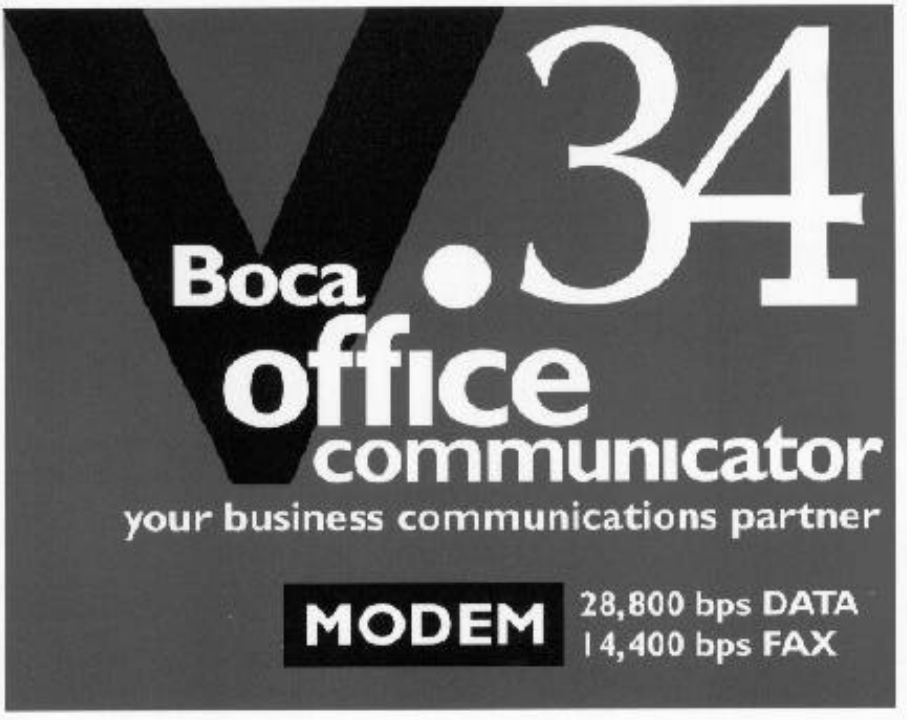


Product Codes:

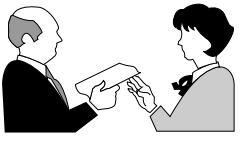
- FDVSP341 (with Speakerphone)
- FDVV341
- FDV34SVD (with DSVD)

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 DOS or Windows tasks. If you are not familiar with basic DOS commands such as DIR, CD, or EDIT, you should check your 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.***



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.

Boca BBS
407-241-1601

Standard Free Technical Support
407-241-8088

Automated *Fax Retrieval System*
407-995-9456

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

Technical Support Fax
407-997-0918

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

The Standard Free Technical Support number is for quick answers to specific inquiries on product features and technical questions (call **407-241-8088**; 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 the V.34 Boca Office Communicator manual.

This manual provides installation and operating instructions for the **Office Communicator.** 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.

Publication Date: October, 1995
Printed in the U.S.A. FDV34ALL.PM5

Contents

HOW THIS MANUAL IS ORGANIZED

Quick Start. If you are familiar with modem operations, this abbreviated procedure provides a short cut for connecting the Office Communicator. Otherwise, read Section Two before continuing.

Section One: Introduction. An overview of the features of the V.34 Boca Office Communicator.

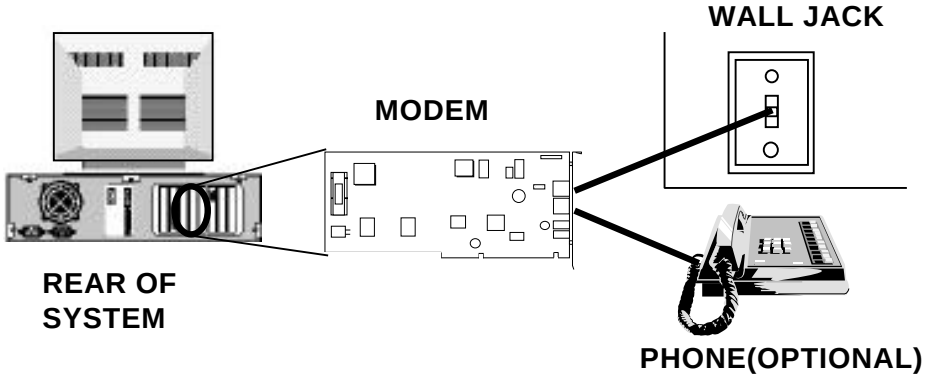
Section Two: Installation. This section provides physical installation instructions (including how to connect the phone line), and procedures for testing the connection. A section for Windows 95 users and Windows 3.1/DOS users is also included. Information on connections for an optional microphone headset are also provided

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, an AT command reference, and information on obtaining service, as well as your warranty.

Quick Start!

If you are familiar with personal computers and modems, you may follow the diagram below to quickly connect the V.34 Boca Office Communicator to your system. Make all necessary connections as shown below.



After you have installed your modem and made the necessary connections, verify line connection by lifting the receiver of the telephone connected to the modem to check for a dial tone. After hearing the tone, hang up, and power on your computer.

Before continuing, check the next page and follow the appropriate instructions based on your operating system.

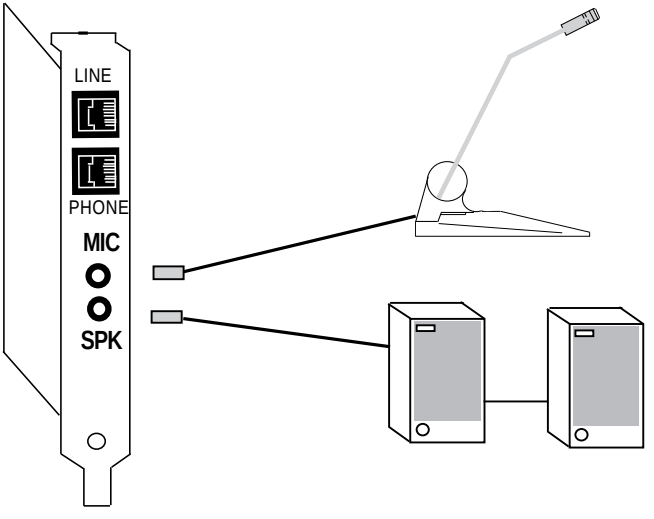
OPERATING SYSTEM	
WINDOWS 95	**WINDOWS 3.1 OR DOS**
Windows 95 will detect new hardware and display **"New Hardware Found"** box. Select **"Driver from disk provided by hardware manufacturer"**. An "**Install from Disk"** box is then displayed. With the Driver and Utilities diskette in your floppy drive, type A: (or B:) and select OK. Windows 95 will complete the installation. For further detail see pages 19-20.	**Make sure you exit to DOS first if you are running Windows**. With the Driver and Utilities diskette in your floppy drive, type A: (or B:). Then type **INSTALL** and press ENTER. Follow all on-screen instructions. For more detail, see pages 21-22.

After following the appropriate instructions to complete installation, you may load your communications software. Consult the next page for speakerphone options.

SPEAKERPHONE OPTION

You may connect a microphone and speakers to the MIC and SPKR jacks, respectively. The microphone and speakers allow you hands-free speakerphone operation.

Check the instructions which came with your microphone and speaker for proper connection to the microphone and speaker jacks.



Now What?

Once your communication software is installed, you will be able to send and receive data as well as faxes and send and receive voice messages. We recommend that you familiarize yourself thoroughly with the communication software documentation.

If you require more details than provided in the Quick Start, proceed to Section Two. For details on installing and running the software, refer to the companion software user's guide. For an overview of the V.34 Boca Office Communicator's features, refer to Section One.

If you will be operating from the command mode with your data communications software (using standard and enhanced AT commands and S-Registers), refer to Appendix C. There are also many references available on the market.

Section One: Introduction

The V.34 Boca Office Communicator offers the latest in modem technology, featuring voice, fax, and data communications. This versatile Plug-and-Play compatible modem allows you to establish a structured set of mailboxes. Now, you have an all-in-one communications product that serves as answering machine, voice mailbox, and fax machine.

Voice Capabilities

The Office Communicator features automatic call recognition, auto-dial and auto-answer, an internal speaker, and 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 skip between mailboxes, then check, answer, and leave messages. The FDVSP34I and FDV34SVD models come with full-duplex speakerphone and echo cancellation.

Fax Capabilities

The Office Communicator offers a wide range of fax services. It supports Group 3, class 1 and 2 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.

Data Capabilities

The Office Communicator offers the widest possible range of internationally accepted standard modulation methods and protocols. The modem complies with ITU-TSS standards V.34, V.32bis, V.32, V.23,

V.22bis, V.22, and V.21, as well as Bell 212A and 103. 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.

VoiceView® Support

This standard allows the transmission of computer data to be introduced during a normal phone call. It alternates between voice and data—once the data goes through, you automatically switch back to your voice conversation.

A Word about Digital Simultaneous Voice and Data (DSVD)

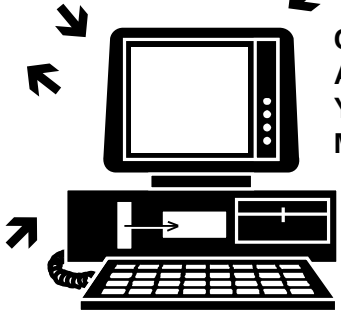
Digital Simultaneous Voice and Data (DSVD) is a standard allowing the simultaneous transmission of voice and data over a single telephone line. If you have the FDV34SVD model, you will be able to make ordinary phone calls to other PC users while sharing modem applications over a standard telephone line. When a phone call is in Digital 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.

IMPORTANT: When you use the Boca V.34 Office communicator in DSVD mode, you need to add the following command to your initialization string:
AT-SSE=1

Note that while the modem is in DSVD mode, full-duplex speakerphone reverts to half-duplex functionality.

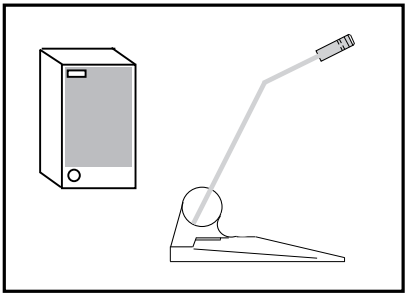
REMOTE CALLER LEAVES AND RESPONDS TO MESSAGES

CALL IN AND CHECK YOUR MESSAGES



USE YOUR VOICE SOFTWARE TO MANAGE YOUR VOICE COMMUNICATIONS

MODEM SAVES VOICE MESSAGES TO HARD DISK FOR RETRIEVAL AND PLAYBACK



USE "MIC" FOR SPEAKERPHONE (FDVSP34I AND FDV34SVD) TO RECORD OUTGOING MESSAGES AND SPEAKERS TO LISTEN TO INCOMING MESSAGES

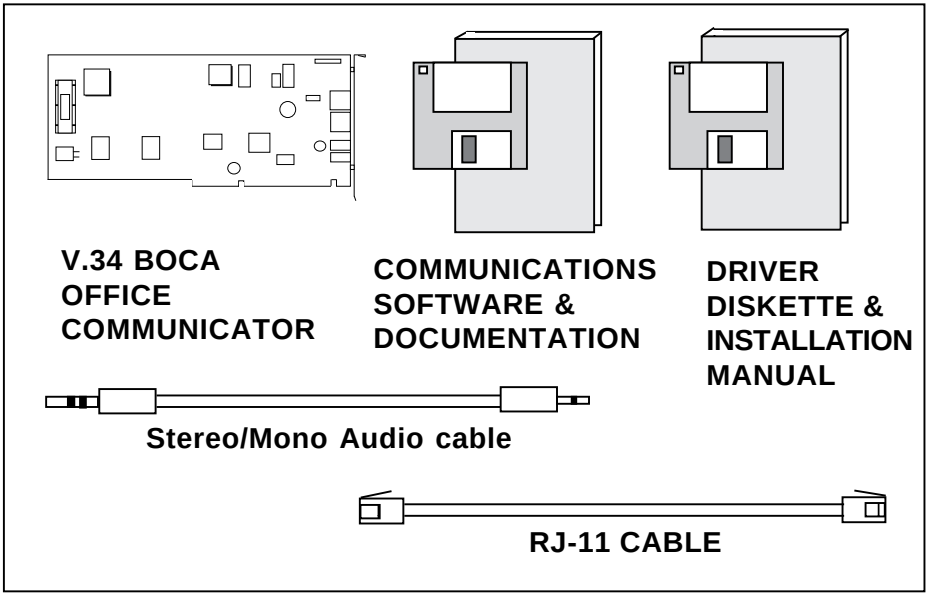
NOTE: You may also use a combination headset / microphone unit.

Section Two: Installation

This section explains how to install the V.34 Boca Office Communicator in your computer.

2.1 The Contents of Your Package

Verify that your modem package contains the following items:



If any items are missing or damaged, contact the vendor from whom you purchased the modem for assistance.

2.2 Installing the Modem

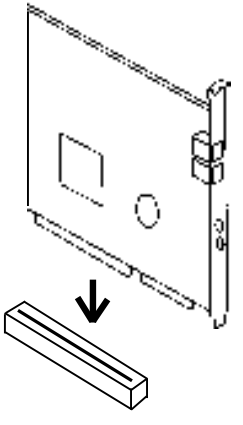
NOTE: If your computer came with an internal modem, you must physically remove it or disable it through your computer's BIOS setup. Consult your computer's manual or manufacturer for specific instructions.

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.

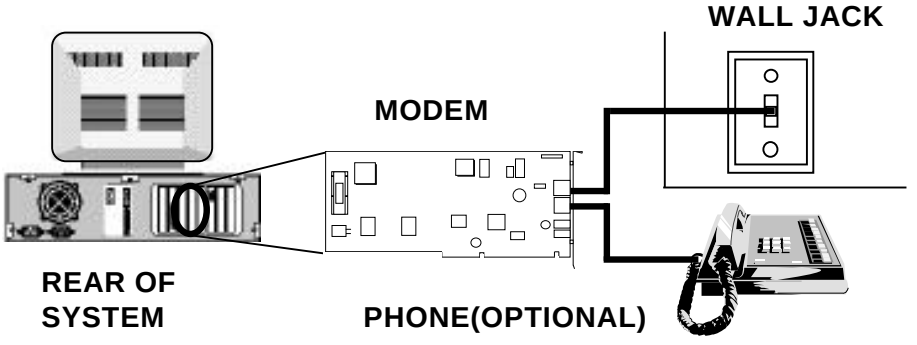
4. Carefully insert the modem into the expansion slot you selected, applying pressure to the upper board edge until it snaps into place.



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.

6. Disconnect your present phone cord from the wall jack. Plug the end of the phone cord that came with the

modem into the wall jack, and the other end into the jack labeled **LINE** on the back of the modem. Plug the phone into the jack labeled **PHONE** on the back of the modem. See illustration below. *Note: A telephone is not necessary for the proper operation of this product.*



7. Replace the system cover and reconnect any detached devices and power cords. Now, you may use the supplied stereo / mono cable to attach to other devices as explained in step 8 below, or power up your computer and go on to **Modem Setup** (Windows 95, page 19; Windows 3.1, page 21).

