

SoundExpression 14.4VSp



Sound



Fax



Voicemail



Speakerphone

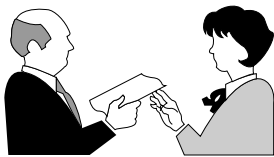


Data

USER GUIDE

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 your 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.



Technical Support
407-241-8088



Technical Support Fax
407-997-0918



Boca BBS
407-241-1601



**Automated Fax Retrieval
System**
407-995-9456



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



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.

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Using The SoundExpression (SE1440) Installation and User Guide

This manual provides installation and operating instructions for this product. The manual assumes you have basic computer skills and are familiar with personal computers. The manual's primary purpose is to provide physical installation instructions, instructions for configuring the board, and basic troubleshooting.

Our 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 to make use of the card's modem functions. For Windows sound applications, refer to the documentation for your sound applications.**

IMPORTANT NOTE: The SoundExpression board REPLACES your existing sound card (if any) and your existing modem (if any). If you require assistance, contact the provider of that device.

How This Manual is Organized.

Section One: Introduction. An overview of the features of the SE1440, along with system requirements.

Section Two: Installing Your New SE1440. This section provides detailed hardware installation instructions, including diagrams of the SE1440's connectors and jumper blocks and explanations of how to make all connections to other devices.

Section Three: Driver Installation. Explains how to run the COMCHECK utility and install the drivers for Windows and DOS.

Section Four: Modem Functions and Features. Describes modem features and provides procedures for testing the modem's connection.

Section Five: Troubleshooting. Provides solutions to common problems for both sound and modem functions.

Appendices. These include technical specifications, configuration settings, microphone and speaker requirements, as well as instructions for installing a wave table card. Notes on the MIDI interface, digital sound, and Windows Sound System are also included. A modem AT command reference, modem and audio glossaries, FCC and DOC (Canada) compliance information, and servicing and warranty policies complete this section.

Section One: Introduction

The SoundExpression by Boca Research provides a digital sound controller and CD-ROM interfaces for multimedia PC applications. It also provides speaker phone capability, integrated with a 14.4Kbps internal modem for high-speed data and fax communications and voicemail. This unique design offers multiple functionality all in a single-board solution.

1.1 Summary of Features

- Integrated sound controller compatible with Sound Blaster Pro, Ad Lib, and Microsoft Windows Sound System. Speaker phone capability.
- 16- or 8-bit stereo and mono sound
- Sample rates up to 44.1KHz
- Built-in sound blaster-compatible digital audio processor.
- Sound controller (software-configurable only).
- Jumpers to configure modem and enable/disable an IDE CD-ROM
- Software-programmable CD-ROM interface for Sony, Mitsumi, Panasonic, and IDE CD-ROM drives.
- Software enable/disable of game (joystick) port.
- Low-cost 16-bit audio.
- Unique 2-in-1 combination of data communications and audio applications.
- 14.4Kbps fax/data/voice modem with speaker phone and 16C550 UART.

- Class 1/Group 3 14.4Kbps send/receive fax
- 14.4Kbps send/receive data
- V.42 and MNP2-4 error control
- V.42bis and MNP5 data compression.

1.2 System Requirements

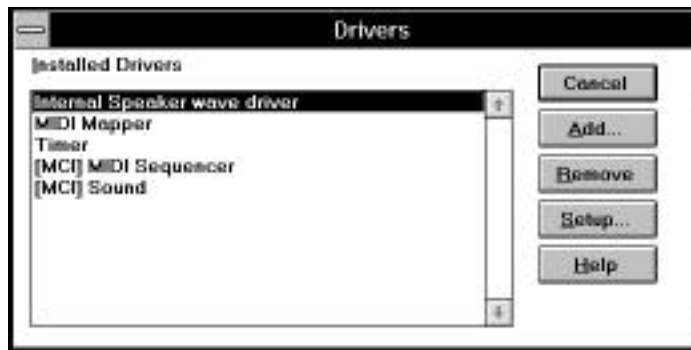
- IBM-compatible computer models 386 DX/33, 486, or Pentium.
- 4MB RAM minimum.
- VGA or SVGA display.
- 15MB of free hard disk space for installing all software.
- Windows 3.1 enhanced mode (if you intend to run games and applications in Windows).
- DOS 5.0 or later.

Section Two: Installing Your New SE1440

This section explains how to install the SE1440 in your computer. Remember to remove any existing sound or modem cards **BEFORE** installing the SE1440.

2.1 Removing an Existing Sound Card or Modem

1. Turn on your computer and start Windows, go to the Main group, select Control Panel and select Drivers. Here you will see a list of device drivers present in your computer.



2. Remove the sound card drivers from the drivers list. Highlight the sound drivers and click on “remove.” If you are not sure which drivers are for your sound card, refer to the documentation that came with your sound card or your computer system.

3. Turn off your computer and remove the sound card from the system.

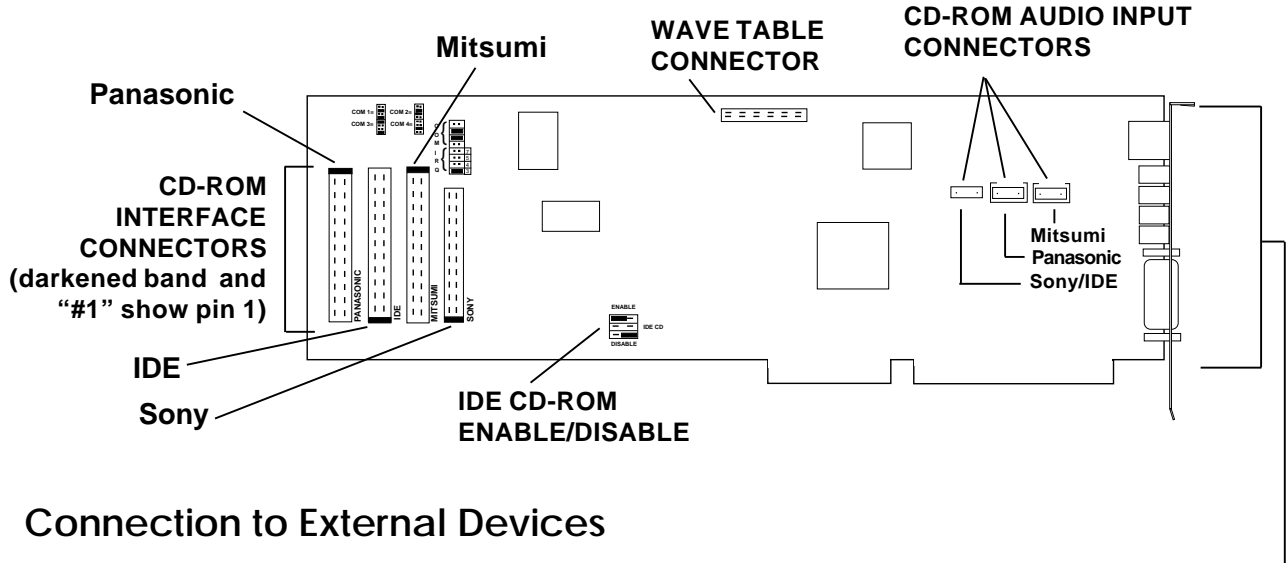
Replacing an Existing Modem

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 manual’s documentation for specific instructions.

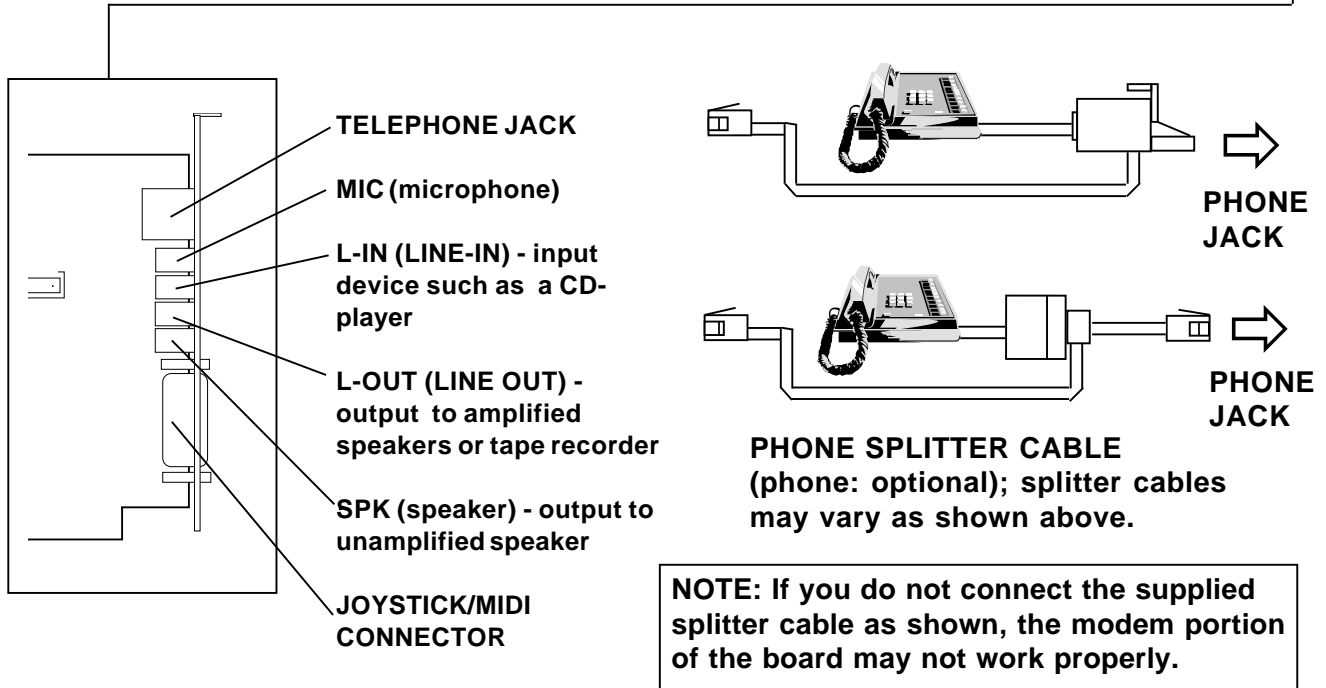
Now, you are ready to install the SoundExpression 14.4.

2.2 Review Board Connectors

Connection to Internal Devices



Connection to External Devices

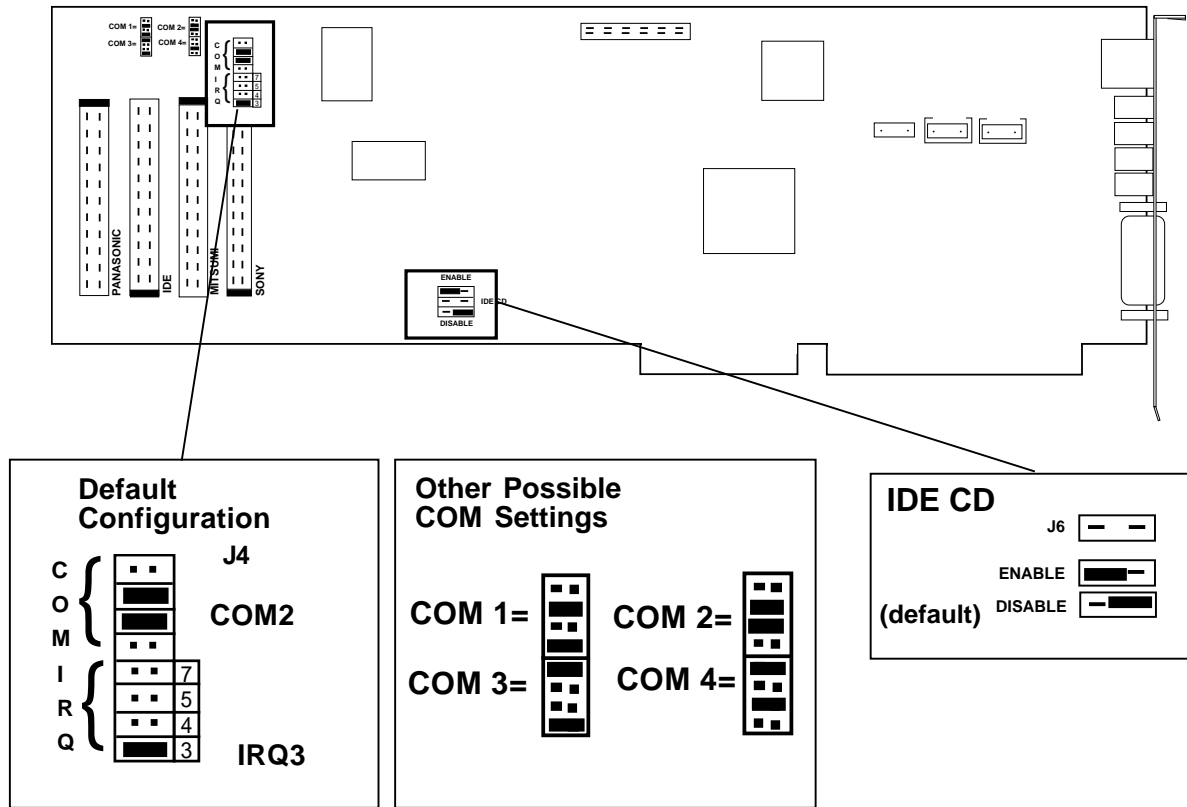


2.3 Installing the SoundExpression 14.4

1. Make sure you exit Windows. Then, before physically installing the SoundExpression 14.4 in your computer, run COMCHECK to determine which serial port address is available in your system. Insert the diskette labeled “**SE1440 Driver and Utility diskette 1 of 1**” and type:
A:COMCHECK or **B:COMCHECK**.
2. Read all on-screen instructions and select the option, “**I have not yet installed the SE1440.**”
3. Next, you are asked if you have a CD-ROM drive
 - a. If no, select “**No, I do not have a CD-ROM drive**” and continue with step 4.
 - b. If yes, select “**Yes I have a CD-ROM drive**” you are asked if you are using the SE1440 as the adapter card for the CD-ROM drive.
 1. If you reply “**No**”, continue with step 4.
 2. If you reply “**Yes**”, you are asked for the type of CD-ROM interface you will be using (“**IDE interface**” or “**Any other type...**”); respond to this question and continue with step 4.
4. Follow the on-screen instructions. Write the recommended COM and IRQ settings here: COM____ IRQ____
5. Remove the SE1440 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. Locate the blue or black plastic jumpers as described on the following page.

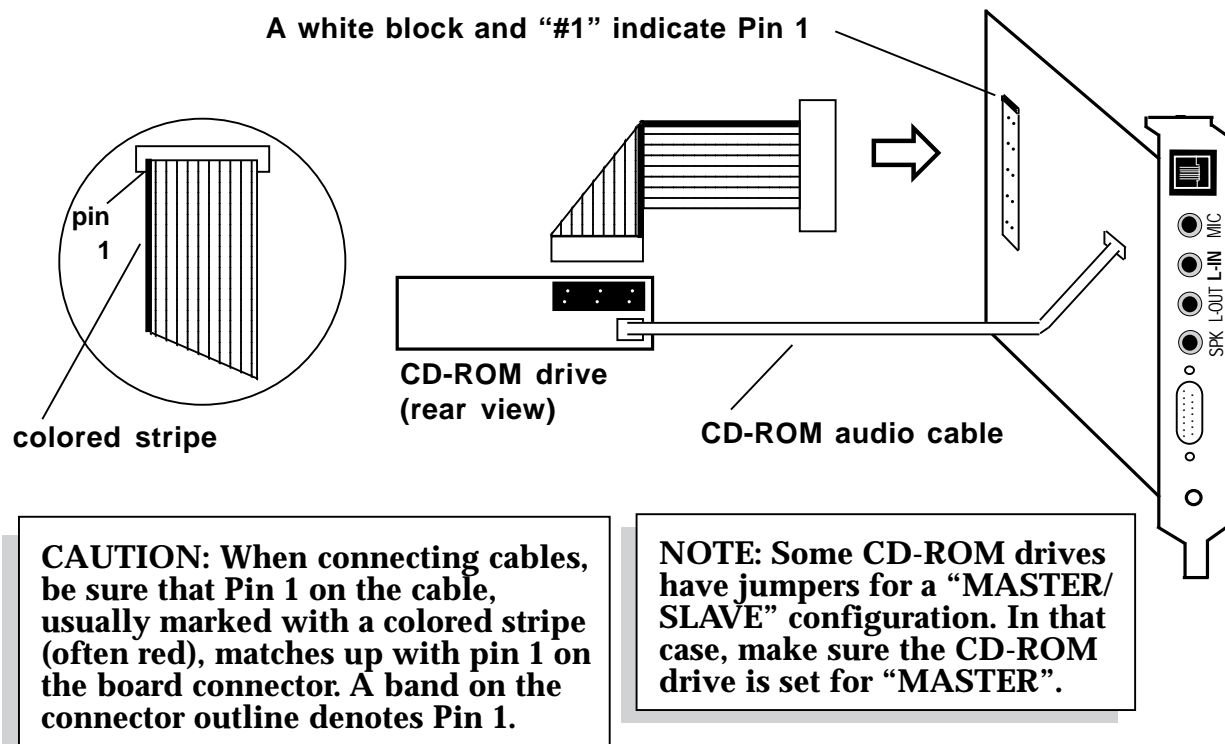
Make sure the jumper settings you just wrote down in step 4 match the jumpers on the SE1440. If not, change them now.

Note: The following diagram shows where the jumper settings are on the board. Normally, you will not need to change these settings unless instructed to do so by COMCHECK. A pair of pins is jumpered when the small plastic sleeve (often blue or black) is fitted over both pins. Jumpers are changed or set by pulling the plastic sleeve up and fitting it on a different pair of exposed pins in the same jumper block.



6. Turn off your computer and disconnect any attached devices and power cords. Remove the diskette. Remove the system cover and install the CD-ROM drive (if you are using one) into your computer system. Refer to the documentation which came with your CD-ROM drive. Otherwise, skip to step 9.

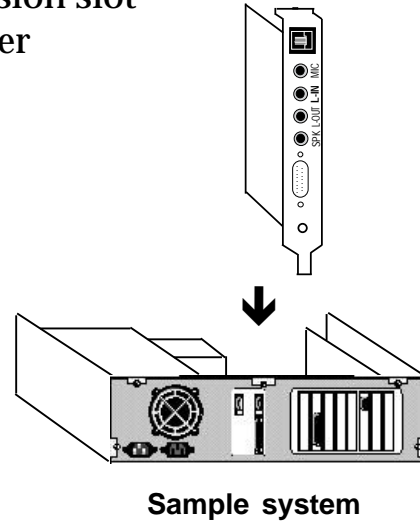
7. Connect the ribbon interface cable from the CD-ROM drive to the appropriate interface connector on the SE1440 before inserting the board into your computer. The connectors are labeled Sony, Mitsumi, IDE and Panasonic. **Note: If your CD-ROM is not listed, consult your CD-ROM documentation to determine which type of connector it emulates. If your CD-ROM drive is any type IDE, use the IDE connector, regardless of the manufacturer. For example, for a Mitsumi IDE CD-ROM drive, use the IDE connector.**
8. If an audio cable is included with your CD-ROM drive, connect it from the CD-ROM drive to the respective CD-ROM sound input connector labeled Sony/IDE, Panasonic, and Mitsumi. For an IDE CD-ROM, use the Sony/IDE connector. **Note: If your CD-ROM manufacturer is not listed, refer to your CD-ROM documentation to determine which sound input connector to use.**



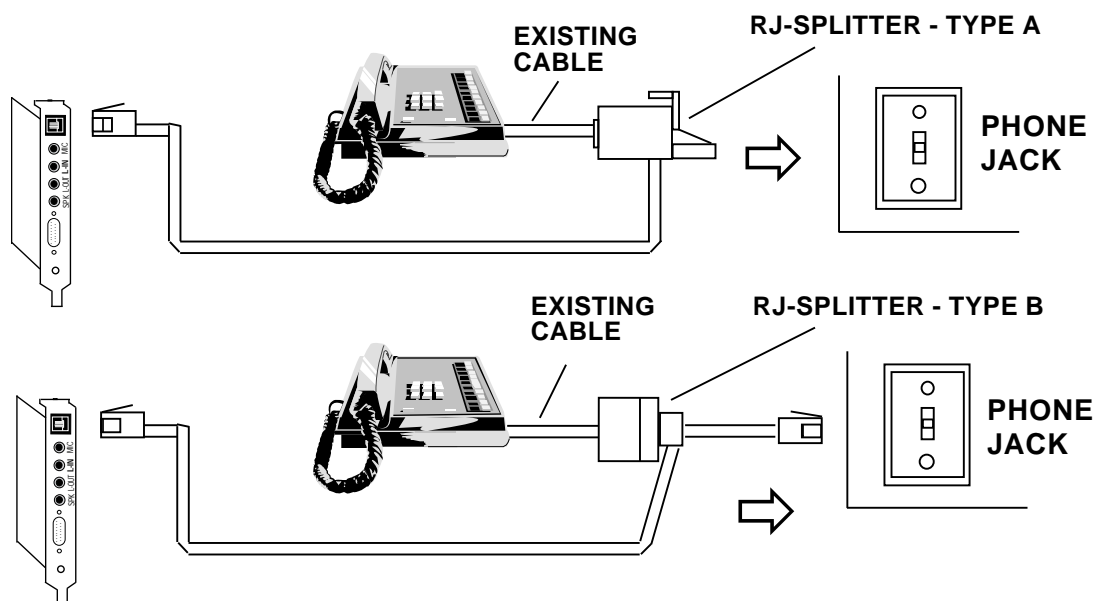
9. Locate an available 16-bit expansion slot located towards the rear of the computer. Remove that expansion slot cover and save the screw.

10. Carefully insert the SE1440 into the expansion slot you selected, applying pressure to the upper board edge until it snaps into place, being careful not to disconnect any CD or audio cables you may have attached.

11. Secure the SE1440 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 9.



12. Disconnect your present phone cord from the wall jack. Plug the end of the splitter/phone cord that came with the SE1440 into the wall jack, and the other end into the phone jack on the back of the SE1440. Plug the phone into the open jack on the splitter/phone cable. **A telephone is not necessary for the proper operation of this product.**



13. Reconnect any detached devices and power cords, and turn on the computer. After re-booting, ignore any error messages that may be a result of an unconfigured CD-ROM drive. Refer to the information you noted at the CD-ROM screen if you need to re-configure your CD-ROM drive.

14. Run COMCHECK again to continue with the installation.
 - A. Insert the diskette labeled “**SE1440 Driver and Utility diskette 1 of 1**” and type: **A:COMCHECK** or **B:COMCHECK**.

 - B. This time select the option, “**I’ve installed the SE1440 and wish to continue.**” Press ENTER. COMCHECK will tell you that it verified configuration.

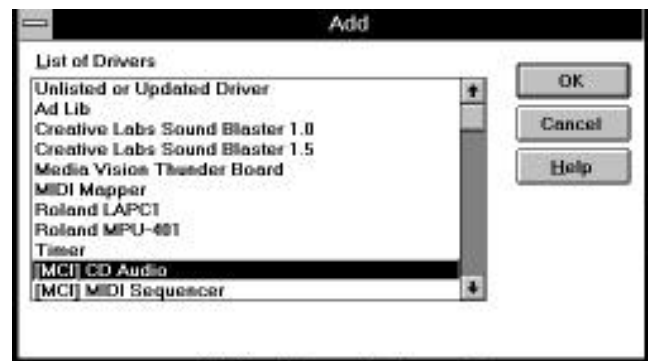
15. Follow the on-screen instructions. Select “**Continue**” to proceed with the setup. For more details on driver installation, see Section Three.

NOTE: If Windows automatically boots up an application when your computer is turned on, you must close that application before the COMCHECK Installation Screen can be viewed.

NOTE: When you come to the Multimedia CD-Audio screen, write down the selected settings for CD type ____ and I/O Address _____. This information may be used to reconfigure an existing CD-ROM driver, or to install the driver supplied by your CD-ROM manufacturer. Refer to the documentation which came with your CD-ROM drive.

16. When SE1440 driver installation is complete, replace the computer cover and reboot your computer. After re-booting, ignore any error messages that may be a result of an unconfigured CD-ROM drive. Refer to the information you noted at the CD-ROM screen if you need to re-configure your CD-ROM drive.

At this time you will need to install the MCI CD Audio driver in order to play musical CDs through Windows. Select Control Panel, then Drivers, then Add.... Highlight the “[MCI] CD Audio Driver” and select OK. You may be asked for your original Windows diskettes in order to copy the driver.



Congratulations! Installation of the SoundExpression 14.4 is complete. See section 2.4 for attaching external audio devices to the SE1440. Then, you may install your communications and audio applications. Refer to the troubleshooting section if you require further assistance.

Note on Installing CD-ROM Drivers: Some CD-ROM drives are shipped with proprietary drivers. If you encountered CD-ROM driver errors at boot-up, it is likely that the drivers which came with your CD-ROM drive are not compatible with the SE1440. For your convenience, we have included a number of non-proprietary CD-ROM drivers. To install one of these drivers, follow the appropriate instructions on the following pages. You may also view the README.TXT file on the Generic CD-ROM driver diskette for additional information which may have become available after the printing of this document.

MITSUMI

MITSUMI CRMC-FX400 Quad Speed IDE CD-ROM and other Mitsumi IDE CD-ROMs.

1. Exit Windows and insert the SE1440 CD-ROM diskette into the A: or B: drive.
2. At the A: or B: prompt type **CD MITSUMI** to go into the Mitsumi directory.
3. At the A:\Mitsumi or B:\Mitsumi prompt, type **IDE133** then press ENTER. This will uncompress the necessary files.
4. At the A:\Mitsumi or B:\Mitsumi prompt, type **SETUPD**, then press ENTER, to start the installation.
5. Press ENTER for instructions in English.
6. Select "**Begin Installation**".
7. Press ENTER to accept the default directory.
8. Re-start your system.
4. At the A:\Mitsumi or B:\Mitsumi prompt, type **SETUP** then press ENTER, to start the installation.
5. Type "Y" to select the MTMCDAS.SYS driver. **DO NOT choose the MTMCDAE.SYS driver.**
6. Press ENTER to accept the default directories.
7. Specify the I/O port address as **340**.
8. Allow the installation to update both your CONFIG.SYS and AUTOEXEC.BAT files.
9. Press ENTER to continue with the default settings.
10. Re-start your system.

MITSUMI CRMC-FX001/001D CD-ROMs.

1. Exit Windows and insert the SE1440 CD-ROM diskette into the A: or B: drive.
2. At the A: or B: prompt type **CD MITSUMI** to go into the Mitsumi directory.
3. At the A:\Mitsumi or B:\Mitsumi prompt, type **FX116** then press ENTER. This will uncompress the necessary files.

PANASONIC

Panasonic CR-562/563 CD-ROMs and other CR-56X series CD-ROMs.

1. Exit Windows and insert the SE1440 CD-ROM diskette into the A: or B: drive.
2. At the A: or B: prompt type **CD PANASONI** to go into the Panasonic directory.
3. At the A:\Panasoni or B:\Panasoni prompt, type **56XDOS** then press ENTER. This will uncompress the necessary files.
4. At the A:\PANASONI or B:\PANASONI prompt, type **INSTALL**, then press ENTER to start the installation.

5. Choose “**Option 3 - Use Interface card except for the above products**”. That is, you will be using the SE1440 as the interface card for the CD-ROM as opposed to one of the other cards listed.
6. Type **340** as the I/O address.
7. Select “**2**” for Express Installation. (If you choose “**1**” for custom, accept all the defaults).
8. Allow the installation to update both your CONFIG.SYS and AUTOEXEC.BAT files.
9. Say “**Yes**”, indicating that the MSCDEX file is located in the C:\DOS directory.
10. Re-start your system.
6. Type **340** as the I/O address.
7. Select “**2**” for Express Installation. (If you choose “**1**” for custom, accept all the defaults).
8. Allow the installation to update both your CONFIG.SYS and AUTOEXEC.BAT files.
9. Say “**Yes**”, indicating that the MSCDEX file is located in the C:\DOS directory.
10. Re-start your system.

Panasonic CR-572B/574B CD-ROMs and other CR-57X series CD-ROMs.

1. Exit Windows and insert the SE1440 CD-ROM diskette into the A: or B: drive.
2. At the A: or B: prompt type **CD PANASONI** to go into the Panasonic directory.
3. At the A:\Panasoni or B:\Panasoni prompt, type **57XDOS** then press ENTER. This will uncompress the necessary files.
4. At the A:\PANASONI or B:\PANASONI prompt, type **INSTALL**, then press ENTER to start the installation.
5. Choose “**Option 3 - Use Interface card except for the above products**”. That is, you will be using the SE1440 as the interface card for the CD-ROM as opposed to one of the other cards listed.

SONY

SONY CDU-55E and other SONY IDE CD-ROMS.

1. Exit Windows and insert the SE1440 CD-ROM diskette into the A: or B: drive.
2. At the A: or B: prompt type **CD SONY** to go into the SONY directory.
3. At the A:\SONY or B:\SONY prompt, type **ATAPI**, then press ENTER. This will uncompress the necessary files.
4. At the A:\SONY or B:\SONY prompt, type **SETUP** then press ENTER, to start the installation.
5. Say “**Yes**” to install the ATAPI_CD.SYS driver.
6. Accept the default directories.
7. Say “**No**” for installation on a Server and changing the Cache size.
8. Re-start your system.

SONY CDU-33A/31A and other SONY interface CD-ROMS.

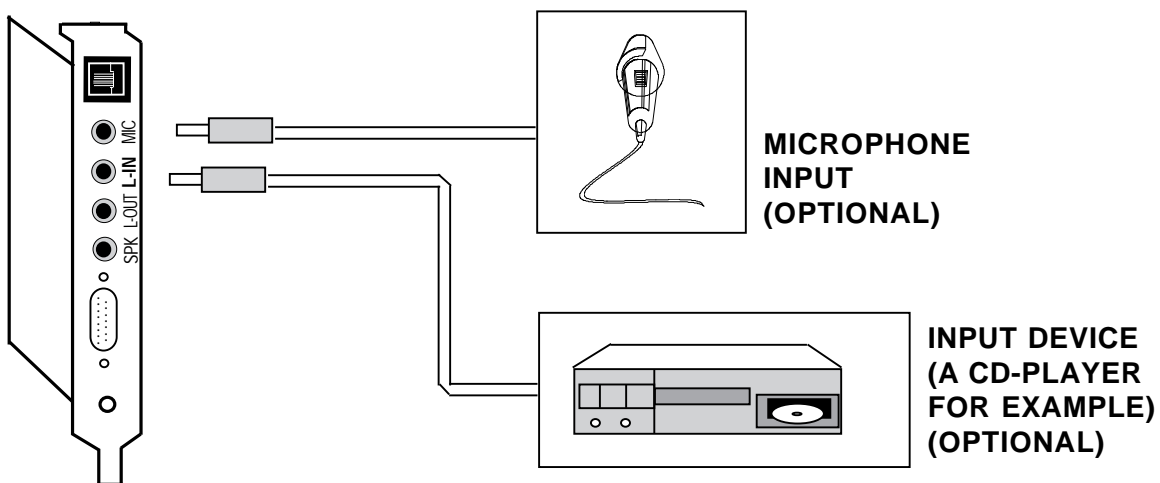
1. Exit Windows and insert the SE1440 CD-ROM diskette into the A: or B: drive.
2. At the A: or B: prompt type **CD SONY** to go into the SONY directory.
3. At the A:\SONY or B:\SONY prompt, type **173A**, then press ENTER. This will uncompress the necessary files.
4. At the A:\SONY or B:\SONY prompt, type **SETUP**, then press ENTER to start the installation.
5. Say “**Yes**” to install the SLCD.SYS driver.
6. Accept the default directories.
7. Allow the installation to update both your CONFIG.SYS and AUTOEXEC.BAT files.
8. Say “**No**” for installation on a Server and changing the Cache size.
9. Re-start your system.

2.4 Attaching External Audio/Game Devices

You can attach optional devices to the remaining connectors as described below. Note also the diagrams that follow.

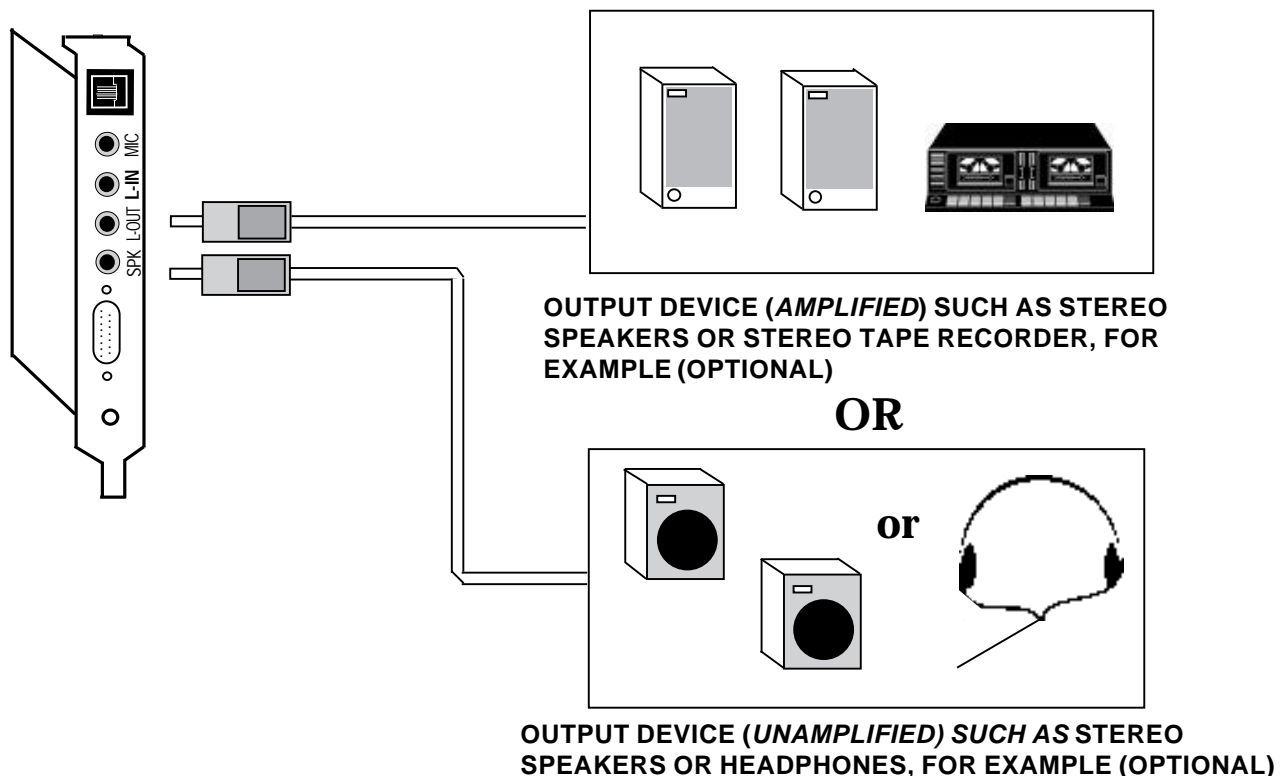
2.4.1 Attaching External Audio-in Devices

1. If you are using a microphone, plug it into the **MIC** connector. Use a dynamic mono microphone with a resistance not exceeding 600 ohms, or an Electret (condenser) mono microphone. See Appendix C for more information.
2. If you are using a CD-player, hi-fi set, radio set, synthesizer, or walkman, plug it into the **L-IN (LINE IN)** connector.



2.4.2 Attaching External Audio-out Devices

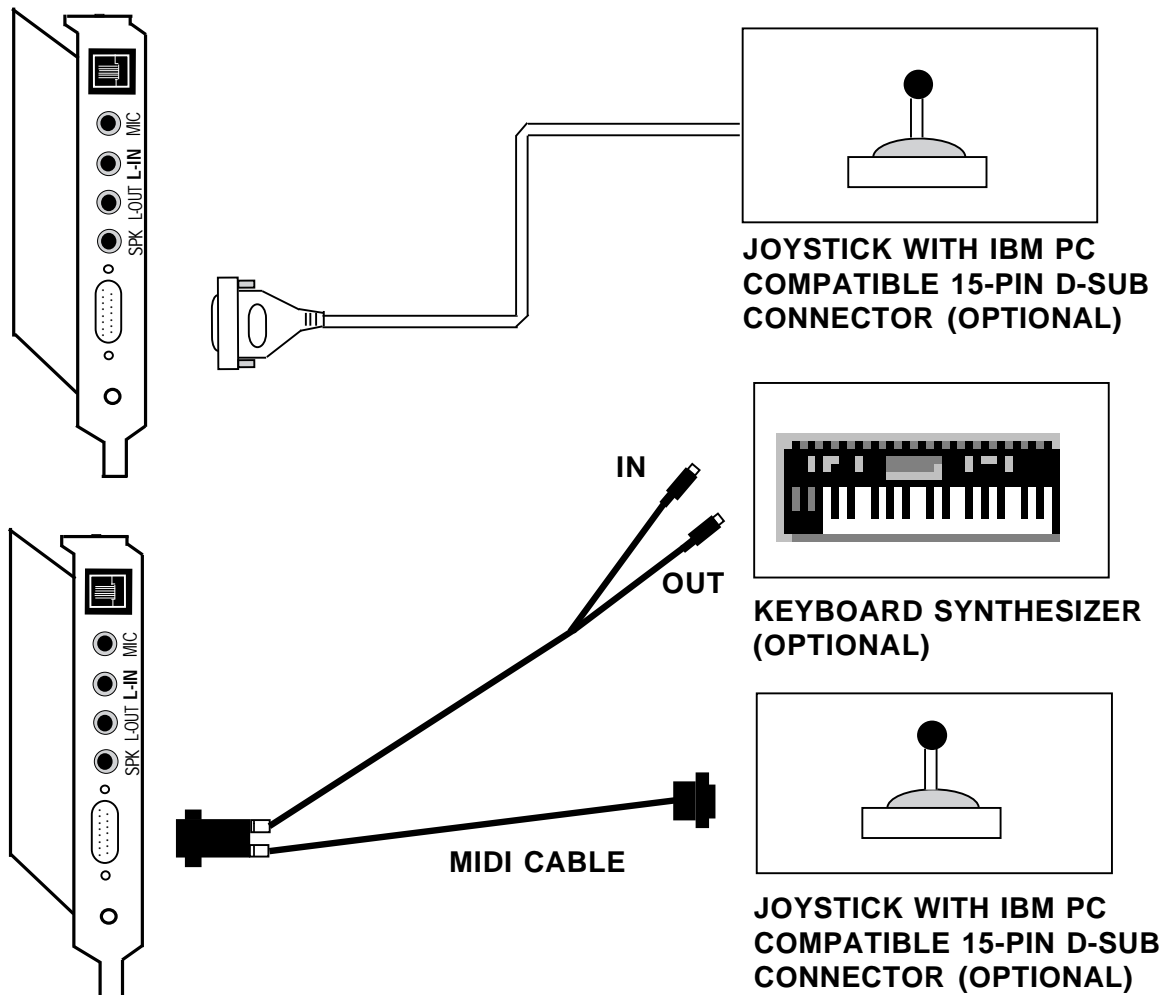
1. If you are using an **amplified** device such as stereo amplifiers, tape cassette recorders, headphones, or amplified speakers, plug it into the **L-OUT (LINE OUT)** connector (8 ohms or greater impedance; see Appendix C for more information).
2. If you are using an **unamplified** device such as speakers, plug it into the **SPK (SPEAKER OUTPUT)** connector (8 ohms or greater impedance; see Appendix C for more information).



IMPORTANT: To avoid temporary or permanent hearing loss or impairment due to unexpected noise or static, always hold your headphone away from your ears and test the sound before putting them on.

2.4.3 Attaching a Joystick/MIDI Device

1. If you are connecting a joystick only, use a 15-pin cable with D-sub connector. **NOTE: You may also attach two joysticks providing you have a 15-pin “Y” cable.**
2. If you are connecting a MIDI-compatible keyboard synthesizer as well, use a MIDI cable to make connections as shown below. Connecting external audio/game devices is complete.



Section Three: Driver Installation

Before beginning driver installation, note the README.TXT file provided on the SE1440 Drivers and Utilities diskette. This file may contain information which became available after the printing of this manual. You may view or edit this file with any text editor or word processor.

3.1 Re-run COMCHECK

In the previous section, you should have run the COMCHECK program before installing the SE1440 board in your system. You need to run the program a second time with the board present in your system. **If you are running Windows, exit before continuing.** The install program will re-start Windows at the proper time.

1. Insert the “SE1440 Driver and Utility diskette 1 of 1”.
2. Type the following:

**A:\COMCHECK (if the diskette is in drive A:) or
B:\COMCHECK (if the diskette is in drive B:)**

3. Select the option, “I’ve installed the SE1440 and wish to continue”

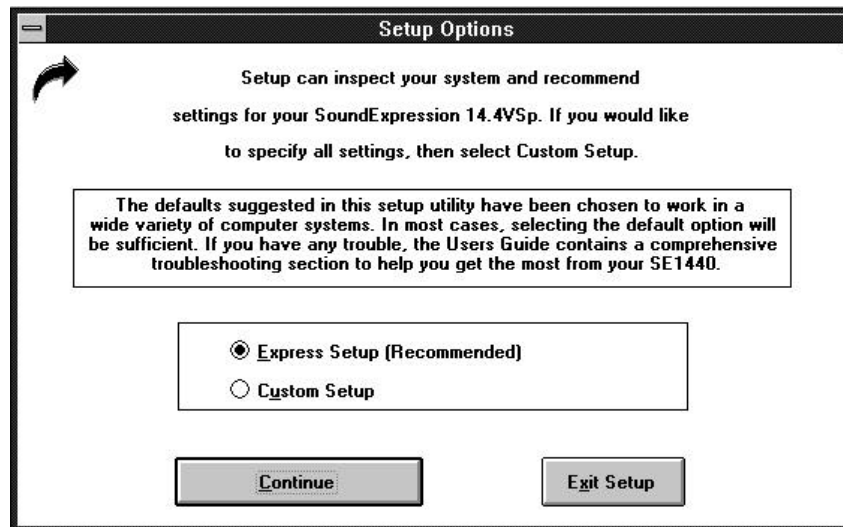
Making this selection starts the automated driver installation.

If COMCHECK detects Windows, a Windows installation is performed that installs both Windows and DOS drivers; go to section 3.2.

If COMCHECK does NOT detect Windows, a DOS installation is performed that installs only DOS drivers; go to section 3.3.

3.2 Driver Installation (Windows)

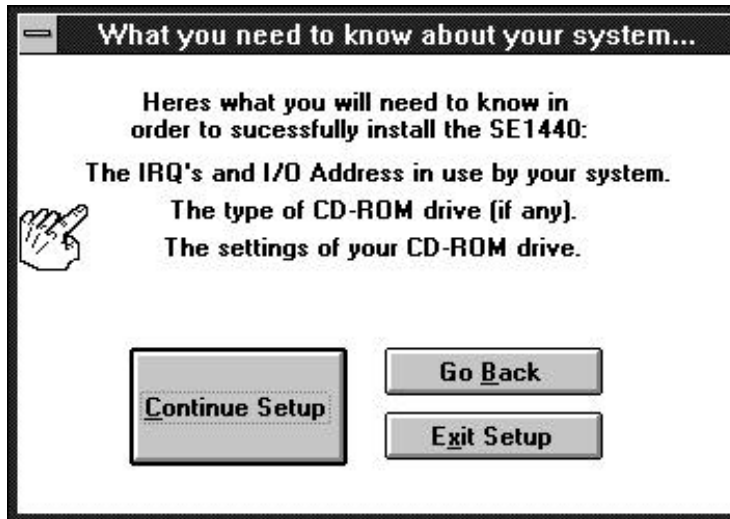
1. After an introductory screen, press Continue and the Setup Options dialog box is displayed as shown below. Throughout installation, follow all on-screen directions. Here, select **Express Setup** (recommended) or **Custom Setup**.



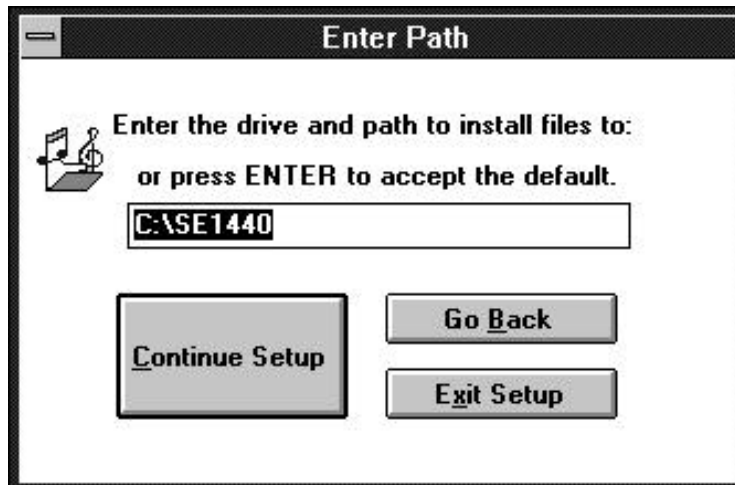
Select Continue or Exit Setup.

2. If you selected Custom setup, the following screen is displayed. You will need to know the IRQs, I/O addresses, and type settings for your CD-ROM drive (if any). Here and on all subsequent screens, you will have the option of continuing setup, returning to the previous screen, or exiting setup.

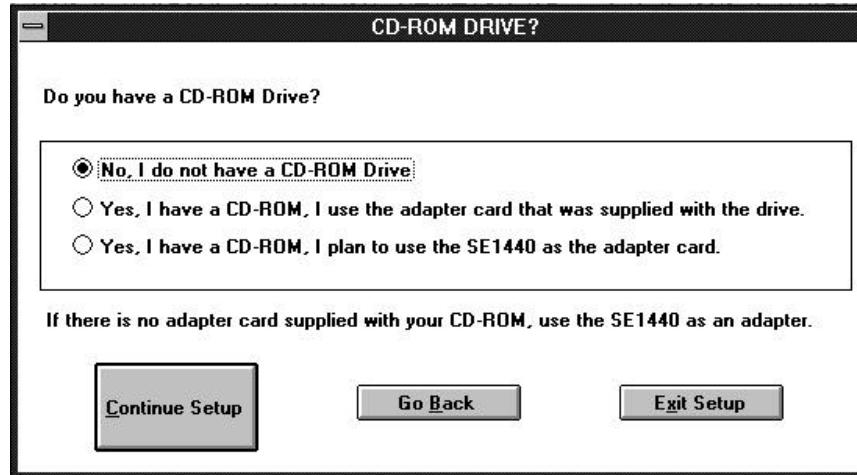
If you selected Express Setup, continue with step 3.



3. Specify the path to where files will be installed and continue Setup.



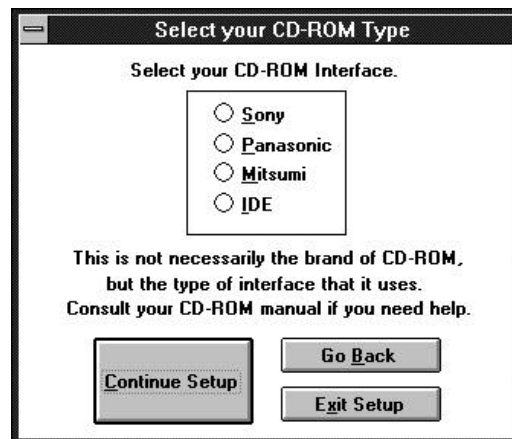
4. Next, you are asked if you have a CD-ROM drive.



If you select “No, I do not have a CD-ROM drive”, continue with step 8.

If you select “I have a CD-ROM drive and I am using the adapter supplied with the drive”, continue with step 8. This means you will **NOT** use the CD-ROM interface on the SE1440.

If you select, “Yes, I have a CD-ROM, I plan to use the SE1440 as an adapter card”, the “Select your CD-ROM Type” dialog box is displayed as shown here. This means you **WILL** use the CD-ROM interface on the SE1440.



IF YOU SELECTED CUSTOM SETUP, you will be presented with the choices shown below, depending on the CD-ROM type you selected. In most cases, the defaults will be satisfactory.

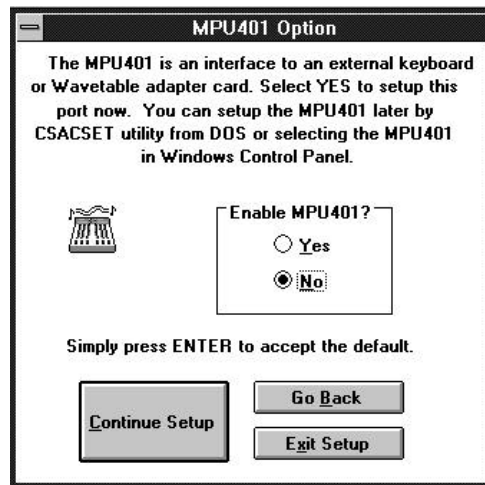
IF YOU SELECTED EXPRESS SETUP, continue with step 8.

SONY	Panasonic	Mitsumi	
I/O Address	I/O Address	I/O Address	IRQ
320	320	320	5
330*	340 (default)	330*	7
340 (default)		340 (default)	9*
360		360	10
			11 (default)

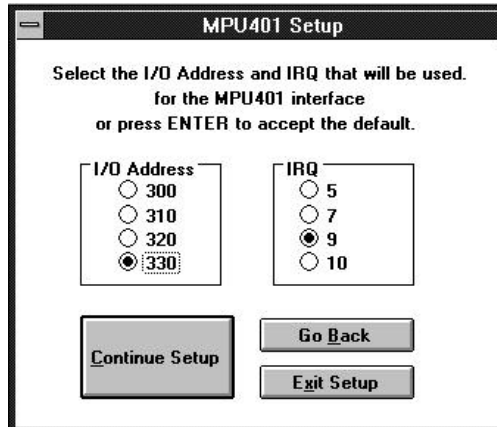
* selecting 330 and IRQ9 is not recommended.

For IDE CD-ROMs: The settings for an IDE CD-ROM are fixed at I/O address 170 and IRQ15. Make sure you enable the J5 jumper on the SE1440 if you have an IDE CD-ROM and will use the SE1440 as the CD-ROM adapter card. After you are satisfied with your choices, continue with the installation.

5. If you selected Express Setup, go to step 8. Otherwise continue here. The MPU401 Option dialog box is then displayed. The MPU401 is an interface to an external keyboard synthesizer or wavetable adapter card. Select YES to enable this port now. You can also enable the MPU401 interface later with the CSACSET utility from DOS, or by selecting the MPU401 in the Windows Control panel.

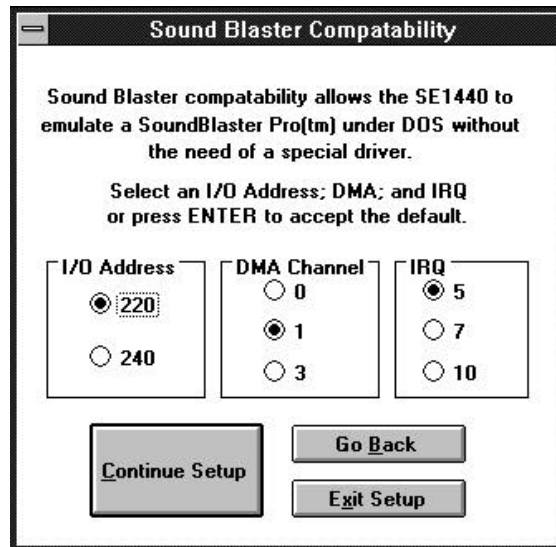


A second dialog box follows. This allows you to select the I/O address and IRQ for the MPU401 interface.



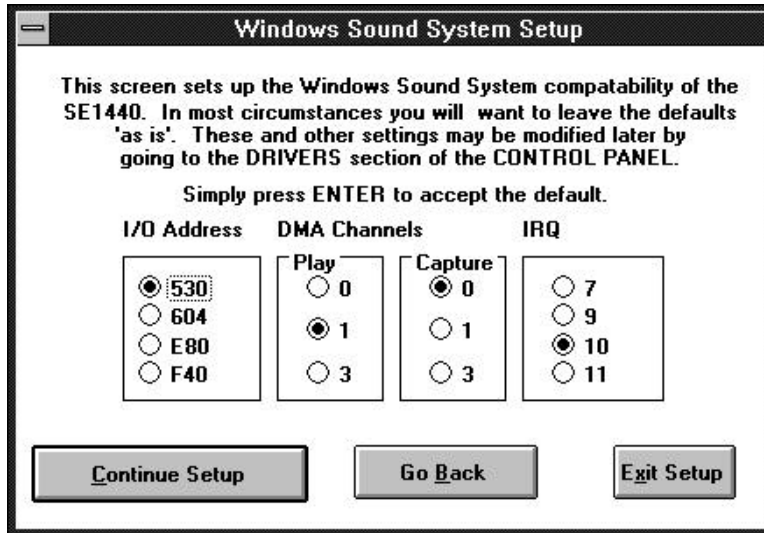
Make your selections or accept the defaults and select Continue Setup.

6. Next, the Sound Blaster Compatibility dialog box appears. This allows the SE1440 to emulate a Sound Blaster Pro™ under DOS without the need of a special driver. Specify I/O address (220 or 240, DMA Channel (0, 1, or 3), and IRQ (5, 7, or 10).



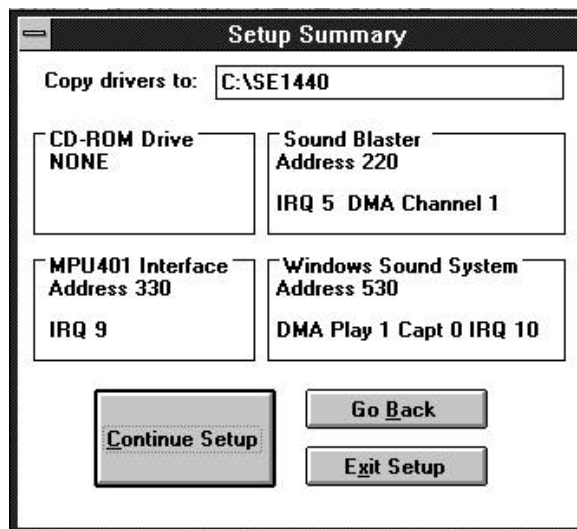
Make your selections or accept the defaults and select Continue Setup.

7. The Windows Sound System dialog box is then displayed. You will normally want to leave the defaults as they are. You may always change these settings later in the Drivers section of the Control Panel.

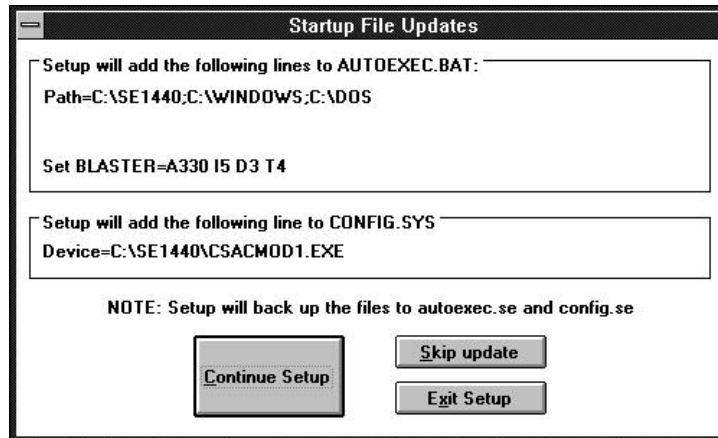


Make your selections or accept the defaults and continue setup

8. Next, a screen similar to the one below is displayed which summarizes all the setup options you have indicated.



9. Files are then transferred and the following screen is displayed.



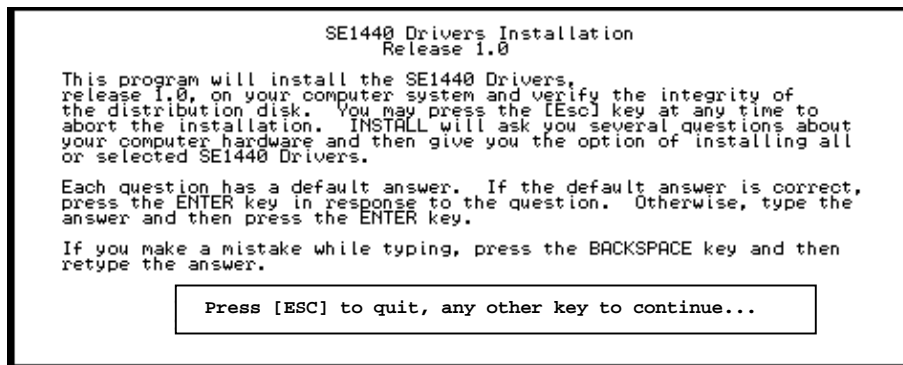
Your AUTOEXEC.BAT and CONFIG.SYS files are updated and previous versions of these files are renamed with .SE extensions.

When complete, select Reboot. Installation is complete. If you haven't already done so, install CD-ROM drivers provided by the manufacturer of your CD-ROM drive. Then proceed to your sound or modem applications.



3.3 Driver Installation (DOS)

1. An introductory screen is displayed as shown below. Throughout the installation, follow all on-screen directions. We recommend accepting the offered defaults. You may press the ESCAPE key to stop the installation at any time, but you will have to start over should you decide to resume.



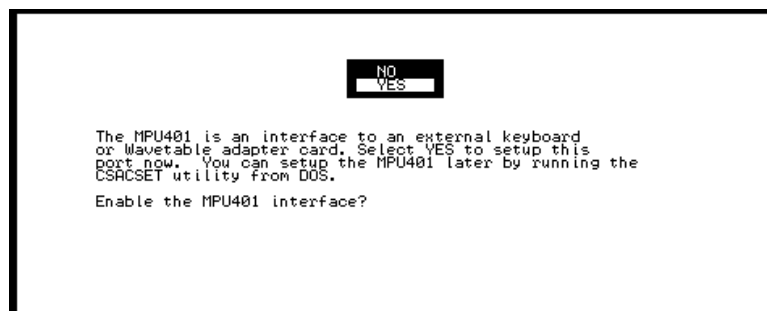
2. Specify the path (drive and directory) to which the files will be installed.



3. Next, you will specify the type of CD-ROM drive you are using (if any). If you select a CD-ROM type (any selection other than None), you will be asked for setup information for your particular CD-ROM. Continue with the installation by pressing ENTER.



4. You are then asked three questions regarding Sound Blaster compatibility: I/O address, interrupt, and DMA channel.
5. Next, you are asked if you want to enable the MPU401 interface. The MPU401 is an interface to an external keyboard synthesizer or wavetable adapter card. Select YES to enable this port now. You can also enable the MPU401 interface later with the CSACSET DOS utility.



6. After completing the prior step, files are copied and your system files (autoexec.bat, config.sys) are updated. You will then need to reboot your system. Installation of DOS drivers is complete. If you add Windows later, you will need to run this setup in Windows. If you haven't already done so, install CD-ROM drivers provided by the manufacturer of your CD-ROM drive. Then proceed to your sound or modem applications.

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Section Four: Modem Functions and Features

4.1 Introduction

The SE1440 offers the latest in modem technology, featuring voice, fax, and data communications. This versatile modem allows you to establish a structured set of messages, mailboxes, and faxes. Now, you have an all-in-one communications product that serves as a modem, voicemail system, and fax machine.

The SE1440 also supports business audio applications such as digital answering machine, voice annotation, and audio file play and record.

Features:

Voice Capabilities

The SE1440 features speaker phone capability, auto-dial, auto-answer, and an embedded voice modem 'AT' command set. The modem supports basic answering machine functions through the included voice and fax communications software. You can set up as many as 1,000 mailboxes.

The automated attendant feature allows dial-in users to access various mailbox features. When dialing in, you can check, answer, and leave messages. You can also retrieve faxes; enable/disable toll saver; change personal mailbox greetings; enable/disable pager notification; and change fax forwarding and pager notification numbers.

Fax Capabilities

The SE1440 offers a wide range of fax services. It supports Group 3, class 1 fax send and receive operations. It complies with ITU-T (formerly CCITT) V.17 (14.4Kbps), V.29 (9600bps), V.27ter (4800bps), and V.21 (300bps) channel 2 international fax standards.

Data Capabilities

The SE1440 offers the widest possible range of internationally accepted standard modulation methods and protocols. The modem is capable of 57.6Kbps data throughput with data compression. It complies with ITU-TSS standards V.32bis (14.4Kbps), V.32 (9600 bps), V.22bis/V.22 (2400 bps), and V.21 (1200bps), as well as Bell 212A and 103. The modem implements V.42 error correction 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.



4.2 Testing the Connection

1. Check that you have made all connections as instructed in Section Two (Connecting for Modem Use). Power on the computer.
2. Check for a dial tone on a phone set if one is connected. If a dial tone is heard, continue. If you do not hear a dial tone, check the connections you made in the previous subsection, or refer to *Troubleshooting (Section 5.2)*.
3. Install your communications software (see companion software manual) and place it in command mode. Refer to the communication software manual for additional information.
4. Start your communications software and enter command mode. If you are not in command mode, AT commands typed in at the DOS prompt will result in a “Bad Command or File Name” message.
5. 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 5.2)*.
6. Type **ATH1** followed by ENTER and you should hear a dial tone from the external speakers attached to the SE1440. To adjust speaker volume, refer to your communications software, or use the **ATL3** command.
7. Type **ATH** followed by ENTER to put the modem “on-hook”. This confirms that the modem has been successfully installed into the computer.
8. Your modem is now ready for use. Proceed now to your communications software and documentation.

Section Five: Troubleshooting

5.1 Sound Problems

This section discusses commonly encountered sound-related problems and possible solutions. Type “CSACDIA1” at the C:\SE1440 subdirectory for the “Audio Card User Diagnostics” screen as shown below:

```

SE1440          Audio Card User Diagnostics Ver 2.00
Copyright(c) 1993-94          All Rights Reserved.

-----
Windows Sound System          Sound Blaster
-----
DMA Capture Channel : 0          DMA Channel : 1
DMA Play Channel    : 1          IRQ Number  : 5
IRQ Number          : 10         Base Address : 220
Base Address        : 530

-----
Windows Sound System          Sound Blaster
-----
-> Sound Test
   Test Base Address
   Test Capture DMA Channel
   Test Playback DMA Channel
   Test Interrupt Setting

<F1> Help  <Esc> Exit          <F5> Run All Tests

```

Press F5 to run all tests. To run sound tests for Windows Sound System (Sound Test) and Sound Blaster (Sound Test and Music Test), use your mouse to click on these tests, or use the arrow keys. Press ENTER. The upper portion of the screen displays your sound card configuration.

NOTE: If you need to change your configuration settings after initial installation, run the DOS-based utility called “CSACSET”. Type:

C:\SE1440\CSACSET and press ENTER.

Resolving Hardware Conflicts

This section describes the possible hardware conflicts between your SE1440 and other adapter cards in your system, and ways of resolving these conflicts.

Hardware conflicts occur when two or more devices use the same I/O address, IRQ, or DMA channel. The default settings of the SE1440 are as follows:

Sound Blaster Mode

DMA	=	1
IO Address	=	220H
IRQ	=	5

These settings might come into conflict with other devices, such as scanners, printers, or a SCSI hard disk drive, for example.

To resolve hardware conflicts:

1. Find out the current board setting (DMA channel, IRQ, I/O port address) of the SE1440 by running "CSACDIA1", from the C:\SE1440 directory (or other directory where you installed the SE1440 drivers).
2. If you know of any peripheral card in your system that is using the same setting, change the hardware setting on the peripheral card or the SE1440.

3. If you are unsure of the settings of the peripheral card, remove all cards except the SE1440 and other essential cards (i.e., video display adapter, hard disk controller) from your system. Run "CSACDIA1" (see section 5.1) each time you remove an interface card. If your SE1440 functions properly after removing an interface card from your system, the interface card you just removed is in conflict with your SE1440. Find out the DMA channel, IRQ, and I/O port address which the interface card is using. Change the settings on your SE1440 or the interface card so that the two are not using the same values.

IMPORTANT! It is advisable to change the jumper settings on the other interface card since some Sound Blaster games use the default Sound Blaster settings (i.e., I/O Port Address = 220H, Interrupt = 5, DMA = 1). These games might not work properly if you change the settings for the SE1440.

For commonly encountered problems, continue to the next page.

Commonly Encountered Problems and Solutions

SYMPTOM	POSSIBLE REMEDY
<p>Your computer does not boot up after installing the board.</p>	<p>The sound board may not have been inserted completely into the 16-bit slot. Refer to Section Two: Installing Your New SE1440 to install the sound board properly.</p>
<p>The computer hangs, reboots itself, or issues a parity error after the board is installed.</p>	<p>There is a hardware conflict between the sound card and other interface cards in your system. Power down and remove all other cards except the SE1440, your video card, and the hard drive controller. Reboot again.</p>
<p>A device in your computer does not work or does not work properly after the board is installed.</p>	<p>There might be a hardware conflict between the sound card and the other device. Run CSACDIA1 (page 43) to find out which hardware setting is conflicting</p>
<p>Your system hangs when you enter or exit Windows.</p>	<p>a) If you installed another sound card in your system before, make sure you have removed all its drivers in Windows including any virtual device driver.</p> <p>b) There might be conflicts with another device in your system. Run CSACDIA1 (page 43).</p>
<p>There is no sound output in games.</p>	<p>a) Check that the speakers are connected properly to the L-OUT (amplified speakers) connector or SPK (unamplified speakers) on the sound card. If your speakers use batteries, make sure that they have the batteries they need.</p> <p>b) Refer to the README file to determine how to adjust the volume.</p>

SYMPTOM	POSSIBLE REMEDY
There is no sound output in games (contd).	<p>c) Make sure that the sound board is inserted properly into the computer.</p> <p>d) If your games are Sound Blaster compatible, make sure the card is in Sound Blaster mode. You can find out what mode the sound card is in by running CSACDIA1 (page 43).</p> <p>e) There might be a DMA conflict between the sound card and other interface cards in your computer. Make sure the DMA channel your sound card is using is not being used by another device in your system.</p> <p>f) Some games need EMM to play digitized voice. Please refer to the documentation that comes with your game.</p> <p>g) Check the address, DMA, and IRQ settings required by the game.</p>
The sound is distorted during sound test or during normal usage.	<p>a) Your speakers might be defective or the quality of the speakers is poor. Make sure you have a good pair of speakers.</p> <p>b) Make sure amplified speakers are attached to L-OUT (LINE OUT) jack; make sure non-amplified speakers are attached to SPK (SPEAKER) jack.</p> <p>c) Interference from another interface card in your computer. Try to install the sound card into a different slot.</p>

SYMPTOM	POSSIBLE REMEDY
<p>There is no music or digitized voice or there is only music in some applications.</p>	<p>a) Some applications need extended or expanded memory to run properly. Use a memory manager to set up the required memory in your system. Refer to the application's user guide on what is required.</p> <p>b) You do not have enough memory to run the game. Remove non-essential device drivers.</p> <p>c) Make sure you have a set blaster= line in your autoexec.bat file (example: set blaster=a220 i5 d1.</p>
<p>Your CD-ROM drive doesn't play music CDs or you receive the message:</p> <p>"CD-ROM Driver Not Detected"</p>	<p>a) Make sure the CD-ROM audio cable is connected to the CD audio-in connector on the Sound card.</p> <p>b) Install the MCI CD Audio driver in Windows. Some applications need this driver to play music CDs. The driver is provided by Windows. Simply select Control Panel in the Windows Program Manager. Then select Drivers and Add a Driver. Select "MCI CD Audio Driver". This will require your Windows diskettes.</p> <p>c) Check the speakers connection. If your speakers use batteries, make sure they have the power they need.</p> <p>d) Check the documentation that comes with your CD-ROM drive on setting up your CD-ROM for playing Audio CDs. Make sure the volume control is turned up in the software.</p>

SYMPTOM	POSSIBLE REMEDY
<p>Your joystick does not work after installing the board.</p>	<p>a) The joystick port on the SE1440 may be disabled. Run the C:\SE1440\CSACSET utility to enable the game port.</p> <p>b) There is a conflict between the game port on the sound card and the game port in your system. Remove the additional joystick from your system.</p>
<p>The joystick is not working properly in some programs.</p>	<p>The CPU speed of your computer might be too fast. You might want to reduce the speed. Refer to your computer's manual for instructions on setting up your computer's operating speed.</p>
<p>You cannot record any sound using a microphone.</p>	<p>a) If your microphone has an On/Off switch, make sure the switch is turned on.</p> <p>b) Make sure you plug the microphone into the mic-in connector.</p> <p>c) The microphone must be a mono Electret (condenser), or dynamic type, with a resistance of no greater than 600 ohms.</p>
<p>There is no sound or the sound is distorted when you are running Windows Sound System applications.</p>	<p>You need the Microsoft Audio Compression Manager to play compressed files in Windows Sound System applications. Make sure you have the following line in the [drivers] section of your system.ini file: wavemapper=msacm.driv</p>
<p>Your speaker phone does not work</p>	<p>Refer to the documentation for your communications software.</p>

5.2 Modem Problems

This section lists common problems that may be encountered with modem usage and their possible solutions.

SYMPTOM	POSSIBLE REMEDY
No dial tone.	<ul style="list-style-type: none">• 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.	<ul style="list-style-type: none">• 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.• Make sure your communications application is set up for the SE1440, or a generic 14.4Kbps modem with AT&F as its init string.
No response when you type in AT commands	<ul style="list-style-type: none">• There may be a conflicting port address. Re-configure the modem's COM port address

SYMPTOM	POSSIBLE REMEDY
<p>No response when you type in AT commands (contd)</p>	<ul style="list-style-type: none"> • Verify that the communication software is set to the same communications port where your modem is attached (e.g., COM1, COM2). Check IRQ settings in your software and on the modem. • Try typing AT&F to reset the modem to its factory defaults. • Move the modem to another serial port (power down the host computer first). If the modem works after being moved, it's likely the problem is not with the modem.
<p>AT commands not visible.</p>	<ul style="list-style-type: none"> • Make sure the echo command is set to ON. Change to echo with the ATE command.
<p>After data connection is established, data is displayed as garbled characters.</p>	<ul style="list-style-type: none"> • Make sure the local (yours) and remote modem configurations are compatible. • Verify that both modems are operating with the same settings, speed, data, parity, and stop bits. • The software may not be set for correct terminal emulation. Configure software to correct type. ANSI terminal emulation is most commonly used. • Power down your system and re-run your communications software. Check software settings. • Exit the communications program and restart it.

SYMPTOM	POSSIBLE REMEDY
The modem does not answer an incoming call.	<ul style="list-style-type: none">• You may not have enabled auto-answer. Use your software to enable this function. Type ATSO=1 at the command mode screen of your data communications application.• If you have an answering machine, it may be answering before the modem can. Turn the answering machine off, or, use the software to set auto-answer to respond in fewer rings than the answering machine.
Modem disconnects while on-line.	<ul style="list-style-type: none">• 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.
Speaker fails to work.	<ul style="list-style-type: none">• Make sure attached speaker is working and conforms to necessary specifications. See Appendix C.

Appendix A: Technical Specifications

The SE1440 is an integrated sound controller compatible with Sound Blaster, Ad Lib, and Microsoft Windows Sound System. It is also a 14.4Kbps fax/data/voice modem.

- 8 or 16-bit sound data: Sound Blaster and Windows 8/16-bit audio up to 44.1Khz stereo
- Sample rates up to 48KHz stereo
- Integrated MIDI UART with 64-byte FIFO
- Built-in Sound Blaster-compatible digital audio processor
- Interface for Wave Table Synthesis
- Software Programmable AT interface for I/O address, IRQ, and DMA Channel
- Software programmable CD ROM interface for SONY, Mitsumi, Panasonic, IDE CD ROM (primary or secondary)
- Software enable/disable of the game port
- Supports 7 DMA and 6 IRQs
- 24mA drivers for direct AT-bus interface
- 16mA drivers for direct CD-ROM interface
- Half-Duplex Speaker phone
- 14.4Kbps fax/data/voice modem with 16C550 UART

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

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

Audio Data Rate: 4800 samples/sec.

Compatibility: **Modem Modulation Protocols**

ITU-T: ITU-T V.22bis (2400bps), V.22 , (1200bps), V.32 (9600bps), V.32bis (14.4Kbps)

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

Fax Modulation Protocols

V.17 (14.4Kbps) 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 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

- **Dimensions:** 13.4" x 4.2"
- **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: Configuration Settings

Sound Blaster Addresses: 220, 240 IRQ: 5, 7, 10 DMA: 0, 1, 3	CD-ROM Addresses: 320, 330, 340, 360, (170/IDE only) IRQ: 5, 7, 9, 10, 11, (15/IDE only)
Windows Sound System Addresses: 530, E80, F40, 604 IRQ: 7, 9, 10, 11 DMA: 0, 1, 3	IDE CD (only) Address: 170 IRQ: 15
MPU-401 Interface Addresses: 300, 310, 320, 330 IRQ: 2/9, 5, 7, 10	MODEM Addresses COM1, 2, 3, 4 IRQ3, 4, 5, 7

Default Configuration

The SE1440 supports both Sound Blaster as well as Windows Sound System applications. After drivers are installed and configured, the card is in Sound Blaster mode when in DOS. It switches to Windows Sound System mode when you start Windows. The default configuration for the board is as follows:

Mode:	Sound Blaster	Modem
Interrupt:	IRQ5	IRQ3
DMA Channel:	DMA1	NA
I/O Port Address:	220h	2F8h (COM2)
CD-ROM interface:	None	NA

The IRQ, DMA channel, and I/O port address for the sound portion of the SE1440 are all software-selectable. The type of CD-ROM interface, I/O port address, IRQ, and DMA channel are software-configurable as well.

IMPORTANT NOTE: There are TWO sets of DMA channel, IRQ, and I/O Port address. One set is for the sound card and the other is for the CD-ROM interface. The DMA channel, IRQ, and I/O port address of the sound card **MUST BE DIFFERENT** from that of the CD-ROM interface. Also: The IRQ chosen for the modem must be different than the IRQs used for sound functions and the CD-ROM interface. The Sound Blaster settings for the SE1440 (DOS-based) may be different from the Windows Sound System settings (Windows-based).

The modem portion of the SE1440 provides a jumper to select COM1, COM2, COM3, COM4 and IRQ3, IRQ4, IRQ5, and IRQ7. The default settings are COM2/IRQ3.

Appendix C: Microphone and Speaker Requirements

The SE1440 is equipped with microphone (MIC) and speaker jacks (SPK) for use with headset, speakers, and microphone. The microphone can be used to record outbound messages as well as sound files. 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 should be of the electret type also known (incorrectly) as a condenser type. The microphone in most telephone handsets and headsets are of this type. The SE1440 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 work with the SE1440. Its sensitivity is much lower, and its frequency response is not as suitable for this purpose.

Speaker Requirements

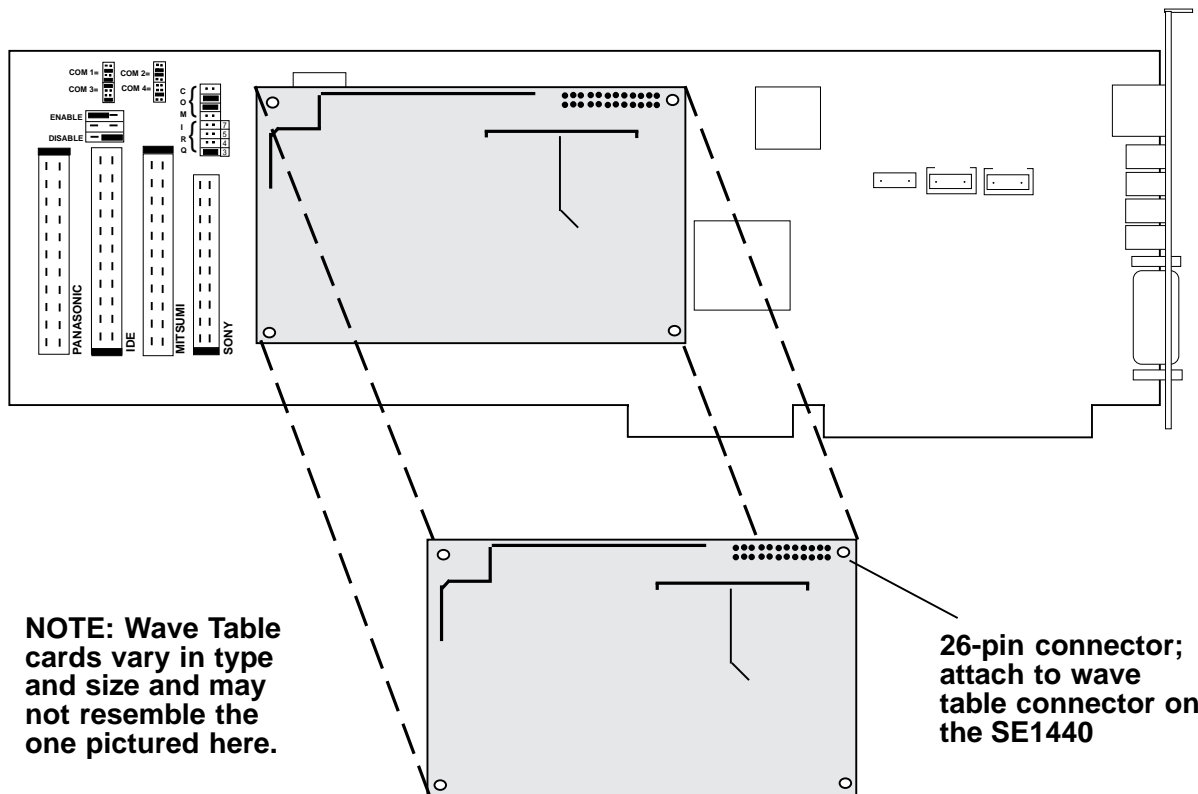
You can attach the SE1440 to a high-quality external speaker or the earpiece of a handset or headset. The external speaker must have an impedance rating of 8 ohms or more.

Appendix D: Wave Table Card Installation

The SE1440 will support a Wave Blaster™ compatible wave table card (not supplied by Boca Research). The Wave Table card contains sound samples of actual instruments. When MIDI music is played using the wave table card, the music will sound like real instruments.

To set up the Wave Table Card:

1. Start Windows as you normally would.
2. Select the Midimapper icon in the Windows Control Panel.
3. Select MPU-401 in the Midimapper dialog box.



Appendix E: A Note on the MIDI Interface

MIDI (Musical Instrument Digital Interface) is a standard for composing and playing music using electronic instruments and computers.

The MIDI interface transmits (MIDI-out) and receives (MIDI-in) MIDI commands serially at 32.5K baud. Multiple instruments can be connected in a daisy-chain fashion to the MIDI interface.

MIDI commands are sent from a MIDI sequencer (i.e., the computer) to the attached instruments. Several instruments can play simultaneously. The result is similar to a complete band playing a song.

MIDI songs consist of commands, not actual digital sounds. Consequently, file size is greatly reduced when compared, for example, to a Windows .WAV file.

The SE1440 can play MIDI songs in three different ways:

1. Through an instrument attached to the joystick/MIDI port.
2. Through an attached Wave Blaster™ compatible wave table card (see Appendix D).
3. Through the on-board OPL3 FM synthesizer.

When playing MIDI songs through the MIDI port or wave table card, the Windows MIDI mapper must be configured for MPU-401 (1-16).

When playing MIDI songs through the OPL3 FM synthesizer, the Windows MIDI mapper must be configured for:

SE1440 FM (1-10), or
SE1440 FM (13-16), or
SE1440 FM (1-16).

NOTE: Most MIDI files will play correctly using the FM (1-10) setting. This setting uses MIDI channels 1-10. Some MIDI files may use channels 13-16. In this case, the song or tune may not play correctly. If this is the case, select FM (13-16). The FM (1-16) setting allows you to play MIDI files that use either channels 1-10 or 13-16.

NOTE: Some MIDI files contain two images of the song (dual-authored files). In this case, the music on channels 1-10 is duplicated on channels 13-16. This type of MIDI file will not sound correctly. So, you should select FM (1-10) instead.

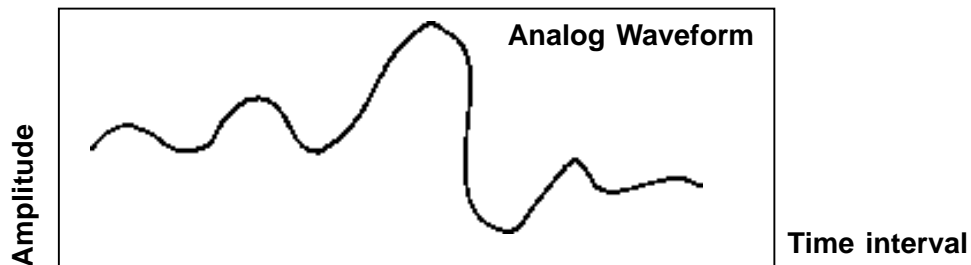
References

Microsoft Windows Multimedia Authoring and Tools Guide
Microsoft Press
©1991 Microsoft Corporation
ISBN 1-55615-391-0

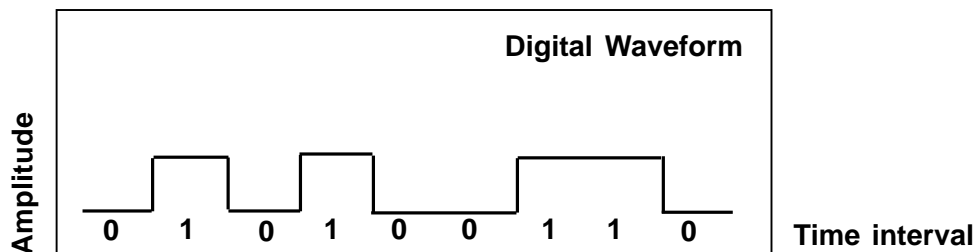
How MIDI Works
by Dan Walker
©1991 Peter L. Alexander Publishing, Inc.

Appendix F: A Note on Digital Sound

Traditionally, sound has been recorded in analog format. Magnetic tape is an example of the media used by analog recording. Analog audio uses electrical signals to create a single model of a given sound or “waveform” as shown below:



Digital sound applies computer-based technology to the recording, handling, and regeneration of sound. A digital waveform reduces the sound to a sequence of binary numbers. Digital audio systems sample the waveform and extrapolate the complete sound from the sample. When a digital recording is played, the numeric data is transformed back to its original acoustic waveform.



Tradeoffs

While the quality of a digital sound recording is subject to almost no degradation (unlike an analog recording), digital sound storage requirements are quite high in terms of computer hard disk space.

Appendix G: A Note on Windows Sound System

Windows Sound System provides 16-bit 44.1 KHz stereo record and play back with OPL3 FM synthesis for DOS game support in a DOS window. Settings for Windows Sound System may be chosen when selecting Driver Setup in the Windows Control Panel. These settings are as follows:

DUPLEX.

Half-duplex allows for either playing or recording.

Full duplex allows simultaneous playing and recording at the same sample rate.

Enhanced is the same as full duplex, but simultaneous playing and recording may occur at different sampling rates.

The default is full-duplex.

I/O Address. The default is 530h.

DMA Channel. The default is 1 for Play and 0 for Capture. NOTE: you may use the same DMA as your Sound Blaster. DMA Channel is not active in Windows.

IRQ. IRQ10 is the best choice. If you select IRQ9 or IRQ11, DOS-based games will not be supported in a DOS window.

Appendix H: Glossary of Audio Terms

amplitude. The variation in a sound signal producing varying levels of loudness. Measured in decibels (dB).

analog sound. Recorded sound depicted by fluctuations in amplitude.

bits per sample. The number of bits employed to record information from a single sample when recording digital sound. See Sampling.

CD quality. Recording quality similar to that of a compact disc player. This means that 16 bits of information are recorded for every sample taken. See Bits Per Sample and Sampling.

decibel (db). A means of measuring amplitude.

digital sound. Recorded and stored sound as a series of numerical values rather than fluctuations in amplitude.

line-in. A connector on audio equipment to which a device like a CD-player or tape cassette player may be attached. See also Line Out.

line out. A connector on audio equipment to which audio components can be attached such as stereo speakers. See also Line In.

MIDI. Musical Instrument Digital Interface. A standard which allows for the exchange of data between two music synthesizers or a synthesizer and a computer. Sound data may be communicated from the synthesizer to the computer and stored as a MIDI file. Or, a MIDI file can be transmitted to the synthesizer for playback.

MPU-401. A UART on the MIDI port which allows MIDI interface to transmit and receive at 32.5K baud (see Appendix E for more information).

pitch. A sound's tone, usually determined by the sound's frequency.

sample. A measurement of sound taken during a certain duration. In digital recording, sampling means recording voltages which make a sound as a sequence of numerical values representing the sound's amplitude.

sound file. Any file which holds sound data. Examples: files with .MID file name extensions are compatible with the MIDI standard (see above); a file with a .WAV file name extension is a standard Microsoft file format for storing waveform audio data. See Waveform and wave file.

timbre. How the ear identifies and classifies sound. Example: the timbre of the same note played by two different instruments (flute and tuba) will not be the same.

voice annotation. Embedding of a voice message into a document for later playback.

wave file. A standard Microsoft file format for storing waveform audio data.

waveform. A graph showing the amplitude of a sound over a particular interval of time. Any portion of that interval is a sample.

Appendix I: Glossary of Modem Communication Terms

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 J: Modem Command Reference

Basic AT Commands (default values are highlighted)

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

Select ITU-T or Bell

ATB0	Selects ITU-T V.22 when the modem is at 1200bps.
ATB1	Selects Bell 212A when the modem is at 1200bps and Bell 103 when the modem is at 300bps (default).

Transmit Carrier Signal

ATC0	Transmit carrier signal off (returns an error message)
ATC1	Transmit carrier signal on. (default)

Dial Modifiers

Dial	Option	Description
ATD	none	Dial. (ATD followed by phone number)
ATDL	none	Re-dial.
ATDP	none	Pulse (rotary) dial. 10 pulses per second.
ATDR	none	Reverse Originate Mode. Places modem in answer mode.
ATDT	none	Touch tone dial (DTMF).
ATDW	1-255sec	Wait for dial-tone. Default is 50 seconds.
ATD,	0-255sec	Pause. Default is specified by S-register S8.
ATD@	none	Wait for quiet answer.
ATD!	none	Initiate hook flash.
ATD;	none	Return to command state after dialing.
ATD^	none	Disable calling tone.
ATDS=0-3	none	Dial stored number.

Command	Description
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Command Character Echo

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

Switch Hook Control

ATH0	Instructs modem to go on-hook.
ATH1	Instructs modem to go off-hook.

Identification

ATI0	Reports product code
ATI1	Reports version number
ATI2	Verifies ROM checksum
ATI3	Reports Device set name
ATI4	Reports modem configuration

Speaker volume

ATL0	Off or low volume.
ATL1	Low volume.
ATL2	Medium volume. (default)
ATL3	High volume.

Speaker control

ATM0	Disables the modem speaker.
ATM1	Turns speaker on until carrier has been detected. (default)
ATM2	Instructs the modem speaker to stay on all of the time.
ATM3	Enables speaker after dialing until connection is established.

Select Data Rate Handshake

ATN0	When originating or answering, handshakes only at the DTE-to-Modem data rate.
ATN1	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, drops down to the highest compatible rate.

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

Result code display control

- 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)**

Result Code Type/Call Progress. This command determines which modem result codes are enabled. Additionally, this command specifies whether busy and dial-tone detection are enabled or disabled.

- ATX0 Result codes 0: 4 enabled. Busy and dial tone detect disabled.
ATX1 Result codes 0: 5, 10 enabled. Busy and dial tone detect disabled.
ATX2 Result codes 0: 6, 10 enabled. Busy detect disabled and dial tone detect enabled.
ATX3 Result codes 0: 5, 7, 10 enabled. Busy detect enabled and dial tone detect disabled.
ATX4 Result codes 0: 7, 10 enabled. Busy and dial tone detect enabled.

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. (default)**
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.

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 The modem ignores DTR.

AT&D1 The modem switches from data mode to command mode when an on-to-off transition of DTR occurs.

AT&D2 **An off-to-on transition of DTR causes the modem to go on-hook (hang up) and disable auto-answer mode. Auto-answer mode (when S0 is not equal to zero) is enabled when DTR is turned on. (DEFAULT)**

AT&D3 An off-to-on transition of DTR re-initializes the modem. This performs a power-up reset, except that the UART registers are not re-configured.

Load Factory Defaults

AT&F Recalls factory defaults. Instructs the modem to use the factory-set parameters.

Guard Tone Options. Controls whether or not guard tones while connected to a remote modem. Guard tones may be required in some countries but are not needed in the United States.

AT&G0 **Guard tone disabled. (DEFAULT)**

AT&G1 550-Hz guard tone enabled.

AT&G2 1800-Hz guard tone enabled.

Command Description**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.

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 ITU-T specification.

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.**

Disable Trellis Coding

- AT&U0 Enabled (Trellis modulation with QAM modulation as a fallback.) (DEFAULT)**
- AT&U1 Disabled (QAM modulation only).**

Command	Description
---------	-------------

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 (where n equals a 45-digit dial string)

AT&Z0=n
AT&Z1=n
AT&Z2=n
AT&Z3=n

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

AT-C0	Disabled. (DEFAULT)
AT-C1	Enabled.

MNP Operation

The SE1440 supports all of the preceding classes. The following AT Commands apply to the MNP protocol. Default values are highlighted.

Command Description

Maximum MNP Block Size. Use this command to transmit smaller blocks of data in a reliable data link connection.

AT\A0	set maximum block size to 64 characters.
AT\A1	set maximum block size to 128 characters.
AT\A2	set maximum block size to 192 characters.
AT\A3	set maximum block size to 256 characters. (DEFAULT)

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)

Modem to Modem Flow Control. Enables or disables modem to modem flow control during a normal mode connection. This command is ignored when error correction is selected.

AT\G0	Disables flow control (XON/XOFF) (default)
AT\G1	Enables flow control (XON/XOFF)

BPS Rate Adjust Control.

AT\J0	Disabled. Serial port speed is independent of the connection speed, which allows much greater throughput when using error correction and data compression. (DEFAULT)
AT\J1	Enabled. If enabled, the serial port speed will automatically be changed to the modem connection speed.

Command	Description
---------	-------------

Break Control. Defines what action the modem takes when a break (attenuation signal) is sent or received

(1) In CONNECT STATE, if reliable mode, then transmit break to a remote:

AT\K0, 2, 4	Enter command state, but do not send a break.
AT\K1	Destructive/expedited.
AT\K3	Non-destructive/expedited.
AT\K5	Non-destructive/non-expedited. (DEFAULT)

(2) In COMMAND STATE, but do not send a break:

AT\K0, 1	Destructive/expedited.
AT\K2, 3	Non-destructive/expedited.
AT\K4, 5	Non-destructive/non-expedited. (DEFAULT)

(3) In CONNECT STATE (if direct mode, then receive break at serial port):

AT\K0, 2, 4	Immediately send a break and enter command state.
AT\K1, 3, 5	Immediately send break through. (DEFAULT)

(4) In CONNECT STATE, receive break at modem port; send to serial port.

AT\K0, 1	Destructive/expedited.
AT\K2, 3	Non-destructive/expedited.
AT\K4, 5	Non-destructive/non-expedited. (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	V.42 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.

Command Description**Originate Reliable Link.**

AT\O. 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**).

Set Serial Port Flow Control.

AT\Q0 Disables flow control.
AT\Q1 XON/XOFF software flow control
AT\Q2 Unidirectional hardware flow control
AT\Q3 **Bidirectional hardware flow control (DEFAULT).**

Set Inactivity Timer.

AT\T1-90 During a normal or reliable connection, if no data is sent within the inactivity time period specified, the link is disconnected.

AT\T0 **Disables inactivity timer. (DEFAULT)**

Accept Auto-reliable Link.

AT\U In Normal mode (\N0), the modem will attempt to **answer** an MNP link, 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**).

Modify Result Code Form.

AT\V0 Enables codes defined by ATV command
AT\V1 **Enables modified MNP codes (DEFAULT).**
AT\V2 Enables extended V.42 codes.

Command	Description
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Set XON/XOFF Passthrough.

AT\X0	Processes flow control characters (DEFAULT).
AT\X1	Processes flow control characters and passes them through to the local or remote so they can process the characters.

Switch to Reliable Mode.

AT\Y	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.
-------------	--

Switch to Normal Mode.

AT\Z	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.
-------------	---

AT Commands for V.42/V.42bis

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

Command	Description
---------	-------------

Set Auto-reliable Fallback Character. In auto-reliable mode (\N3), with auto-reliable fallback character enabled (\C2), receipt of the fallback character from the line during V.42 detection causes the modem to switch to normal mode. This allows a 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.

AT%An	13 (DEFAULT). n = 0-127 (ASCII character)
--------------	--

Command **Description**

Auto-retrain (V.22bis and V.32bis only). