0

S2 - Escape Character
S2 holds the decimal value of the ASCII character used as the escape character. The default value corresponds to an ASCII ‘+’. A value over 127 disables the escape process, i.e., no escape character will be recognized.

Range:	0-255, ASCII decimal
Default:	43 (+)

S3 - Line Termination Character

S3 sets the decimal value of the command line and result code terminator character. Pertains to asynchronous operation only.

Range:	0-127, ASCII decimal
Default:	13 (Carriage Return)

S4 - Response Formatting Character

S4sets the decimal value of the character generated by the modem as part of the header, trailer, and terminator for result codes and information text, along with the S3 parameter (see the description of the V parameter for usage). If the value of S4 is changed in a command line, the result code issued in response to that command line will use the new value of S4.

The Response Formatting character is output after the Line Termination character if verbose result codes are used.

Range:	0-127, ASCII decimal
Default:	10 (Line Feed)

S5 - Command Line Editing Character

S5s sets the decimal value of the character recognized by the modem as a request to delete from the command line the immediately preceding character. The modem will not recognize the Command Line Editing character if it is set to a value that is greater than 32 ASCII. This character can be used to edit a command line. When the echo command is enabled, the modem echoes back to the local DTE the Command Line Editing character, an ASCII space character and a second Command Line Editing character; this means a total of three characters are transmitted each time the modem processes the Command Line Editing character.

Range:	0-32, ASCII decimal
Default:	8 (Backspace)

S6 - Wait Time for Dial Tone Before Blind Dialing, or After “W” Dial Modifier (W-Class Models)

S6 sets one of two possible parameters:

1. Sets the length of time, in seconds, that the modem will wait before starting to dial after going off-hook when blind dialing. This operation, however, may be affected by some ATX options according to country restrictions. The “Wait for Dial Tone” call progress feature (W dial modifier in the dial string) will override the value in register S6.
2. For W-class models, S6 sets the length of time, in seconds, that the modem will wait for dial tone when encountering a “W” dial modifier before returning NO DIAL TONE result code.

The modem always pauses for a minimum of 2 seconds, even if the value of S6 is less than 2 seconds.

Range: 2-255 seconds

Default: 2

S7 - Wait Time For Carrier After Dial, For Silence, or For Dial Tone After “W” Dial Modifier (US Models)

S7 sets one of three possible parameters:

1. Sets the length of time, in seconds, that the modem will wait for carrier before hanging up. The timer is started when the modem finishes dialing (originate), or 2 seconds after going off-hook (answer). In originate mode, the timer is reset upon detection of answer tone if allowed by country restrictions.
2. Sets the length of time, in seconds, that modem will wait for silence when encountering the @ dial modifier before continuing with the next dial string parameter.
3. For US models, S7 sets the length of time, in seconds, that the modem will wait for dial tone when encountering a “W” dial modifier before continuing with the next dial string parameter.

Range: 1-255 seconds

Default: 50

S8 - Pause Time For Dial Delay

S8 sets the time, in seconds, that the modem must pause when the “,” dial modifier is encountered in the dial string.

Range: 0-255 seconds

Default: 2

S10 - Lost Carrier To Hang Up Delay

S10 sets the length of time, in tenths of a second, that the modem waits before hanging up after a loss of carrier. This allows for a temporary carrier loss without causing the local modem to disconnect. When register S10 is set to 255, the modem functions as if a carrier is always present.

The actual interval the modem waits before disconnecting is the value in register S10 minus the value in register S9. Therefore, the S10 value must be greater than the S9 value or else the modem disconnects before it recognizes the carrier.

Range:	1-255 tenths of a second
Default:	14 (1.4 seconds)

S11 - DTMF Tone Duration

S11 sets the duration of tones in DTMF dialing (US models only). This value has no effect on pulse dialing.

For W-class models, this parameter is a country parameter loaded by the Product Configuration File.

Range:	50-255 milliseconds
Default:	95 (95 milliseconds)

S12 - Escape Prompt Delay (EPD)

S12 defines the maximum period, in fiftieths of a second, allowed between receipt of the last character of the three escape character sequence from the DTE and sending of the OK result code to the DTE. If any characters are detected during this time, the OK will not be sent. Note that sending of the OK result code does not affect entry into command mode. (See 3.1.3.)

Range:	0-255 1/50 of a second
Default:	50 (1 second)

S29 - Flash Dial Modifier Time

S29 sets the length of time, in units of 10 ms, that the modem will go on-hook when it encounters the flash (!) dial modifier in the dial string. The time can be limited as it is a country dependent parameter.

Range:	0-255	10 ms intervals
Default:	70	(700 ms)

RESULT CODES

General

The modem responds to commands from the DTE and to activity on the line by signaling to the DTE in the form of result codes. The result codes that the modem can send are described below.
Two forms of each result code are available: long-form, an English-like “verbose” response, and short-form, a data-like numeric response (included in parentheses following the long-form). The long-form code is preceded and terminated by the sequence < CR> < LF>. The short-form is terminated by < CR>, only with no preceding sequence.

If result messages are suppressed, nothing is returned to the DTE. The long-form results codes can be modified by the OEM through the Product Configuration File.

The table which follows on the next page lists each result code short form (ATV0), result code long form (ATV1), and the corresponding n value in the ATVx command.

Short Form	Long Form	n Value in ATXn Command				
(ATV0)	(ATV1)	0	1	2	3	4
0	OK	x	x	x	x	x
1	CONNECT	x	x	x	x	x
1	CONNECT XXXX	1	x	x	x	x
2	RING	x	x	x	x	x
3	NO CARRIER	x	x	x	x	x
4	ERROR	x	x	x	x	x
6	NO DIALTONE	3	3	x	x	x
7	BUSY	3	3	3	x	x
8	NO ANSWER	x	x	x	x	x
24	DELAYED	4	4	4	4	x
32	BLACKLISTED	4	4	4	4	x
33	FAX	x	x	x	x	x
35	DATA	x	x	x	x	x
+F4	+FCERROR	x	x	x	x	x

Notes:

1.

An ‘x’ in a column indicates that the message (either the long form if verbose, or the value only for short form) will be generated when that particular value of ‘n’ (shown at the top of the column) has been selected by the use of ATXn. If the column is blank, then no message will be generated for that x option. A numeral indicates which less explicit message (verbose or short form) will be output for that X option.

Description of Result Codes

OK (0)

The OK code is returned by the modem to acknowledge execution of a command line.

CONNECT (1)

The modem will send this result code when a connection has been established and the modem is switching from command state to online data state:

CONNECT XXXX (1)

For X1, X2, X3, and X4, the modem sends this result code when the DTE speed is XXXX bps and the modem has been instructed to report the DTE speed to the DTE upon connecting. (Also, see the W command.)

RING (2)

The modem sends this result code when incoming ringing is detected on the line. What qualifies as a ring signal is determined by country-dependent parameters, modifiable through the Product Configuration File. When cellular interface is selected, RING indicates that the cellular phone is receiving an incoming call.

NO CARRIER (3)

The modem sends this result code when an attempt o establish a connection fails or an established connection has been terminated

Under X0, if busy tone detection is enforced, this result code is used as a response to the detection of busy or circuit busy. Under X0, if dial tone detection is enforced or selected, this result code indicates that dial tone has not been detected.

ERROR (4)

The modem returns this result code if the command is not recognized (e.g., the command line has a syntax error or the command is not supported), the command line maximum length is exceeded, a parameter value is invalid, or other problem with processing the command line is detected. Under X0, X1, X2, and X3, this result is used instead of DELAYED and BLACKLISTED.

NO DIALTONE (6)

For X2 and X4, the modem sends this result code if it has been instructed to wait for dial tone during dialing but none is received.

When cellular phone interface is selected, NO DIALTONE indicates that cellular service is not currently available.

BUSY (7)

For X3 and X4, if busy tone detection is enforced, the modem sends this result code when attempting to originate a call if the busy (engaged) signal is detected on the line.

NO ANSWER (8)

The modem sends this result code when:

1. Attempting to originate a call if a continuous ringback signal is detected on the line until the expiration of the timer S7.
2. “@” (Wait for Quiet Answer) dial modifier was used, but remote ringing followed by five seconds of silence was not detected before expiration of the connection timer (S7)

DELAYED (24)

For X4, the modem returns this result code when a call fails to connect and the number dialed is considered ‘delayed’ due to country blacklisting requirements.

BLACKLISTED (32)

For X4, the modem returns this result code when a call fails to connect and the number dialed is considered ‘blacklisted’.

FAX (33)

The modem returns this result code when a fax modem connection is established in a facsimile mode.

DATA (35)

The modem returns this result code when a data modem connection is established in a facsimile mode.

+FCERROR (+F4)

This message is sent to the DTE when high speed fax data (V.27, V.29, V.33, or V.17) is expected and a V.21 signal is received.

AUDIOSPAN* AND DSVD Commands

*future implementation

AudioSpan and DSVD are two technologies that allow simultaneous voice and data operation. AudioSpan and DSVD implementations differ in the manner that voice and modem data are combined. Voice and data channels are combined in the analog domain for AudioSpan and in the digital domain for DSVD.

Establishing a AudioSpan or DSVD connection is analogous to establishing a regular data modem connection. Initiate the call using normal dialing (ATD) and answering (ATA) procedures. The modem can switch from a regular phone conversation into AudioSpan or DSVD mode and back to phone conversation. A handset, headset, or microphone/speaker can be used for voice communication during AudioSpan or DSVD mode.

AudioSpan operates in normal (non-error corrected) or error-corrected/compression mode (MNP 5 or V.42 bis depending on the error correction settings of the modems). The DTE rate must be equal to or greater than the anticipated modem connection speed. In general, DTE speed of 38400 bps or higher should be used.

-SSE - Enable/Disable DSVD

This command enables/disables DSVD according to the supplied parameter.

Syntax

```
-SSE=[<value>]
```

Defined Values

<value>	Decimal number corresponding to the selected option.
	0 = Disable DSVD. (Default.)
	1 = Enable DSVD. A modem not supporting DSVD will respond with ERROR.

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05/98