8. Connect devices to microphone and speaker jacks.

a. If you DO have an existing sound card, continue below, or skip to step b.

- Attach the microphone to the **MIC** jack (to record outgoing messages; in addition, the microphone serves as a transmitter for your speakerphone) on the modem.

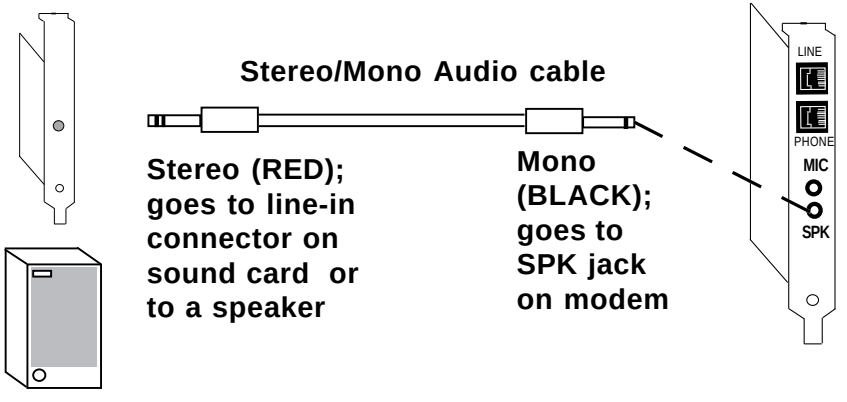
- Attach the mono-end of the supplied stereo-mono cable to the SPK jack (to listen to phone messages through your sound board) on the modem. E.g., playback, call monitoring.

- Attach the stereo-end of the supplied 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 SPK jack on the modem.

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

- Connect the supplied microphone to the **MIC** jack (to record outgoing messages; in addition, the microphone serves as a transmitter for your speakerphone).

- Connect a speaker(s) (not supplied) to the **SPK** jack (to listen to incoming messages; in addition, the speaker serves as a receiver for your speakerphone) on the board.



Line connection is complete. Power your computer up and continue with Modem Setup for either Windows 95 or 3.1.

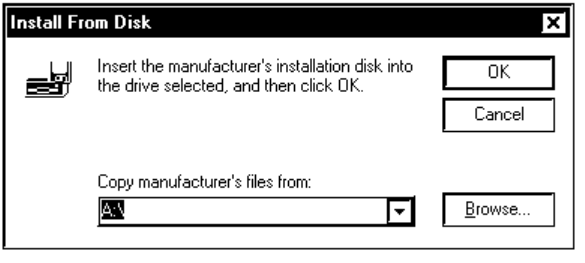
2.3 Modem Setup for Windows 95 Users

1. When the board is physically installed, start Windows 95 as you normally would.

2. When Windows 95 detects new hardware, it displays the **"New Hardware Found"** dialog box. Here, you are asked what (if any) driver files are associated with the new hardware.

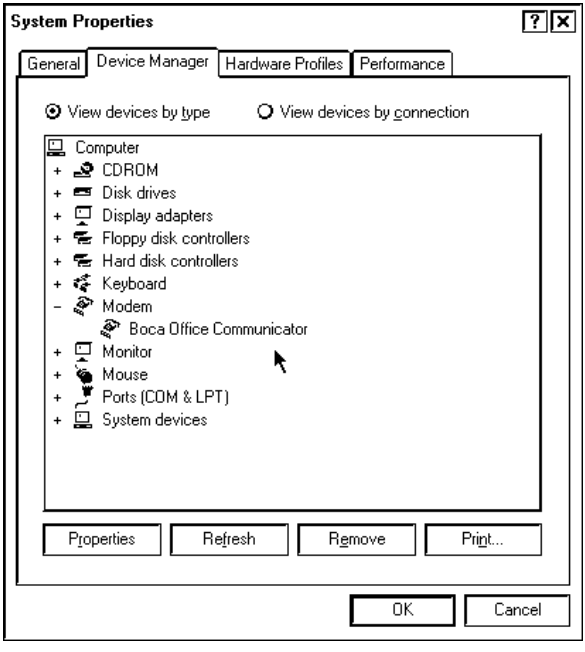
3. From the choices given, select **"Driver from disk provided by hardware manufacturer"**.

4. Windows 95 then displays the **"Install from Disk"** dialog box. Here, you are asked for the location of the driver files. Insert the diskette labelled "FDV34 Driver and Utilities" in your floppy drive. Type A: (or B:) and select OK. Windows 95 will now copy files from the installation diskette.



5. Windows 95 may ask you for your original Windows 95 installation diskettes.

If you need to re-configure the board, click on “Control Panel”, then “System”, then “Device Manager”. The device description is under the section, “Modems”. See your Windows 95 documentation on changing properties of devices using the Device Manager. Congratulations! Setup is complete for Windows 95 users.

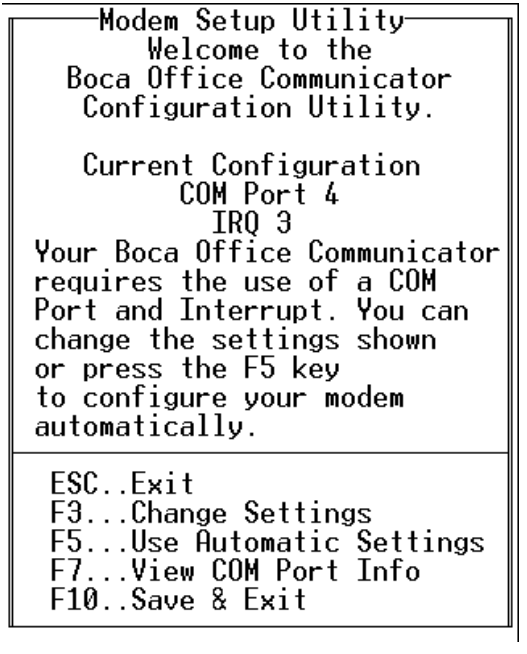


2.4 Modem Setup for Windows 3.1 or DOS Users

Make sure you exit to DOS first if you are running Windows.

With the Driver and Utilities diskette in your floppy drive, type A: (or B:). Then type **INSTALL** and press ENTER. Install copies files to your hard drive and modifies your CONFIG.SYS and startup files. When Install is finished, it will restart your computer.

When your computer restarts, you must run the SETMODEM command to configure the modem. Type **SETMODEM** from the directory where the files were copied. SETMODEM displays the Modem Setup Utility screen as shown in the sample below. All necessary instructions are provided on screen.



When starting up the utility, you have the following options:

Press **ESC**... to exit without saving

Press **F3**... to change settings. Here, you can change your current COM port/IRQ assignments. If you enter an incorrect setting, setup will display available valid choices.

Press **F5**... to run automatic settings. Modem Setup will determine and configure the best COM port and IRQ assignments for the modem in your system.

Press **F7**... to view existing COM port/IRQ assignments. No changes are made to your configuration.

Press **F10**... to save and exit setup.

2.5 Optional Accessories

The V.34 Boca Office Communicator is equipped with microphone and speaker jacks for use with headset, speakers and microphone. **(See installation instructions on pages 17-18).** The microphone can be used to record outbound messages. These messages can also be recorded with a telephone attached to the modem. 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. The V.34 Boca Office Communicator 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 the V.34 Boca Office Communicator

Speaker Requirements:

You can attach the V.34 Boca Office Communicator to a high-quality external speaker or the earpiece of a handset. The external speaker must have an impedance rating of 8 ohms or more.

2.6 Testing the Connection

1. Power on the computer and check for a dial tone. If a dial tone is heard, continue. If you do not hear a dial tone, check the connections your made in the previous subsection, or refer to *Troubleshooting (Section Three)*.

2. Install your data communications software (see companion software manual) and place it in command mode. Refer to the program's documentation for additional information.

3. Start your communications software and enter terminal mode. **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**.

4. 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).

5. Type **ATH1** followed by ENTER and you should hear a dial tone from the modem speaker. To adjust speaker volume up, refer to your communications software, or type the **ATL3** command the press ENTER.

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

7. Your Office Communicator 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.

SYMPTOM	POSSIBLE REMEDY
No dial tone.	• Verify that you have cables plugged in correctly as instructed in Section Two. • 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.
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. • The telephone line may be in use at a different extension. • 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 that your modem is set to (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.

SYMPTOM	POSSIBLE REMEDY
Garbled characters (contd)	• Exit the communications program and restart it.
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 other telephony devices (e.g., answering/fax machine), they 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. In many cases, this is done with *70 or 1170.

SYMPTOM	POSSIBLE REMEDY
Microphone fails to work.	• Make sure attached microphone is working and conforms to necessary specifications. See Section 2.5. • 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 2.5. • Make sure speaker is plugged into correct jack.

Appendix A: Technical Specifications

Modem Data Rate: 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400 12,000, 9600, 7200, 4800, 2400, 1200, or 300bps

Fax Data Rate: 14,400, 12,000K, 9600, 7200, 4800, or 2400bps

Audio Data Rate: 11.025K, 7200 samples/sec.

Compatibility:

Modem Modulation Protocols

ITU-T: V.34, V.FC (28,800bps) V.32bis (14,400bps), V.32 (9600bps), V.22bis (2400bps), V.22 (1200bps)

Bell: Bell 212A (1200bps), Bell 103 (300bps)

Fax Modulation Protocols

V.17 (14.4KKbps) transmit and receive
V.29 (9600/7200bps) transmit
V.27 ter (4800/2400bps) transmit and receive
V.21 channel 2 (300bps) transmit and receive
EIA-578 Service Class 1 and 2 commands

V.42/MNP2-4 and V.42bis/MNP5 support

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

Physical and Electrical Characteristics

- Size: 8.875" x 3.875"
- Power: +5V, 1.2 watts (maximum)
  +/-12V, 0.5 watts (maximum)
  (from host computer power supply)

Operating Temperature Requirements:

Dry Bulb Temperature:	10-40° C (50-104° F)
Relative Humidity:	8-80%
Storage:	1-60° C (33.8-140° F)

Appendix B: Compliance Information

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.

DOC Compliance Statement (Canada)

The Canadian Department of Communications 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. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). 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 an authorized Canadian maintenance facility 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.

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.

Appendix C: Modem Command Reference

BASIC AT COMMANDS (default values are highlighted)

Command	Description
AT	Attention characters
ATA	Answer command
A /	Re-Execute last command

Dial Modifiers

Dial	Options	Description
ATD	0-9	DTMF digits
	L	Re-dial last number.
	P	Pulse (rotary) dial. 10 pulses per second.
	T	Touch tone dial (DTMF).
	W	Wait for dial tone for 1-255 seconds. Default is 50 seconds (this value is set by the S7 register).
	,	(Comma) Pause for 0-255 seconds. Default is 2 seconds (this value is set by the S0 register.
	@	Wait for quiet answer.
	!	Initiate hook flash.
	;	Return to command state after dialing.
	^	Disable calling tone.
	S=n	Dial stored number. (See AT&Z). n=0-3.

Command	Description

Command Character Echo

ATE0	Disables echoing of the commands to the screen.
ATE1	**Enables echoing of the commands to the screen. (default).**

Command	Description
Disconnect (hang-up)	
ATH0	Instructs modem to go on-hook.
ATH1	Instructs modem to go off-hook.
Identification	
ATI0	Displays the product identification code.
ATI1	Displays the checksum.
ATI2	Displays ROM checksum as OK or ERROR.
ATI3	Displays the firmware revision level.
ATI4	Reports OEM-defined identifier string.
ATI5	Reports country code.
ATI6	Reports modem data pump model.
Speaker volume	
ATL0	Low volume.
ATL1	**Low volume. (default)**
ATL2	Medium volume.
ATL3	High volume.
Speaker control	
ATM0	Disables the modem speaker.
ATM1	**Turns speaker on until carrier has been detected. (default)**
ATM2	Speaker is always on.
ATM3	Speaker is on when receiving carrier and during dialing, but off during answering.
Automode enable	
ATN0	Requires speed of the connection be that specified by the value of S37.
ATN1	**Permits handshaking at any speed supported by both modems. (default)**

Command	Description
Return to on line state mode	
ATO0	Switches the modem from command mode to on-line mode without dialing.
ATO1	Switches from command mode to on-line mode and initiates an equalizer retrain sequence.
Mode responses	
ATQ0	**Enables result codes to be issued to the screen. (default)**
ATQ1	Disables result codes to be issued to the screen.
Result code format	
ATV0	Numeric format.
ATV1	**Verbal format. (default)**
Error correction message control	
ATW0	**Error correction call progress not reported. (default)**
ATW1	Call progress reported.
ATW2	Call progress not reported. Connect xxxx message reports DCE speed (e.g., CONNECT 28800).
Extended result codes	
ATX0	Disables monitoring of busy tones unless forced otherwise by country requirements; sends only OK, CONNECT, RING, NO CARRIER, ERROR and NO ANSWER result codes.
ATX1	Disables monitoring of busy tones unless forced otherwise by country requirements; sends only OK,CONNECT, RING, NO CARRIER, ERROR, NO ANSWER and CONNECT XXXX result codes.
ATX2	Disables monitoring of busy tones unless forced otherwise by country requirements; sends only OK, CONNECT, RING, NO CARRIER, ERROR, NO DIAL TONE, NO ANSWER and CONNECT XXXX result codes.

Command	Description
ATX3	Enables monitoring of busy tones; sends only OK, CONNECT, RING, NO CARRIER, ERROR, NO DIALTONE, NO ANSWER and CONNECT XXXX.
ATX4	**Enables monitoring of busy tones and sends all messages. (default)**

Control long space disconnect

ATY0	**Disables long space disconnect. (default)**
ATY1	Enables long space connect.

Soft reset and restore profile

ATZ0	Restores stored profile 0.
ATZ1	Restores stored profile 1.

Escape Characters

+++	The escape characters are known as +++. They will switch from on-line mode to command mode while preserving the connection with the on line modem.

DSVD Function

AT-SSE=1	This command must be added to your initialization string for the modem to work in DSVD mode. **NOTE: While the modem is in DSVD mode, full-duplex speakerphone reverts to half-duplex functionality.**

Extended AT Commands

Command	Description
Data carrier detect (DCD) signal	
AT&C0	Forces DCD signal to be on at all times.
AT&C1	**DCD on indicates presence of data carrier. (default)**
Data terminal ready (DTR) signal.	
	Interprets the ON to OFF transition of the DTR signal from the DTE according to the &Q settings.
AT&D0	&Q0,5,6. DTR ignored. &Q1,4. Modem hangs up; auto answer not affected. &Q2,3. Modem hangs up; auto answer inhibited.
AT&D1	&Q0,1,4-6. Asynchronous escape sequence. &Q2,3. Modem hangs up; auto answer inhibited.
AT&D2	**&Q0-6. Modem hangs up; auto answer inhibited. (default)**
AT&D3	&Q0,1,4-6. Modem does a soft reset as if the ATZ command were received; &Q2,3. Modem hangs up; auto answer inhibited.
AT&F	**Recalls factory defaults.**
	Instructs the modem to use the factory set parameters.
DTE/Modem flow control	
AT&K0	Disable flow control.
AT&K3	**Enable RTS/CTS (default for data mode)**
AT&K4	Enable XON/XOFF.
AT&K5	Enable transport XON/XOFF.
AT&K6	**Enable both RTS/CTS and XON/XOFF (default for FAX mode)**

Note on Flow Control. XON/XOFF is a software-based flow control method, using standard ASCII control characters to pause or resume data transmission. RTS/CTS pacing, a hardware-based method, uses an electrical signal. Signals are exchanged as follows:

RECEIVER		**TRANSMITTER**
CTS ON	======>	START SENDING
CTS ON	<======	RTS ON (ready to send)
CTS OFF	======>	RTS OFF (stop sending)

Select pulse dial make/break ratio

AT&P0	**Selects a make/break ratio of 39/61 at 10pps. US and Canada. (default)**
AT&P1	Selects a make/break ratio of 33/67 at 10pps. UK and Hong Kong.
AT&P2	Same as 0 except at 20pps.
AT&P3	Same as 1 except at 20pps.

Asynchronous mode

AT&Q0	Direct Asynchronous mode.
AT&Q5	**Modem negotiates an error-corrected link. (default)**
AT&Q6	Selects asynchronous operation in normal mode (i.e., speed buffering).

RTS/CTS (Request to Send/Clear to Send)

AT&R0	Not supported.
AT&R1	**CTS will drop if required by flow control (default).**

Data Set Ready (DSR) signal

AT&S0	**Causes DSR signal to be active at all times. (default)**
AT&S1	Causes DSR signal to be active according to the CCITT specification.

Command	Description
Test and diagnostics	
AT&T0	Terminates any test in progress.
AT&T1	Executes the local analog loopback test.
AT&T3	Executes the local digital loopback test.
AT&T4	**Enables the modem to accept a request from a remote modem for a digital loopback test. (default)**
AT&T5	Instructs the modem to deny a request from a remote modem for a digital loopback test.
AT&T6	Executes the remote digital loopback test.
AT&T7	Executes the remote digital loopback test with a self test.
AT&T8	Executes the remote analog loopback test with a self test.
View Configuration	
AT&V	View current configuration and user profile.
Store user profile.	
Saves the current configuration into non-volatile RAM as one of two user profiles.	
AT&W0	Saves as user profile 0.
AT&W1	Saves as user profile 1.
Designate default user profile	
AT&Y0	Selects user profile 0.
AT&Y1	Selects user profile 1.
Stored phone number	
AT&Z0=	Stores a 45 digit dial string.
AT&Z1=	Stores a 45 digit dial string.
AT&Z2=	Stores a 45 digit dial string.
AT&Z3=	Stores a 45 digit dial string.

MNP Operation

The Office Communicator supports all of the preceding classes. The following AT Commands apply to the MNP protocol. Default values are highlighted.

Maximum MNP Block Size

Use this command to transmit smaller blocks of data in a reliable data link connection.

Command	Description
AT\A0	set maximum block size to 64 characters.
AT\A1	**set maximum block size to 128 characters. (default)**
AT\A2	set maximum block size to 192 characters.
AT\A3	set maximum block size to 256 characters.

Transmit Break

When this command is entered during a non-MNP connection, a break signal is sent to the remote modem. The length of the break is 100 times the n parameter (1-9) in milliseconds. The default is 3.

AT\B3 (default)

Break Control

Determines the modem response when a BREAK is received from the DTE or the remote modem. The values of the parameters vary based on the three following conditions:

(1) When a break is received from the DTE during NORMAL or MNP mode:

AT\K0, 2, 4: modem enters command mode without sending a break to the remote modem.
AT\K1: modem clears the terminal and modem buffers and sends a break to the remote modem.
AT\K3: modem does not clear the buffers, but sends a break to the remote modem.
AT\K5: modem sends a break to the remote modem in sequence with any transmitted data. (default).

(2) When a break is received from the remote modem during NORMAL mode:

AT\K0, 1: modem clears the terminal and modem buffers and sends a break to the local DTE.
AT\K2, 3: modem does not clear the buffers but sends a break to the local DTE.
AT\K4, 5: modem sends a break in sequence with any data being buffered. (default)

(3) When a break is received from the DTE during DIRECT MODE mode:

AT\K0,1,3: modem sends a break to the remote modem and enters command mode.
AT\K2, 4, 5: modem sends a break to the remote modem. (default)

Error Correction Operating Mode

Selects the operating mode the modem uses while connected.

AT\N0 NORMAL (speed buffering) mode.
AT\N1 DIRECT (pass-through) mode.
AT\N2 RELIABLE LINK mode. Specifies error correction for the modem-to-modem connection
AT\N3 AUTO-RELIABLE LINK mode. Attempts error-correction connection but will fall back to normal mode if unable to establish an MNP link. (default)
AT\N4 LAPM error correction mode.
AT\N5 MNP error correction mode

AT Commands for V.42/V.42bis

The following AT commands apply to the V.42/V.42bis protocol:

Command Description

Compression Control

Determines whether or not modem will use data compression.

AT%C0	disables data compression
AT%C1	enables MNP5 data compression negotiation
AT%C2	enables V42bis data compression.
AT%C3	**enables both V.42bis and MNP5 data compression (default)**

Auto-retrain

Determines whether or not the modem automatically monitors the line quality and requests a retrain when necessary.

AT%E0	disables line quality monitor auto-retrain
AT%E1	enables line quality monitor auto-retrain
AT%E2	**enables line quality monitor auto retrain and auto fall back/forward. (default)**

Report Received Signal Level

AT%L	009 = -9 dBm, 010 = -10dBm, etc. all the way to 043 (-43 dBm)

Line signal and noise are determined by the unit of measurement dBm (decibel referenced to one milliwatt). To arrive at a signal/noise ratio, the noise level is subtracted from signal level in dBm.

Report Line Signal Quality

AT%Q 009 = -9 dBm, 010 = -10dBm, etc. all the way to 043 (-43 dBm)

Returns a “high-order” byte of the calculated EQM (“eye quality monitor”). This can range from 0 to 255. When the value is 8 or greater, the modem will automatically retrain if enabled by the AT%E1 command. The value for a normal connection ranges from 0 to 2 and approaches 8 for a progressively poorer connection. Returns an OK result code.

000 to 007 no retrain
008 to 255 retrain performed if enabled by %E1.

S-Registers

This section defines the purpose of the modem registers, and sequentially lists the registers and describes their functions. These registers affect various operating characteristics and allow you to obtain information about the modem, as well as test the modem. Each register has a factory-set value, which you can read or change to fit your needs.

Reading a Register Value

To read the current value of a register, type:

AT Sn? [ENTER],

where n is a register number.

AT Sn? Sn? [ENTER] from the command mode.

To read the register values of S0 and S1, type

AT S0? S1? [ENTER].

The modem will display the first register value, a carriage return, the next register value, a carriage return, and OK or 0.

Changing a Register Value

To change a register value, use the Sn command (ATSn=v), where n is a register number and v is the new value you want to assign to the register. Type:

AT S0=3 [ENTER]

to have the modem automatically answer on the third ring.

The table on the following page lists the modem's registers and their functions.

Reg.	Range	Units	Default	Definition
S0	0-255	rings	0	Auto-answer
S1	0-255	rings	0	Count incoming rings
S2	0-255	rings	43	Escape character value.
S3	0-127	ASCII	13	Carriage return character.
S4	0-127	ASCII	10	Line feed character.
S5	0-255	ASCII	8	Backspace character.
S6	2-255	seconds	2	Wait time for Blind Dialing.
S7	1-255	seconds	50	Wait for carrier after dial.
S8	0-255	seconds	2	Pause time for dial delay.
S9	1-255	seconds	6 (0.6)	Carrier detect.
S10	1-255	seconds	14 (1.4)	Lost Carrier to Hang Up Delay.
S11	50-255	ms	95 ms	DTMF tone duration (* in one-hundredth second increments)
S12	0-255	seconds	50(1)	Escape code guard time*. (*in one-fiftieth second increments)
S13				Reserved.
S14	Bit Mapped		138(8Ah)	Bit mapped registers.
S15				Reserved
S16	Bit Mapped		0	Modem test options.
S17				Reserved.
S18	0-255	seconds	0	Test timer.
S19				Reserved.
S20				Reserved.
S21	Bit Mapped		4(04h)	Bit mapped registers.
S22	Bit Mapped		117(75h)	Bit mapped registers.
S23	Bit Mapped		54(36h)	Bit mapped registers.
S24	0-255	seconds	0	Sleep Inactivity Timer.
S25	0-255	seconds	5	Asynchronous DTR Delay.
S26	0-255	seconds	1	RTS to CTS Delay Interval.
S27	Bit Mapped		9(09h)	Bit mapped registers.
S28	Bit Mapped		0	Bit mapped registers
S29	0-255	ms	0	Flash Dial Modifier Time.

Reg.	Range	Units	Default	Definition
S30	0-255	tens of seconds	0	Disconnect Inactivity Timer.
S31	Bit Mapped		2	
S32	0-255	ASCII	17(11h)	XON Character.
S33	0-255	ASCII	19(19h)	XOFF Character.
S34-35				Reserved.
S36			7 (07h)	LAPM Failure Control
S37			0	Line Connection speed

NOTE: Desired sub-V.34 line connection speed. If an invalid number is entered, the number is accepted into the register, but S37 will react as though the default value has been entered. See the +MS command for more modulation selections.

Bits 0-4:

0 =		**Attempt auto mode connection (DEFAULT)**
1-3	=	Attempt to connect at 300bps
4	=	Reserved
5	=	Attempt to connect at V.22 1200bps
6	=	Attempt to connect at V.22bis 2400bps
7	=	Attempt to connect at V.23
8	=	Attempt to connect at V.32/V.32bis 4800bps
9	=	Attempt to connect at V.32/V.32bis 9600bps
10	=	Attempt to connect at V.32bis 12Kbps
11	=	Attempt to connect at V.32bis14.4Kbps
12	=	Attempt to connect at V.32bis 7200bps (ATF7)

S38	0-255	seconds	20	Delay Before Forced Hangup.
S39	Bit Mapped		3	Bit Mapped Registers.
S40	Bit Mapped		105(69h)	Bit Mapped Registers.
S41	Bit Mapped		3	Bit Mapped Registers.
S46	136 or 138		138	Data Compression Control.

NOTE: 136 enables error correction with no compression; 138 enables error correction WITH compression.

Reg.	Range	Units	Default	Definition
S48	0, 7, 128		7	V.42 Negotiation.

NOTE: 0 disables negotiation and proceeds with LAPM; 7 enables negotiation; and 128 disables negotiation and proceeds with fallback action specified in S36. The default for S36 is to attempt an MNP connection.

S82	3, 7, 128		128(40h)	Break Handling Option.
S86	0,4,5,9,12,13,14		NA	Connection Failure Cause Code.
	0 =	Normal disconnect; no error occurred.		
	4 =	Loss of carrier		
	5 =	V.42 negotiation failed to detect an error-correction remote modem.		
	9 =	The modems could not find a common protocol.		
	12 =	Normal disconnect initiated by the remote modem.		
	13 =	Remote modem does not respond after 10 re-transmissions of the same message.		
	14 =	Protocol violation.		
S91	0 to -15	dBm	10	PSTN Transmit Level.
S92	0 to -15	dBm	10	Fax Transmit Level.
S95	Bit-Mapped		0	Extended Results Codes.

NOTE: Bit values are defined as follows for S95:

0 = CONNECT CODE indicates DCE speed instead of DTE speed.
1 = Append ARQ (automatic repeat request) to verbose CONNECT XXXX result code if protocol is other than none.
2 = Enable CARRIER XXXX result code.
3 = Enable PROTOCOL XXXX result code.
5 = Enable COMPRESSION result code.

Bits 4, 6, and 7 are reserved.

AT+MS Command (Modulation Select)

This extended format command selects the modulation, optionally enables or disables automode, and optionally specifies the lowest and highest connection rates using from one to four subparameters. The command format is:

+MS=<mod>[,[<automode>][,[<min_rate>][,[<max_rate>]]]]

The default value as reported by the +MS? command is:

+MS=11,1,300,28800

Note 1: For 14400bps and lower speeds, the Nn command and S37 register can alternatively be used, in which case the +MS subparameters will be modified to reflect the Nn command and S37=x settings. Use of the Nn and S37=x commands is not recommended, but is provided for compatibility with existing communication software. (S37 is not updated by the +MS command).

Note 2: Subparameters not entered (enter a comma only or <CR> to skip the last subparameter) remain at their current values.

Reporting Selected Options

The modem can send a string of information to the DTE consisting of selected options: **+MS?**

The response is:

+MS:<mod>,<automode>,<min_rate>,<max_rate>

Example: +MS: 11, 1, 300, 28800 (shows default values)

Reporting Supported Options

The modem can send a string of information to the DTE consisting of supported options using the following commands.

+MS=?

The response is:

+MS: (list of supported <mod> values), (list of supported <automode> values), (list of supported <min_rate> values), list of supported <max> rate values)

Example:

+MS: (0, 1, 2, 3, 9, 10, 11, 64, 69, 74), (0,1) (300-28800), (300-28800)

Subparameter Definitions

1. **<mod>** = a decimal number which specifies the preferred modulation (automode enabled) or the modulation (automode disabled) to use in originating or answering a connection. The options are as shown following:

<mod>	Modulation Selected	Possible rates (bps)
0	V.21	300
1	V.22	1200
2	V.22bis	2400 or 1200
3	V.23	1200*
9	V.32	9600 or 4800
10	V.32bis	14400, 12000, 9600, 7200, or 4800
11	**V.34**	**28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, or 2400 (default)**
64	Bell 103	300
69	Bell 212	1200
74	V.FC	28800, 26400, 24000, 21600, 19200, 16800, 14400

* For V.23, originating modes transmit at 75bps and receive at 1200bps; answering modes transmit at 1200bps and receive at 75bps. The rate is always specified at 1200bps.

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

• 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.

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

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

2. **<automode>**=an optional numeric value which enables or disables automatic modulation negotiation. Options are:

<automode>	**Option Selected**
0	Automode disabled
1	Automode enabled

The default value is 1, which enables automode. Note, however, there are modulations for which there is no automatic negotiation (e.g., Bell 212 (<mod>=69).

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

a. If <max_rate> is within the rates supported by the selected modulation, the selected rate is that specified by <max_rate>.

Example: +MS=9,0,1200,4800 selects V.32 4800bps fixed rate.

b. 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.

Example: +MS=9,0,2400,14400 selects V.32 9600 or 4800bps.

c. To emulate N0S37=x command sequence to select fixed mode operation, specify the <max_rate> and <min_rate> both to be the same requested speed, and <mod> to be the modulation for that speed.

Example: +MS=11,0,16800,16800 selects V.34 16800bps fixed mode (no comparable S37 command).

+MS=10,0,12000,12000 selects V.32bis 12000bps fixed mode (same as N0S37=10).

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

a. 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 selected modulation.

Example: +MS=10,1,1200,24000 selects automoding down from V.32bis 14400bps.

b. To emulate N1S37=x sequence command, specify the modulation and the rate to start automoding down from using <mod> and <max_rate>, respectively. Set <min_rate> to 300 to allow automoding all the way down to V.21 300bps.

Example: +MS=11,1,300,16800 selects automoding down starting at V.34 16800bps (no comparable S37 command)

+MS=10,1,300,12000 selects automoding down starting at V.32bis 12000bps (same as N1S37=10).

3. **<min_rate>**= is an optional number which specifies the lowest rate at which the modem may establish a connection. The value is decimal-coded in units of bps, e.g., 2400 specifies the lowest rate to be 2400bps. The default is 300 for 300 bps.

4. **<max_rate>**= is an optional number which specifies the highest rate at which the modem may establish a connection. The value is decimal-coded in units of bps, e.g., 14400 specifies the highest rate to be 14400bps. The default is 28800 for 28800bps.

Result Codes

Result Code	Numeric Value	Description
OK	0	Modem successfully executed a command line.
CONNECT	1	Connection made at 300 bps.
RING	2	Modem detected an incoming call.
NO CARRIER	3	Modem lost or could not detect a remote carrier signal within the Register S7 time.
ERROR	4	Modem found an error in the command line.
CONNECT 1200	5	Modem established a connection at 1200bps.
NO DIALTONE	6	Modem did not detect a dial tone within 5 seconds after going off-hook.
BUSY	7	Modem detected a busy signal.
NO ANSWER	8	Five seconds of silence was not detected when using the @ command in the dial command line.
CONNECT 0600	9	Modem established a connection at 600 bps.
CONNECT 2400	10	Modem established a connection at 2400 bps.
CONNECT 4800	11	Modem established a connection at 4800 bps.
CONNECT 9600	12	Connection made at 9600 bps.
CONNECT 7200	13	Connected as data modem during an answer.

Result Code	Numeric Value	Description
CONNECT 12000	14	Connection made at 12000 bps.
CONNECT 14400	15	Connection made at 14400 bps.
CONNECT 19200	16	Connection made at 19200 bps.
CONNECT 38400	17	Connection made at 38400 bps.
CONNECT 57600	18	Connection made at 57600 bps.
CONNECT 115200	19	Connection made at 115,200 bps.
CONNECT 75TX/1200RX	22	Modem returns this result code when upon establishing a V.23 originate connection when the modem has been instructed to report the DTE speed to the DTE upon connecting.
CONNECT 1200RX/75RX	23	Modem returns this result code when upon establishing a V.23 answer connection when the modem has been instructed to report the DTE speed to the DTE upon connecting.
DELAYED	24	For X4; when a call fails to connect and the number dialed is 'delayed' due to country blacklisting requirements.
BLACKLISTED	32	For X4; when a call fails to connect and the number dialed is considered 'blacklisted'.
FAX	33	A fax modem connection is established.

Result Code	Numeric Value	Description
DATA	35	A data modem connection is established.
CARRIER 300	40	Carrier rate of 300 bps.
CARRIER 1200/75	44	V.23 backward channel has been detected.
CARRIER 75/1200	45	V.23 forward channel has been detected
CARRIER 1200	46	Carrier rate of 1200 bps.
CARRIER 2400	47	Carrier rate of 2400 bps.
CARRIER 4800	48	Carrier rate of 4800 bps.
CARRIER 7200	49	Carrier rate of 7200 bps.
CARRIER 9600	50	Carrier rate of 9600 bps.
CARRIER 12000	51	Carrier rate of 12000 bps.
CARRIER 14400	52	Carrier rate of 14400 bps.
CARRIER 16800	53	Carrier rate of 16800 bps.
CARRIER 19200	54	Carrier rate of 19200 bps.
CARRIER 21600	55	Carrier rate of 21600 21600 bps.
CARRIER 24000	56	Carrier rate of 24000 bps
CARRIER 26400	57	Carrier rate of 26400 bps.

Result Code	Numeric Value	Description
CARRIER 28800	58	Carrier rate of 28800 bps.
CONNECT 16800	59	Connect speed of 16800 bps.
CONNECT 21600	61	Connect speed of 21600 bps.
CONNECT 24000	62	Connect speed of 24000 bps.
CONNECT 26400	63	Connect speed of 26400 bps.
CONNECT 28800	64	Carrier rate of 28800 bps.
COMPRESSION: CLASS 5	66	The modem has connected in MNP class 5 and COMPRESSION message reporting has been enabled.
COMPRESSION: V.42BIS	67	The modem has connected in V.42bis and COMPRESSION message reporting has been enabled.
COMPRESSION:	69	The modem has connected without data NONE compression and COMPRESSION message reporting has been enabled.
PROTOCOL: NONE*	70	Modem has connected without any form of error connection.
PROTOCOL: LAPM*	77	Modem has connected in the V.42 LAPM mode of error correction.
PROTOCOL:	80	Modem has connected in the MNP ALT* mode of error correction.

* PROTOCOL message reporting has been enabled.

+FCERROR	+F4	Fax carrier error.

Appendix D: Glossary

A

algorithm. A formula or procedure which employs various methods defining how data is to be used to give a prescribed result.

analog signals. Signals which can vary over a continuous range (e.g., the human voice over conventional telephone lines). Analog circuitry is more subject to distortion and noise, but it is more capable of handling complex signals than are digital signals which can have only discrete values.

ARQ. Automatic ReQuest for retransmission. A type of communications link where the receiver asks the transmitter to re-send a block of data when errors are detected.

ANSI. American National Standards Institute. A non-profit, private industry association which governs most USA-standards setting agencies.

ASCII. Acronym for American Standard Code for Information Interchange. ASCII is an ANSI character set. The standard ASCII character set consists of 128 decimal numbers (0-127) for letters of the alphabet, numerals, punctuation marks, and common special characters. The extended ASCII character set extends to 255 characters and contains special mathematical, graphics, and foreign characters.

asynchronous communications. A method of transmission in which one character is sent one bit at a time; also referred to as serial transmission.

B

Bell standards. Refers to the U. S. modulation protocol standards developed by the former AT&T Bell Systems such as Bell 103 (300bps transmission) and Bell 212A (1200bps transmission).

bit-mapped registers. An S-register which contains multiple bit-oriented values.

blind dialing. An automated process whereby the modem goes off-hook and dials without waiting for a dial tone. This is prohibited in many countries.

block transfer control. Determines whether or not the modem uses block or stream mode during an MNP connection. In stream mode, MNP sends data frames in varying length. Block mode sends fixed data frames of 256 characters.

bps. bits per second.

break handling. Determines how the modem responds when a BREAK signal is received from either the DTE (Data Terminal Equipment or computer/terminal) or the remote modem. This is controlled by the MNP-based AT extended command \K. A break signal is represented on the communications line by a steady space signal for a significant length of time. Break signals may be activated from the keyboard by pressing the BREAK key or the control (CTRL) and C keys.

C

CCITT. Consultative Committee for International Telephone and Telegraph. This advisory organization is part of the ITU (International Telecommunication Union) which is an agency of the United Nations. Organization recently renamed International Telecommunications Union-Telecommunications Standard Sector (ITU-T)

command mode. The modem is in command mode when it is turned on or reset, when it loses its connection to a remote modem, when it is in on-line mode, or when escape characters (+++) are typed. To transmit data, the modem must be in data mode. The modem does not transmit data when in command mode.

communications protocol. A set of procedures which controls how a data communications network operates.

D

DCD. Data Carrier Detect. Indicates to the terminal device that the modem is receiving a valid carrier signal from a remote modem. The carrier is a tone at a specified frequency.

DCE. Data Communications Equipment. The local and/or remote modem. A DCE is usually connected to a DTE.

DTE. Data Terminal Equipment. The computer or terminal, either local (yours), or the remote (the one you're communicating with). A DTE is usually connected to a DCE.

DTR. Data Terminal Ready. The computer issues this signal to the attached modem indicating that it is ready to receive data.

data compression. A technique that examines transmitted data for redundancy and replaces strings (groups) of characters with special codes which the receiving modem interprets and restores to its original form. Transmission of compressed data results in shorter connect times and hence cost savings for connect charges. Data compression is sometimes called "source encoding".

data mode. The modem is in data mode when a connection has been established with a remote modem and sends a CONNECT response confirming the connection. User data may then be transmitted or received.

dial modifier. Dial modifiers are special characters appended to the ATD command which instruct the modem how to place a call.

digital signal. A discrete signal which can only take on one of several (usually only two) discrete levels in contrast to analog signals which can take a continuous range of levels.

E

error detection and correction. The transmitting modem attaches a special pattern (called a frame check sequence) calculated according to a prescribed algorithm from user-defined data to the end of a block of data. The receiving modem performs the same algorithm and compares it to the one with the transmitted data. If these match, then the block of data has been received correctly. If not, the block of data is re-transmitted until no errors are detected.

escape sequence. Also referred to as the escape command. This special command is entered as three plus symbols (+++) and places the modem in command mode and interrupts user data transmission, but does not terminate the data connection. This allows the entering of commands while the connection is maintained.

extended AT-command. Extended commands were developed to provide greater functionality and control over modem operations than is available from the basic AT command set.

F

fax mode. The modem is in fax mode when, through use of fax communications software, it can send and receive faxes, print and display fax files, convert files to fax-files, and set certain fax-related features. Note: the modulation protocol used by the modem in fax mode is also different from the usual data mode modulation.

flow control. Compensates for the difference between the rate at which data reaches a device and the rate at which the device processes and transmits. The two common types of flow control are RTS/CTS signaling (a hardware based method, employing an electrical signal) and XON/XOFF (a software-based method using standard ASCII control characters to pause or resume transmission). The \G command controls XON/XOFF flow control.

full-duplex. Two-way simultaneous transmission between modems, which may occur via a four-wire circuit on a leased line, or with a two-wire connection when the frequency bandwidth is divided into two

distinct channels, or when echo cancellation is employed (e.g., Bell 103, 212, and V.22 use frequency division, while V.32 uses echo cancellation).

G

guard tone. Guard tones are used in the United Kingdom and other countries. This requires that the modem transmit an 1800-Hz tone after it sends an answer tone. The guard tone is controlled by the &G command. Guard tones are not used in the U.S.A.

H

half-duplex. Signal flow in both directions, but only one way at a time with each modem alternating between send and receive.

Hayes-compatible. Hayes Microcomputer Products, Inc. developed the AT command set which has become a de facto industry standard. Hayes commands are always initiated with an AT (attention code) prefix.

hook flash. The dial modifier "!" causes the modem to go on-hook (hang-up) for one-half second. Also controlled by the ATH command.

L

LAPM. Link Access Protocol Modem. A V.42 ARQ type of error correction protocol where LAPM may be activated with or without V.42bis data compression.

leased line. Also referred to as a private line. A leased line is obtained from a communications company (carrier) to provide a transmission medium between two points. The line consists of a permanent dedicated circuit between two points, or to set of previously arranged points. The cost of the line is usually based on the distance between locations. This is in contrast to switched or dial-up lines, which can be connected to any point on the network.

line modulation. The means by which a carrier is varied to represent a signal carrying information. In a modem, the user's digital data is used

to modulate the modem's transmitter's carrier or carrier to allow the digital signal to be carried over analog facilities.

long space disconnect. Determines whether or not modem disconnects when it receives a continuous break from a remote modem. Controlled by the ATY command.

loopback tests. There are four types of loopback tests which are as follows: (1) the local digital loopback tests the operation of the DTE, including whether or not data is leaving the terminal or computer port; (2) the local analog loopback tests the digital and analog circuits of the modem; (3) the remote digital loopback checks the operating condition of the line and remote modem; (4) the remote analog loopback tests the line to the remote modem.

M

MNP. Microcom Networking Protocol. A series of data communications protocols developed by Microcom for full-duplex, error-free communications.

make/break ratio. The &P command controls the ratio of the off-hook (make) to on-hook (break) interval used by the modem when it pulse dials. &P0 selects a 39%/61% make/break ratio for use in the U.S. &P1 selects a 33%/67% make/break ratio for use in the United Kingdom and Hong Kong. The &P command is NOT allowed in some countries.

modulation handshake. Also referred to as Automode Enable and is controlled by the ATN command. This determines whether or not the modem must connect at a particular speed, or allow connection at any speed supported by both modems.

N

negotiation fallback. Controlled by S-Register 36 as part of the V.42 protocol. Setting this register indicates what action to take when a desired connection cannot be made (e.g., hang-up, direct mode connect, normal mode connect).

non-volatile RAM. Also NVRAM. Random access memory whose data is retained when power is turned off. This is especially useful for modems to store user-defined default configuration settings and frequently used telephone numbers. This information would be loaded into modem RAM at power-up.

O

on-line state. Same as data mode. To transmit or receive data, the modem must be in the on-line state. When placing a call, the modem is put on-line with the dial command.

P

PBX. Private Branch Exchange. A telephone switch at a customer site.

pulse dialing. Also referred to as rotary dialing, i.e., dialing with the older-style rotary dial wheel. The dial modifier ATDP sets the modem to pulse dialing, which is the default method as opposed to tone dialing (push-button touch-tone) which is enabled with ATDT. All telephone exchanges will accept older-style pulse dialing and most exchanges will accept modern tone-dialing. Tone dialing is faster and more reliable since mechanical relays and their inherent failure mechanisms are avoided.

R

result code. A response sent by the modem after executing a command. The response reports the modem's status or the progress of a call and can take the form of either digits (numeric) or words (verbose). Issuing a V1 command enables word responses. A V0 (V-zero) command enables numeric responses. The Q1 command disables their use entirely. Example: "OK" (word), or 0 (numeric) indicates that the modem successfully executed a command.

retrain. An adjustment process performed when one of the modems detects signal distortion or line noise which threaten data integrity.

RTS/CTS. Request to Send / Clear to Send. RTS and CTS are two control signal lines between the modem (DCE) and terminal (DTE) which allow the terminal to control the flow of information. See also flow control.

S

sleep inactivity timer. Determines the length of time the modem operates in normal mode with no activity before entering low-power "sleep" mode.

split-speed direction. Determines which direction (transmit or receive) has the 75bps channel and which has the 1200bps channel.

standard AT-command. The basic AT command set, originated by Hayes Microcomputer Products, Inc.

synchronous communications. A method of transmission in which data bits are sent continuously at the same rate under the control of a fixed frequency clock signal.

T

touch-tone dialing. Push-button tone dialing as used on contemporary phone sets. The dial modifier ATDT sets the modem to "tone" mode. Tone dialing is faster and more reliable than older-style pulse dialing.

trellis coding. A method of modulation which targets specific modulation points. Signals falling outside of these points are treated as line noise, thus ensuring greater noise immunity over a given line. QAM (Quadrature Amplitude Modulation) functions similarly, but has a broader tolerance and results in lesser noise immunity than trellis coding.

X

XON/XOFF. XON and XOFF are the names of two different flow control characters. See also flow control.

Acknowledgments

The Complete Modem Reference. Gilbert Held. John Wiley & Sons, Inc.
Upgrading and Repairing PCs. (Second Edition). Que Corporation.

Appendix E: Servicing Your Boca Product

If your Boca 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 (407) 241-1601 and will support data transmission speeds up to 28.8Kbps 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 (407) 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 V.34 Boca Office Communicator *(board only)***
- **a copy of the original invoice**
- **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 # _____
1601 Clint Moore Road
Boca Raton, FL 33487-2841

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

Appendix F: Warranty Information

Limited 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 period of five (5) years 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 five-year 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 DURING the first year of service. 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 FIVE- AND ONE-YEAR PERIODS, RESPECTIVELY.

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 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.

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