BOCAMODEM

14.4Kbps MODEM
# PCMCIA

**Product
Code:
M144PA**

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.
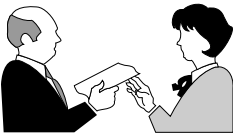
Boca BBS
407-241-1601

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

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 above.

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.
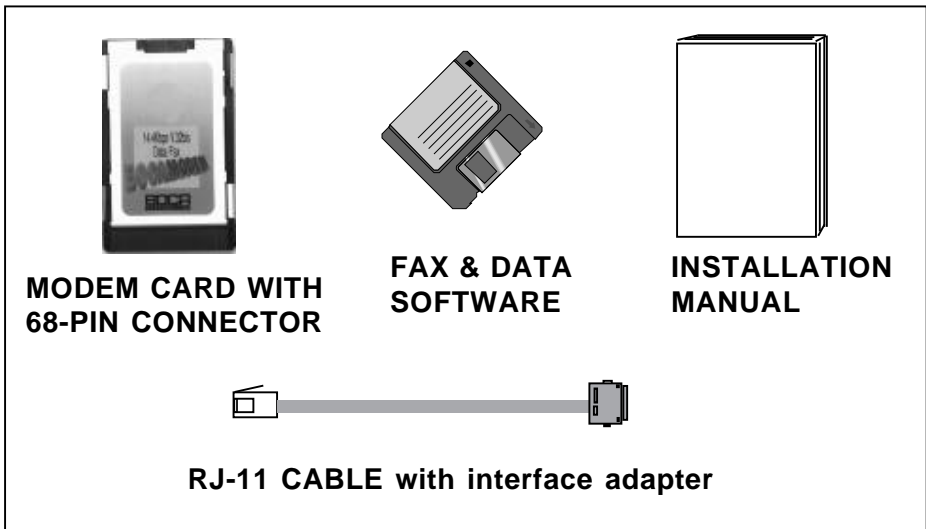
Contents

Congratulations...

...on the purchase of your 14.4 BOCAMODEMcard-PC from
Boca Research, Inc., a leader in high-tech computer
enhancement products. Get started by reviewing the package
contents as shown below. Then continue with the *EXPRESS*
Installation on pages 8-10 which is intended for more
knowledgeable and experienced users. The balance of the
manual contains a product overview, detailed installation
instructions, troubleshooting, and technical specifications.

Package Contents
Make sure you have received the following items:

MODEM CARD WITH 68-PIN CONNECTOR **FAX & DATA SOFTWARE** **INSTALLATION MANUAL**

RJ-11 CABLE with interface adapter

If any items are missing or appear damaged, contact your
dealer for assistance.

EXPRESS Hardware Installation

PC CARD SLOT

PCMCIA MODEM CARD

LAPTOP OR NOTEBOOK COMPUTER

RJ-11 CABLE WITH INTERFACE ADAPTER

CONNECT INTERFACE ADAPTER TO CONNECTOR ON MODEM CARD.

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**CONNECT RJ-11 END
TO WALL JACK.**

**PHONE
JACK**

**GO TO PAGE 10,
EXPRESS
SOFTWARE
INSTALLATION.**
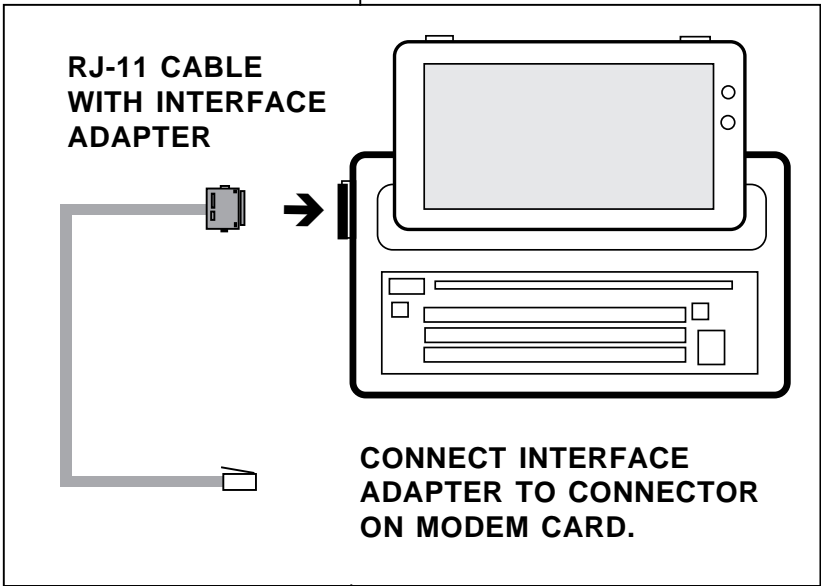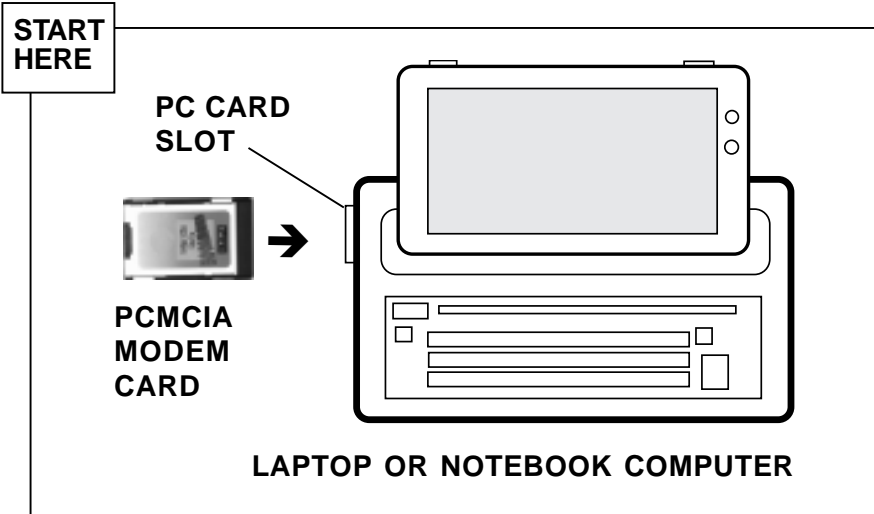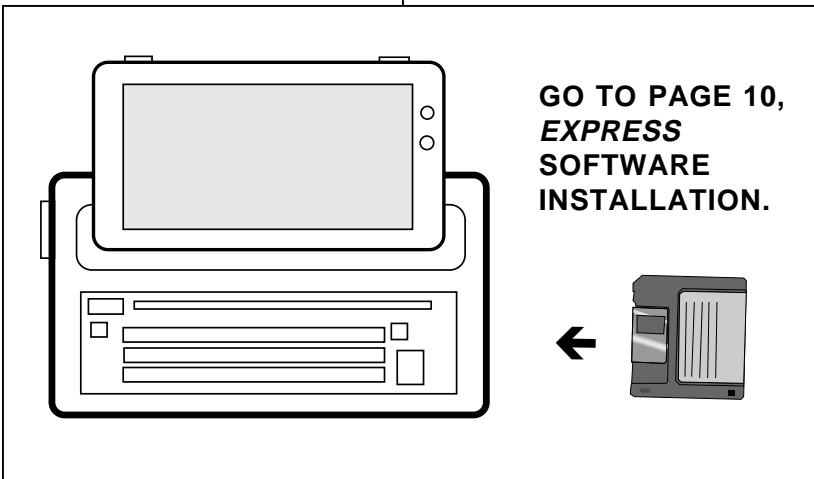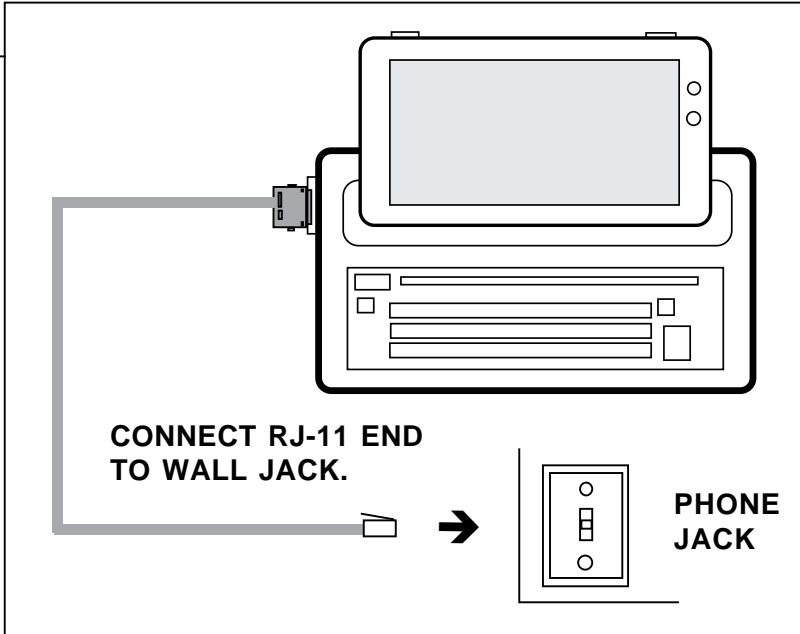
EXPRESS Software Installation
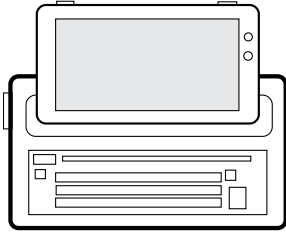
BOOT YOUR
SYSTEM AND MAKE
SURE WINDOWS IS
STARTED.
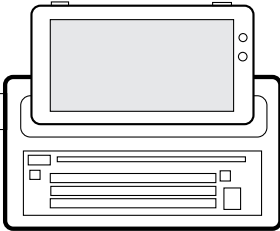
INSERT THE
COMMUNICATIONS
SOFTWARE DISKETTE
IN THE A:\DRIVE.

TYPE A:\SETUP, PRESS
ENTER, AND FOLLOW
ALL ON-SCREEN
INSTRUCTIONS.

Section One: Product Overview

Designed for laptop and notebook computers, the 14.4 BOCAMODEMcard-PC offers high-speed data and fax capability in an easily transportable "credit card"-sized adapter. This modem fully complies with the PCMCIA standard, type II, release 2.0.

Features

• 14,400 bps V.32bis data/send-receive fax modem
• Designed for most notebook and laptop which support the PCMCIA Type II slot specification
• Compatible with the Hayes AT command set
• Provides MNP and V.42 protocols for error correction
• Provides MNP5 and V.42bis data compression for throughput up to 57,600bps.
• Stores configuration in non-volatile memory
• Auto-dial and auto-answer; tone or pulse dialing
• Automatic detection of incoming data or fax calls
• Asynchronous communications
• Conforms to CCITT and U.S. Bell standards: V.32bis, V.32, V.22bis, V.22, Bell 212A, and Bell 103
• FCC Part 15, FCC Part 68 approved; DOC certified

Fax Features

- 14,400 bps send and receive fax
- Group 3 fax compatibility (Class 1)
- Background send and receive functions through Windows
- Transmit a fax to a single receiver or broadcast to a group

A Note on PCMCIA Standards

The PCMCIA (Personal Computer Memory Card International Association) was created in 1989 to establish and monitor standards for these IC (integrated circuit) cards. There are three types of cards which differ only in thickness size: **Type I, Type II**, and **Type III**. All three use the same 68-pin connector which attaches the card to the notebook or laptop computer. The cards are *downward* compatible.

Software requirements for these cards are known as **card** services and **socket** services. Card services controls communications between the PCMCIA card and your computer. Socket services monitors each PCMCIA slot to determine if a card is present, so your computer can make use of the card's utilities.

Flexibility. A notebook or laptop computer with a PCMCIA slot allows greater flexibility for adding and interchanging components (e.g., modems, LAN cards).

Section Two: Installation

This section explains how to connect the 14.4
BOCAMODEMcard-PC to your computer.

STEP1: Install the Modem

A. Most notebook and laptop computers supporting the
   PCMCIA Type II slot specification have a small covered
   opening for the slot. Open the cover to expose this slot. If
   you require assistance in locating this slot, refer to your
   computer documentation.

> **CAUTION: The modem can only be inserted one way. Plug the
> modem into the slot with the direction arrow pointing towards
> your computer (top side facing up).**

B. **Make sure power is OFF**. Locate the correct slot for the
   modem card. Gently slide the card into the slot but do not
   apply excessive force. The card can only be inserted one
   way.

STEP 2: Connect the Telephone Line

The modem comes with a RJ-11 cable with a DAA (direct access arrangement) interface adapter. The special connector on one end of the cable attaches to the 68-pin connector on the modem, while the other end plugs into your telephone jack. Make these connections now. Then, power ON your computer.

STEP 3:Install Fax and Communications Software

Install your communications software. When complete, continue with the sections which follow. Depending on the software you choose, refer to the appropriate manual for start-up and configuration.

STEP 4: Test the Modem

1. Your communications software should already be loaded as instructed in STEP 3. Most communication programs when started are in command mode. Refer to the program's documentation for additional information. **NOTE: AT commands typed in at the DOS prompt (not in command mode) will result in a "Bad command or file name" message.**

2. Once you are in command mode, type in the command **ATZ** followed by **ENTER** and the modem will respond with OK. If the modem does not respond with OK, refer to the Troubleshooting section of this manual.

3. Type **ATH1** followed by **ENTER** and you should hear a dial tone from the speaker on the modem.

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.

SYMPTOM	POSSIBLE REMEDY
No dial tone.	• Verify that you have cables plugged in correctly as instructed in Section Two. • Install the socket services driver. • 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.	• Make sure the PCMCIA card is fully inserted. • 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.	• Verify that the communication software is set to the same communications port that is reported when you load socket services.

SYMPTOM	POSSIBLE REMEDY
No response when you type in AT commands (contd)	• Make sure the special plug on the supplied RJ-11 cable is securely inserted to the modem. • Try typing AT&F to reset the modem to its factory defaults. • Move the modem to another PCMCIA port, if available (***power down the host computer first***). If the modem works after being moved, it's likely the problem is not with the modem.
AT commands not visible.	• Make sure the echo command is set to ON. Change to echo with the ATE 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 BBS terminal emulation is most commonly used.
The modem does not answer an incoming call.	• Exit the communications program and restart it. • You may not have enabled auto-answer. Use your software to enable this function.

SYMPTOM	POSSIBLE REMEDY
The modem does not answer an incoming call (contd)	• 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. • Make sure the modem is sent an ATS0=1 command.
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. • Send an ATS10=128 command to the modem and retry the connection.
My software does not specifically support this modem.	• Contact your software publisher for an updated modem description file that supports your new Boca modem.

Appendix A: Technical Specifications

Modem Data Rate: 14.4K, 12K, 9600, 7200, 4800, 2400, 1200, or 300bps

Fax Data Rate: 14.4K, 12K, 9600, 7200, 4800, 2400bps

Compatibility: **Modem Modulation Protocols**

   CCITT/ITU-TSS: V.32bis, V.32, V.22bis (2400bps), V.22 (1200bps)

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

   Fax Modulation Protocols
   CCITT/ITU-TSS:
   V.17 (14.4Kbps) transmit/receive
   V.29 (9600/7200bps) transmit/receive
   V.27 ter (4800/2400bps) transmit/receive
   V.21 channel 2 (300bps) transmit/receive
   EIA-578 Service Class 1 commands

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

Diagnostics: • Automatic power-on self-test.

Physical and Electrical Characteristics:• Size: 2.13"x3.37"x.197"

• Weight: 1.12oz.
• Switchless configuration for COM1 through COM4
• PCMCIA-compliant (version 2.0)/68-pin, Type II, release 2.0
• PCMCIA design intended for notebook or laptop computers running
  MS-DOS.

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

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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, or on the underside of the external modem.

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 PCMCIA Modem.

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Appendix C: 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 an authorized dealer ("the Warranty Period"). Should the product fail to be in working order at any time during the five-year period, BRI, will at its option, repair or replace this product as described below, provided that in BRI's sole determination the part or product has not been abused, misused, repaired, or modified.

All products will be serviced and returned via ground at no charge to customers DURING the first year of service.

All returns for limited warranty service require a Return Merchandise Authorization (RMA). All customers are required to demonstrate proof of purchase when requesting an RMA. The period of warranty commences on the date of purchase. A dated 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, copy of canceled check (if any), and the Return Merchandise Authorization (RMA) number provided by BRI Technical Support. Refer to the Appendix in this 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. BRI does not make any warranties in respect to the product, either expressed or implied, including no implied warranties of merchantability or fitness for a particular purpose, except as expressly provided in this agreement. If any labor, repair, or parts replacement is required because of accident, negligence, misuse, theft, vandalism, fire, water or other peril; or because of conditions outside of specifications, including, but not limited to, electrical power, temperature, humidity or dust; or by moving, repair relocation, or alteration not performed by BRI, or by any other cause other than normal use, the warranty and maintenance obligations provided herein shall not apply.

BRI SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OR FOR LOSS, DAMAGE, OR EXPENSE DIRECTLY OR INDIRECTLY ARISING FROM CUSTOMER'S USE OF OR INABILITY TO USE THE EQUIPMENT EITHER SEPARATELY OR IN COMBINATION WITH OTHER EQUIPMENT, OR FOR PERSONAL INJURY OR LOSS OR DESTRUCTION OF OTHER PROPERTY, OR FROM ANY OTHER CAUSE.

This warranty shall not be applicable to the extent that any provision of this warranty is prohibited by any Federal, state, or municipal law which cannot be preempted. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Appendix D: Servicing Your Boca 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 (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 (Section Three) did not resolve your problem, you may call our technical support staff for assistance. If you haven't referred to the Troubleshooting section, 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 or external unit 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. <u>Please place this
number on the outside of the package </u>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 14.4 BOCAMODEMcard-PC (card only)**
   - **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 product were covered by the warranty, Boca Research, Inc. will return it prepaid via UPS.

Appendix E: Command/Protocol Overview

In most cases, your communications software will set and control the operation of your modem. Following is a brief survey of the most commonly used Hayes-compatible AT commands for use with your modem. In addition, we've also provided information on extended AT command sets, S-Registers, and commands and registers for high-level protocols such as MNP, V.42/V.42bis, and V.32/V.32bis.

It will rarely be necessary to use 'AT' commands and S-Registers in command mode. We include them here for more advanced users who may prefer command mode operation, or require special settings. See pages 49-75 for additional details.

Hayes-compatible commands consist of a basic command set and an extended command set. The basic set involves functions such as dialing a number, or putting the modem on-hook (i.e., replacing the telephone handset).

Extended commands allow more sophisticated control of the modem such as transmission speed, or initiating high-level functions like data compression or error correction. These functions are defined and controlled by the available protocols mentioned above. A protocol is a set of standards by which data communications operate.

Every AT command includes an "AT" prefix, followed immediately by the command and, in many cases, additional parameters. Multiple commands can be entered at the same time from your communications software.

AT Command[parameter) [parameter] ...
PRESS ENTER

Example: ATH or ATH0 tells the modem to disconnect

Extended commands were developed to provide greater functionality and control over modem operations. Their format is the same as the basic command except that an additional parameter is required following the AT prefix and before the numerical parameter. This additional parameter comes in three different forms:

the *ampersand* (**&**) character:	extended AT command
the *backslash* (\) character:	extended AT command for MNP
the *percent* (%) character:	extended AT command for V.42/V.42bis

Examples: **AT&V** tells the modem to display (view) its current configuration and user profile.

AT\G1 enables flow control. 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.

AT%E1 tells the modem to monitor line quality and request a "retrain" (adjustment) to the connection.

S-Registers

Modem command "language" also employs a set of indicators or registers, which are various numerical values all with a standard "S" prefix, hence S-Registers. To a large extent, the values defined in the S-Registers regulate the operation of the modem and the function of some commands in the AT command set.

Example: S-Register 6, or S6=n, defines the length of time the modem will wait for a dial tone. In this case the acceptable range is 3-6 (in seconds) with a default value of 5. With S6=3, the modem will wait three seconds for a dial tone when going off-hook before dialing the first digit of its telephone number.

Data Communication Protocols

This can be more than a little confusing. These protocols represent various domestic and international standards which enhance modem performance and reliability. The protocols are activated and controlled by a variety of extended AT commands and S-Registers.

MNP stands for Microcom Networking Protocol and is a protocol developed by Microcom for full-duplex, error-free communications. This protocol detects and corrects errors which can result from telephone line noise and other signal distortions. There are several classes of MNP operation also referred to as service classes. Class 5 maximizes data transfer rate and provides compression which can significantly increase data throughput.

The "V-Dot" standards are more numerous, but have a single origin: the International Telecommunications Union Telecommunications Standards Sector (formerly the Consulting Committee for International and Telephone and Telegraph or CCITT). Some of the lower-level standards such as V.21 and V.22 have "domestic" equivalents as developed by the former Bell System, also referred to as Bell standards. The "V.Dot" standards may be summarized as shown on the following page.

V.21 The CCITT standard for 300bps communications. Domestic modems follow the Bell 103 standard, but V.21 can accept international calls at 300bps.

V.22 The CCITT standard for 1200bps communications. The domestic equivalent is the Bell 212A standard.

V.22bis The CCITT standard for 2400bps.

V.23 CCITT for 1200bps with a 75bps back channel. This is mostly used in Europe and South America.

V.24 CCITT serial interface standard (EIA/RS232-D).

V.32 CCITT standard for 9600bps and 4800bps communications.

V.32bis CCITT standard for an extensive range of high-speed modems operating at 14,400bps, 12Kbps, 9600bps, 7200bps, and 4800bps.

V.42 CCITT standard for detection and negotiation for LAPM (Link Access Procedure for Modems) error control. V.42 will also support MNP levels 2-4.

V.42bis An extension of V.42 specifying the data compression protocol for use with V.42.

Appendix F: AT Command Reference

Note: An asterisk (*) denotes factory default settings.

Command   Description (Default)

A/   Repeat Last Command: (none)

This command re-executes the last 'AT' command string stored in the command buffer. The A/command is the only command not preceded by 'AT' and ended by a carriage return.

A   Answer Command: (none)

This command causes the modem to immediately go off-hook and initiate an Answer Mode handshake without waiting for an incoming ring signal. This command is useful for manually answering a call or establishing back-to-back connection with an Originate Mode modem.

Bn   Select CCITT or Bell: (1)

This command selects whether the modem is configured as a CCITT or BELL modem.

n = 0   Selects CCITT V.22 when the modem is at 1200 bps.
n = 1   Selects Bell 212A when tile modem is at 1200 bps, and Bell 103J when tile modem is at 300bps.*

Cn   Carrier Control Option: (1)

This command is reserved for selecting between Controlled Carrier or Constant Carrier Modes. This modem supports only Constant Carrier Mode.

n = 0   Transmit career always off (returns an ERROR message)
n = 1   Normal transmit carrier *

D   Dial Command: (none)

This command causes the modem to immediately go off-hook as an originating modem and dial a telephone number with corresponding dial modifiers. Dial modifiers are parameters that define how the modem should dial the telephone number.

Dial Modifiers:
0 to 9 Dialing Digits
A, B, C, Tone Dial Characters
D,*,#

P   Pulse Dial: Configures the modem to use pulse dialing to dial a telephone number.

R   Reverse Originate Mode: Places the modem in Answer Mode. This modifier should be the last character in the dialing string (e.g., ATDT 123-45678 R)

S=n   Dial NVRAM Telephone Number: Causes the modem to dial a telephone number previously stored in the NVRAM with the AT&Zn = x command.

T   Tone Dial: Configures the modem to use DTMF tones to dial a telephone number.

W   Wait for Dial Tone: Causes the modem to look for dial tone for a specified amount of time. if dial tone or the amount of time specified by the S-Register S6 times-out, the modem will then process the next command in the dial string. If a busy signal is detected, the modem will respond back to the DTE with a busy response code, and then go into Off-line Command Mode.

,   Pause: Causes the modem to pause or delay implementing the next parameter in the dial string by the time specified inS-Register S8.

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!   Flash Hook: Causes the modem to go on hook for 0.75
           seconds.

@   Wait for Quiet Answer: Causes the modem to wait for   specified
           amount of time (S-Register S7) followed by 5 seconds of
           silence before processing the next dial modifier.

;   Return to Idle State: Causes the modem to enter On-line
           Command Mode without initiating a data modem handshake
           (used for phone directory auto-dialers).

-()   Ignored by Modem: These four characters are ignored by the
           modem, but space may be included in the dial string for
           separating area codes and numbers.

En   Command Mode Echo: (1)

This command selects whether the modem echoes 'AT' commands back
to the host in either On-line or Off-line command Mode.

n = 0   Echo disabled
n = 1   Echo enabled *

Fn   On-line Echo: (1)

This command is normally used to select whether the modem echoes
data back to the host during On-line Data Mode. This device set does not
support On-line Data Mode echo.

n = 0   Echo enabled (returns an ERROR message)
n = 1   Echo disabled *

Hn   Switch Hook Control: (0)

This command is used to control the telephone line relay (OHREL*) and
causes the modem to either hang-up or pick-up the telephone line.

n = 0   Hang-up telephone line (go on-hook)*
n = 1   Pick-up telephone line (go off-hook)

In   Identification/Checksum Option: (0)

This command causes the modem to send product code and hardware setup information to the DTE.

n = 0   **Report product code ***
n = 1   Firmware version #
n = 2   Verify ROM checksum
n = 3   Device set name

n = 4   Modem configuration
        Bit 0   0 = Hayes Escape Sequence
                  1 = TIES Escape Sequence
        Bit 1   0 = Data/fax/voice without V.42/MNP
                  1 = Data/fax/voice with V .42/MNP
                      firmware
        Bit 2   0 = Serial host interface
                  1 = Parallel host interface
        Bit 3   0 = No external Static RAM present
                  1 = External Static RAM present
        Bit 4   0 = 8K x 8 static RAM present (valid only if Bit 3 = 1)
                  1 = 32K x 8 static RAM present (valid only if Bit 3 = 1)
        Bits 5-7 Reserved

Kn   Buffer Control: (1)

This command selects whether the modem SRAM is used for Voice and Fax Mode.

n = 0   SRAM Buffer disabled (default when no SRAM is available)
n = 1   **SRAM Buffer enabled (default when the SRAM is available on modem board)***

Ln   Speaker Volume Control: (2)

This command selects the modem speaker volume.

n = 0   Low speaker volume
n = 1   Low speaker volume

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n = 2   Medium speaker volume *
n = 3   High speaker volume

Mn   Speaker Control: (1)

This command specifies when the speaker is turned on and off.

n = 0   Speaker always off
n = 1   Speaker on until carrier present *
n = 2   Speaker always on
n = 3   Speaker off during dialing, and on until carrier detect

---

Nn   Select Data Rate Handshake: (1)

This command specifies whether the resulting modem-to-modem data
rate can be different than the local DTE-to-modem data rate.

n = 0   When originating or answering, handshake only at the DTE-to-
         modem data rate.
**n = 1   When originating or answering, begin handshaking at the
         DTE-to-modem data rate. If the remote modem does not
         support the local DTE-to-modem data rate, fall down to the
         highest compatible data rate.***

On   Go On-line: (0)

This command causes the modem to return back to On-line Data Mode
from On-line Command Mode.

n = 0   Returns the modem to Data Mode.*
n = 1   Begins an equalizer retrain sequence, then returns to Data
         Mode. This parameter is only valid for 2400-bps connections.

P   Select Pulse Dialing: (none)

This command configures the modem to use pulse dialing next time the
modem dials a telephone number.

Qn   Result Code Display Control: (0)

This command selects whether the modem will send result codes to the DTE.

n = 0   **Result codes enabled***
n = 1   Result codes disabled

Sn   Select an S-Register: (none)

This command is used to select the current S-Register. Range: 0-30

Sn=x   Write to an S-Register: (none)

This command is used to write a decimal number 'x' to S-Register 'n'.

n = 0-30
x = 0-255

Sn?   Read an S-Register: (none)

This command is used to read a decimal number from S-Register 'n'.

n = 0-30

T   Select Tone Dialing: (none)

This command configures the modem to use DTMF tones next time the modem dials a telephone number.

Vn   Result Code Form: (1)

This command selects whether modem response codes are in either numeric or verbose form.

n = 0   Numeric form
n = 1   **Verbose (text) form. ***

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Xn	Result Code Type/call Progress: (4)

This command determines which modem result codes are enabled. Additionally, this command specifies whether Busy and dial tone detection are enabled or disabled.

n = 0   Result codes 0: 4 enabled. Busy and dial tone detect disabled.
n = 1   Result codes 0: 5, 10 enabled. Busy and dial detect disabled.
n = 2   Result codes 0: 6, 10 enabled. Busy detect disabled and dial tone detect enabled.
n = 3   Result codes 0: 5, 7, 10 enabled. Busy detect enabled and dial tone detect disabled.
n = 4   Result codes 0: 7, 10 enabled. Busy and dial tone   detect enabled. *

Yn	Long Space Disconnect: (0)

This command controls whether the modem will send silence to the remote modem before disconnecting and disconnect after seeing 1.6 seconds of silence from the remote modem.

n = 0   Disables long space disconnect*
n = 1   Enables long space disconnect. The modem disconnects after receiving 1.6 seconds of silence from the remote modem.

Additionally, after receiving an 'ATH0' command, the modem will send at least 4 seconds of silence before hanging up.

Zn	Reset Modem/Recall Stored Profile: (0)

This command causes the modem to go on-hook (hang-up), perform a warm reset, and then load user-configuration profile 'n'— previously stored in the NVRAM—into the active profile. The Zn command must be the last command in command string as all subsequent commands are ignored.

n = 0   Resets the modem and recalls user profile 0*
n = 1   Resets the modem and recalls user profile 1

&Cn   Data Carrier Detect (DCD) Option: (1)

This command controls how the modem functions in relation to the DCD or RLSD Signal.

n = 0   State of carrier from remote modem is ignored. DCD is always on.
n = 1   State of carrier from remote modem is tracked. DCD reflects the state of the received carrier.*

&Dn   Data Terminal Ready (DTR) Option: (2)

This command controls how the modem responds to DTR.

n = 0   In Asynchronous Mode (&Q0), the modem ignores DTR.
n = 1   The modem switches from Data Mode to Command Mode when an on-to-off transition of DTR occurs.
n = 2   An on-to-off transition of DTR causes the modem to go on-hook (hang-up) and disable Auto-answer Mode. Auto-answer Mode (S0 is not equal to zero) is enabled when DTR is turned on.*
n = 3   An on-to-off transition of DTR reinitializes the modem. The reinitialize procedure is identical to the 'Zn' reset procedure.

&F   Load Factory Defaults: (none)

This command loads command and S-Register factory defaults into the active configuration.

&Gn   Guard Tone Option: (0)

This command controls whether the modem will send out guard tones while connected to a remote modem. Guard. tones may be required in some countries but are not needed in the United States. Guard Tones are sent by the answer modem to disable Central Office echo cancelers.

n = 0   Guard tone disabled.*
n = 1   550-Hz guard tone enabled.
n = 2   1800-Hz guard tone enabled.

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&P   Dial Pulse Ratio: (0)

This command determines the make/break (i.e., off-hook/on-hook) ratio during pulse dialing.

n = 0   Make = 39%; Break = 61% for use In the United States. *
n = 1   Make = 33%; Break = 67% for use in the United Kingdom and Hong Kong.

&Sn   Data Set Ready (DSR) Option: (0)

This command controls how the modem treats the DSR Signal.

n = 0   DSR circuit always on *
n = 1   DSR circuit is on during handshaking, off in Test or Idle Modes. DSR is on when carrier is lost.

&Tn   Self-test Command: (0)

This command is used to initiate and terminate loop back tests for testing modem-to-modem and DTE-to-modem data communication integrity.

n = 0   Terminates test in progress *
n = 1   Local analog loop back
n = 3   Local digital loop back
n = 4   Grants RDL request from remote modem
n = 5   Denies RDL request from remote modem
n = 6   Remote digital loop back
n = 7   Remote digital loop back with self-test
n = 8   Local analog loop back with self-test

&U   Disable Trellis Coding: (0)

This command selects whether the modem will transmit and receive modulated 9600 bps carrier with QAM or Trellis encoding for V.32.

Range: n = 0-1
        n = 0   Enabled (Trellis modulation with QAM modulation as a fallback)*
        n = 1   Disabled (QAM modulation only)

&Vn   View Active Configuration and Stored Profiles: (0)

This command causes the modem to send command and S-Register configuration information for the active and stored user profiles to the DTE.

n = 0   Stored profile 0 *
n = 1   Stored profile 1

&Wn   Store Active Profile: (0)

This command causes the modem to store a subset of the active profile command and S-Register configurations into the NVRAM user profile 'n'.

n = 0   Store in user profile 0*
n = 1   Store in user profile 1

&Yn   Select Stored Profile on Power-up: (0)

This command selects the particular stored user profile from the NVRAM that will be loaded into the active profile upon modem power up.

n = 0   Select profile 0*
n = 1   Select profile 1

&Zn=x   Store Telephone Number: (none)

This command stores up to a 38-digit telephone number in to the NVRAM. To dial the stored telephone, use the ATDS=n command.
n=0-3

-Cn   Generate Data Modem Calling Tone: (0)

This command allows the DTE to select whether the modem will send 1300 Hz calling tone when originating a Data Modem connection.

n = 0   Calling tone disabled*
n = 1   Calling tone enabled

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%En   Auto-retrain Control (V.22bis and V.32bis only): (1)

This command controls whether the modern will automatically initiate a modem retrain whenever the Received Data Signal quality falls below a threshold that may affect data reliability. The value for 'n' is stored in the NVRAM, but it is not displayed by the 'AT&Vn' command.

n = 0   Disabled
n = 1   Enabled*

%Gn   Auto Fallforward / fallback Enable (V.32bis only): (0)

This command selects whether the modem will automatically initiate a change to a higher speed or lower speed depending on received signal quality (i.e. Rate Negotiation). The modem always responds to any rate change initiated by the remote modem.

n = 0   Disabled*
n = 1   Enabled

% Q   Line Signal Quality: (none)

This command returns the higher order byte of the EQM value. This information indicates the quality of the telephone line signal. Note that this values will be different for different DAAs.

Range: 0-255

0-7   No Retrain
8-255   Modem performs a Retrain (i.e., if configured for %E1)

V.42 AND MNP DATA MODE 'AT' COMMAND SET

Command   Description (Default)

%An   Set Auto-reliable Fallback Character: (none)

In Auto-reliable Mode (\N3), with Auto-reliable Character Fallback enabled
(\C2), receipt of the fallback character from the line during the V.42
detection phase will cause the modem to switch to Normal Mode. This
allows a remote user with a non-V.42 modem to connect immediately with
a 'V.42 modem. A space or carriage return is usually chosen for the
fallback character.

n = 0-127 (ASCII character)

%Cn   MNP 5 Data Compression Control: (1)

This command controls whether the data sent during the MNP frames is
compressed using MNP Class 5 compression standard. MNP 5 data
compression can improve throughput by as much as 150%.

n = 0   No compression
n = 1   MNP Class 5 compression *

\An   MNP Block Size: (3)

This command specifies the maximum number of data bytes in an MNP
data frame. A smaller frame size may improve throughput on high
impairment (noisy) telephone lines.

n = 0   Max 64 characters
n = 1   Max 128 characters
n = 2   Max 192 characters
n = 3   Max 256 characters *

\Bn   Transmit Break: (none)

This command causes the modem to send a break (Attention Signal), for a duration specified by 'n', to the remote modem. When n = O, the default break length is used.

n = 0-9 Break length in 100 msec

\Cn   Set Auto-reliable Buffer: (0)

In Auto-reliable Mode (\N3), this command determines the fallback method and enables data buffering. The settings for this command are used by the modem during the V.42 detection phase.

n = 0   Does not buffer data. *
n = 1   Buffers data for four seconds until 200 characters have been buffered or SYN character is detected, then switches to Reliable Mode. If the buffer fills, data is passed to serial port.
n = 2   Does not buffer data. Switches to Normal Mode, upon receipt of Auto-reliable Fallback Character and passes it to serial port. This feature is used to allow non-V.42 modems to connect immediately to a V.42 modem without data loss.

\Gn   Set Modem Port Flow Control: (0)

In Normal Mode (\N0 or after fallback), this command enables modem-to-modem flow control using XOFF (13 hex) and XON (11 hex) characters to stop and start transmission between modems, respectively.

n = 0   Disables port flow control*
n = 1   Sets port flow control to XON/XOFF

\Jn   BPS Rate Adjust Control: (0)

If enabled, Use serial-port speed will automatically be changed to the modem-connection speed, forcing the user to change the bps rate of the DTE-to-modem, if needed. If disabled, the serial-port speed is independent of the connection speed, which allows much greater throughput when using error correction and data compression.

---

otherwise only LAPM will be attempted. If configured for -J0 and a protocol connection is not made, the modem will hang up. If configured for -J0 and a protocol connection is not made, the modem will fail back to Speed Buffering Mode.*

n = 4   V.42 Reliable—The modem attempts to negotiate LAPM error correction, hanging up if it fails.

NOTE: 300 bps does not support synchronous operation. The modem will automatically fall back to MNP asynchronous operation.

\O   Originate Reliable Link: (none)

In Normal Mode (\N0), the modem will attempt to originate an MNP link, regardless of whether the modem originated or answered the telephone call (physical connection). The remote modem must answer the MNP link request for the link to be established (refer to the \U command).

\Qn   Set Serial Port Flow Control: (3)

This command specifies the DTE-to-modem flow control. Software flow control uses the XOFF (13 hex) and XON (11 hex) characters to stop and start data transmission, respectively, both to and from the DTE. Unidirectional hardware flow control uses the CTS control line to stop/start data from the DTE only, while bi-directional hardware flow control also uses the RTS control to stop/start data from the modem.

n = 0   Disables flow control
n = 1   XON/XOFF software flow control
n = 2   Unidirectional hardware flow control
n = 3   Bi-directional hardware flow control *

\Tn   Set Inactivity Timer: (0)

During a normal or reliable connection, if no data is sent or received within the inactivity time period, the link will be disconnected. The default of zero disables this feature.

n = 0-90 Length in minutes
n = 0 Disables Inactivity Timer

\U   Accept Auto-reliable Link: (none)

In Normal Mode (\N0), the modem attempts to answer an MNP link request, regardless of whether the modem originated or answered the telephone call (physical connection). The remote modem must originate the MNP link request for the link to be established (refer to the \O command).

\Vn   Modify Result Code Form: (0)

This command specifies which modem response codes are supported.

n = 0   Enables codes defined by ATV command*
n = 1   Enables modified MNP codes
n = 2   Enables extended V.42 codes

\Xn   Set XON/XOFF Pass-through: (0)

If software flow control is enabled (\Q1), this command defines whether the XON (11 hex) and XOFF (13 hex) characters received from the DTE are sent to the remote modem, In addition, if the modem port flow control is enabled (\G1) In Normal Mode, the command specifies whether the XON and XOFF characters received from the remote modem are sent to the DTE, In both cases, flow control operation is not affected.

n = 0   Processes flow control characters*
n = 1   Processes flow control characters and passes them
            through to the local or remote so they can process
            the characters.

\Y   Switch to Reliable Mode: (none)

In Normal Mode (\N0), the modem attempts to originate or answer an MNP link request, depending on whether the modem originated or answered the physical connection, respectively. The remote modem must attempt to answer/originate the MNP link for the link to be established.

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\Z   Switch to Normal Mode: (none)

During an MNP link, the modem will disconnect the link (exit error correction/data compression) and change to Normal Mode, without disconnecting the modem-to-modem connection.

-Jn   Set V.42 Detect Phase: (1)

In V.42 Modes (\N3, \N4), this command specifies whether the modem will detect V.42, MNP, or no error-correcting protocols from the remote modem and change to the appropriate mode. Otherwise, only LAPM will be attempted.

n = 0   Disables the V.42 detect phase
n = 1   Enables the V.42 detect phase*

"Hn   V.42bis Compression Control: (3)

This command specifies whether the data in the LAPM frames are compressed using the V.42 his data compression, which can improve throughput by as much as 400%. Compression can be negotiated to operate in only one direction, or in both directions.

n = 0   Disables V.42bis
n = 1   Enables V.42bis only when transmitting data
n = 2   Enables V.42bis only when receiving data
n = 3   Enables V.42bis for both transmitting and receiving*

"On   V.42bis String length: (16)

This command specifies the maximum number of characters that can be compressed into one V.42bis codeword. The default value of 16 optimizes throughput for most file types.

n = 6-250 = Number of characters

S-Registers

Command   Description (Default)

S0   Number of Rings to Auto-answer On: (0)

Assigning S0 a value from 1 to 255 configures the modem for Auto-
answer Mode. The modem will automatically go off hook and initiate a
Data Mode Answer Mode handshake after detecting the specified
number of rings.

Range: 0-255 rings
n = 0   Auto-answer Mode disabled*
n = 1-255   Auto-answer Mode enabled

S1   Ring Count: (0)

Reports the number of ring signals detected by the modem. This register
is cleared to zero if no ring signals are detected within an eight second
time interval.

Range: 0-255 rings
Default: 0 rings

S2   Escape Character: (43)

S2 specifies ASCII value for the Hayes and TIES escape character. The
factory default is '+' or ASCII decimal 43. The escape character may
range between 0-127. Any value over 127 will disable the escape
sequence.

Range: 0-127
Default: 43 ('+')

S3   Carriage Return Character: (13)

S3 specifies the 'AT' command string terminator and modem response
code terminator. The factory default is a <CR>, or carriage return (ASCII
decimal 13).

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Range: 0-127
Default: 13 (carriage return)

S4   Line Feed Character: (10)

S4 specifies the line feed character. The line feed character is
used for verbose (text) modem result codes.

Range: 0-127
Default: 10 (line feed)

S5   Backspace Character: (8)

S5 specifies the backspace character that is used m delete the
last-entered character. After receiving a backspace character,
the modem sends three characters to the DTE: a backspace character, a
space character and then another backspace character.

Range: 0-32, 127
Default: 8 (BS)

S6   Wait Before Blind Dialing: (2)

S6 specifies the amount of time after the modem goes off-hook before
the modem starts dialing the first telephone number. The modem waits
for at least 2 seconds, even if S6 is set for a value less than 2, before
dialing the first number. S6 is only used for Result Code Type commands
X0, X1, X3 (i.e., Blind Dialing Result Code Types). The 'W' (wait for dial
tone) dial modifier causes the modem to ignore the contents of S6.
Result Code Types X2 and X4 enable dial-tone detection, and never use
S6.

Range: 2-255 seconds
Default: 2 seconds

S7   Wait for Carrier/Dial tone: (60)

S7 specifies the amount of time that the modem waits to detect the remote modem carrier aver dialing the telephone number. If the remote modem carrier is not detected within the So time limit, the modem will hang-up and send a NO CARRIER response code to the DTE. If the remote modem carrier is detected, the modem goes into On-line Data Mode and sends a CONNECT message to the DTE. S7 also specifies the time duration for the 'W' (walt for dial tone) dial modifier. Range: 1-255 seconds

S8   Pause Time for Dial Modifier: (2)

S8 specifies the amount of time that the modem will pause during the dialing process each time the ',' dial modifier is detected in the dialing string.

Range: 0-255 seconds
Default: 2 seconds

S9   Carrier Detect Response Time: (6)

S9 specifies how long the remote modem carrier must be present on the telephone line before the modem will detect it and turns on DCD. The greater the time duration, the less likely that a false carrier detection will occur due to noise on the telephone line.

Range: 1-255 (10ths second)
Default: 6 (10ths seconds)

S10   Lost Carrier Hang Up Delay: (14)

S10 specifies amount of time the modem waits before hanging up after the loss of the remote modems carrier. This delay allows for the temporary loss of remote modem carrier without causing the local modem to hang up. When set to 255, the modem will not disconnect upon loss of remote modem carrier.

Range: 1-255 (10ths second)
Default: 14 (10ths second)

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S11   DTMF Dialing Speed: (95)

S11 specifies the duration of dual-tone multi-frequency (DTMF) dialing.
This register is not used for pulse dialing.

Range: 50-255 milliseconds
Default: 70 milliseconds

S12   Guard Time: (50)

S12 is used to specify guard and detect times used for the Hayes and
TIES Escape Sequences.

For the Hayes Escape Sequence, S12 specifies the Minimum-delay
Timer (or guard time) required before and after the three escape
character before the modem will detect the Hayes Escape Sequence.

For the TIES Escape Sequence, S12 specifies the maximum time limit
after receiving the three escape characters and no other characters
before sending an OK message to the DTE.

Range: 0-255 (50ths second)
Default: 50 (50ths second)

S13   Reserved (none)

S14   Bit-mapped Options: (none)

S14 is a read-only register that indicates 'AT' command
settings.

Bit 0		Reserved
Bit 1	0	E0 is selected
	1	**E1 is selected***
Bits 6,2	0	V0 is selected
	1	**V1 Is selected***
Bit 4	0	Dumb Mode off (normal)
	1	Dumb Mode on
Bit 5	**0**	**T is selected***
	1	P is selected
Bit 7	0	Answer
	1	**Originate***

S15   Reserved (none)

S16   Modem Test Options: (none)

S16 indicates the test in progress. The ECLED serial LED driver will pulse on and off whenever the modem is performing a test with the serial host interface.

Bit 0	**0**	**Local analog loopback disabled ***
	1	Local analog loopback enabled (&T1)
Bit 1	0	Reserved
Bit 2	**0**	**Local digital loopback disabled ***
	1	Local digital loopback enabled (&T3)
Bit 3	**0**	**Remote digital loopback off ***
	1	Remote digital loop back in progress (&T6)
Bit 4	**0**	**RDL not active ***
	1	RDL request from distant end is in service
Bit 5	**0**	**Remote digital loop back with self-test disabled ***
	1	Remote digital loop back with self-test enabled (&T7)
Bit 6	**0**	**Analog loop back with self-test disabled ***
	1	Analog loop back with self-test enabled (&T8)
Bit 7	0	Reserved

S17   Reserved (none)

S18   Modem Test Timer: (0)

S18 specifies the amount of time that the modem will conduct one of the loop back tests (&Tn). After timing out, the modem returns back to Command Mode. Setting S18 to zero disables the Modem Test Timer; the loop back test must be terminated by issuing the appropriate escape sequence followed by an 'AT&T0' or 'ATH'.

Range: 0-255 seconds
Default: 0 seconds

S19 -S20   Reserved (none)

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S21   Bit-mapped Options: (none)

S21 is a read-only register that indicates 'AT' command settings.

Bit 0	**0**	**&J0 is selected***
	1	&J1 is selected
Bit 1		Reserved
Bit 2	**0**	**&R0 is selected***
	1	&R1 is selected
Bit 4,3	00	&D0 is selected
	01	&D1 is selected
	10	**&D2 is selected***
	11	&D3 is selected
Bit 5	0	&C0 is selected
	1	**&C1 is selected***
Bit 6	**0**	**&S0 is selected***
	1	&S1 is selected
Bit 7	**0**	**Y0 is selected***
	1	Y1 is selected

S22   Bit-mapped Options: (none)

S22 is a read-only register that indicates 'AT' command settings.

Bit 1,0	00	Reserved
	01	L1 is selected
	10	**L2 is selected***
	11	L3 is selected
Bit 3,2	00	M0 is selected
	01	**M1 is selected***
	10	M2 is selected
	11	M3 is selected
Bit 6,5,4	000	X0 is selected
	001	Reserved
	010	Reserved
	011	Reserved
	100	XI is selected
	101	X2 is selected
	110	X3 is selected
	111	**X4 is selected***
Bit 7	**0**	**&PO Is selected***
	1	&PI is selected

S23   Bit-mapped Options: (none)

S23 is a read-only register that indicates 'AT' command
settings.

Bit 0	0	&T5 is selected
	1	**&T4 is selected ***
Bit 3,2,1	000	0-300 bps communications rate
	001	1200bps
	010	2400 bps
	011	4800 bps
	100	7200 bps
	101	9600bps
	110	19.2kbps
	111	38.4 kbps
Bit 5,4	00	Even parity *
	01	Space parity/no parity
	10	Odd parity
	11	Mark
Bit 7,6	00	&G0 is selected *
	01	&G1 is selected
	10	&G2 is selected
	11	Reserved

S24   Reserved (none)

S25   Detect DTR Change: (5)

S25 is used for two purposes. When the modem is operating in
Synchronous Modes 1 or 4, the value assigned to S25 is equal to the
length of time that the modem waits after a connection has been
established before examining the DTR Signal from the DTE. This allows
the modem to ignore on-to-off transition of DTR and gives the user
sufficient time to disconnect an asynchronous terminal and connect a
synchronous terminal, without causing the modem to return back to
Asynchronous Command Mode. In this mode of operation, the value
specified in S25 is defined in seconds.

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In all other modes, and after establishing a call in Synchronous Modes 1 and 4, the value specified in S25 is defined in 11100 seconds. In any mode, a change in DTR (i.e., ON-to-OFF transitions) that persists for a shorter time than the valued specified in S25 is ignored by the modem while in On-line Data Mode.

Range: 0-255 (100ths second if On-line or On-line Command State)
       0-255 (1 second otherwise) Default: 5

S26   RTS to CTS Delay Interval: (1)

S26 is only used for synchronous operation. This register, when the modem is configured for &R0, specifies the time delay between an off-to-on transition on RTS and turning CTS on.

Range: 0-255 (100ths second)
Default: 1 (100ths second)

S27   Bit-mapped Options: (none)

S27 is a read-only register that indicates 'AT' command settings.

Bit 3,1,0	000	&Q0 is selected*
	001	&Q1 is selected
	010	&Q2 is selected
	011	&Q3 is selected
	100	&Q4 is selected
	101	not used
	110	not used
	111	not used
Bit 2	0	&L0 is selected*
	1	&L1 is selected
Bits 5,4	00	&X0 is selected*
	01	&X1 is selected
	10	&X2 is selected
	11	reserved
Bit 6	0	B0 is selected
	1	B1 is selected*
Bit 7	Reserved	

S28-S29   Reserved (none)

S30   Sleep Mode Timer: (10)

S30 determines when the modem enters Sleep or Powerdown Mode. When enabled (S30 <> 0), the DSuP will enter Sleep Mode whenever the modem has been inactive for a user-programmable time delay (S30). The modem is considered to be in an inactive state when:

1) No internal processing is being performed;
2) There is no activity between the host and the modem within a specified time period;
3) The modem is off-line.

The modem exits Sleep Mode whenever the host rems or writes to the modem, or a ring signal is detected. Sleep Mode is disabled by setting S30 to zero.

Range: 0-90 seconds

S37   Maximum Line Speed Attempted: (0)

This S-register selects the maximum line speed allowable (i.e., the modem will attempt to connect at this speed or fallback to a lower speed). Note that S37 has no effect during V.32bis retraining/rate negotiation.

Range: n = 0-11
        n = 0   DTE rate
        n = 1   Reserved
        n = 2   Reserved
        n = 3   300
        n = 4   Reserved
        n = 5   1200
        n = 6   2400
        n = 7   4800
        n = 8   7200
        n = 9   9600
        n = 10   12000
        n = 11   14400

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S90   Disconnect Inactivity Timer: (0)

This S-register sets the length of time, in minutes, that the modem will stay on-line/off-hook before disconnecting when no data is transmitted or received. In data and fax modes, any data transmitted or received between the DTE-DCE interface will reset the timer. In all other modes except Telephone-emulation mode, any data transmitted will reset the timer. In Telephone-emulation mode, S90 is ignored (i.e., the modem will not automatically hangup the line after a given time delay).

Range: n = 0-255 minutes
         n = 0 Disabled

S108   Retrain Signal Quality Selector: (1)
This S-register selects when the modem should perform a retrain.

Range: n = 0-3
         n = 0   Never retrain
         n = 1   Low Quality - retrain after a large number of data
                  errors
         n = 2   Medium Quality - retrain after a number of data errors
         n = 3   High Quality - retrain after a few data errors

Default: V.32   n = 1   V.32bis n = 2

S109   Line Speeds Permitted: (62)

This bit mapped S-register selects all permitted line speeds. If the speed bit is set to a '1', then the modern is permitted to connect at the specified speed. If the speed bit is set to a '0', then the modem will never connect at the specified speed.

Bit 0	Reserved
Bit 1	4800
Bit 2	7200
Bit 3	9600
Bit 4	12000
Bit 5	14400
Bits 6-7	Reserved

Default: V.32   S109 = 1   Bits 2,4, and 5 not supported
**   V.32bis S109 = 62**

RESPONSE CODES

Basic Response Codes (W0)

Numeric Verbose
Code   Code

Numeric Code	Verbose Code
0	OK
1	CONNECT
2	RING
3	NO CARRIER
4	ERROR
5	CONNECT 1200
6	NO DIAL TONE
7	BUSY
8	NO ANSWER
10	CONNECT 2400
11	CONNECT 4800
12	CONNECT 7200
13	DATA
14	CONNECT 9600
15	FAX
16	CONNECT 12000
17	CONNECT 14400
+F4	+FCERROR

Modified Response Codes (W1)

22	CONNECT 300/REL
24	CONNECT 1200/REL
25	CONNECT 2400/REL
26	CONNECT 4800/REL
27	CONNECT 7200/REL
28	CONNECT 9600/REL
29	CONNECT 12000/REL
30	CONNECT 14400/REL

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V.42 Extended Response Codes (W2)

Numeric Code	Verbose Code
32	CONNECT 300/REL-MNP
34	CONNECT 1200/REL-MNP
35	CONNECT 2400/REL-MNP
36	CONNECT 4800/REL-MNP
37	CONNECT 7200/REL-MNP
38	CONNECT 9600/REL-MNP
39	CONNECT 12000/REL-MNP
40	CONNECT 14400/REL-MNP
42	CONNECT 300/REL-MNP5
44	CONNECT 1200/REL-MNP5
45	CONNECT 2400/REL-MNP5
46	CONNECT 4800/REL-MNP5
47	CONNECT 7200/REL-MNP5
48	CONNECT 9600/REL-MNP5
49	CONNECT 12000/REL-MNP5
50	CONNECT 14400/REL-MNP5
54	CONNECT 1200/REL-LAPM
55	CONNECT 2400/REL-LAPM
56	CONNECT 4800/REL-LAPM
57	CONNECT 7200/REL-LAPM
58	CONNECT 9600/REL-LAPM
59	CONNECT 12000/REL-LAPM
60	CONNECT 14400/REL-LAPM
64	CONNECT 1200/REL-LAPM V.42bis
65	CONNECT 2400/REL-LAPM V.42bis
66	CONNECT 4800/REL-LAPM V.42bis
67	CONNECT 7200/REL-LAPM V.42bis
68	CONNECT 9600/REL-LAPM V.42bis
69	CONNECT 12000/REL-LAPM V.42bis
70	CONNECT 14400/REL-LAPM V.42bis

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Publication Date: September, 1995
Printed in the U.S.A.

M144PA.PM5

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RESEARCH INC

Manual Part No. 9401

Rev. 5.1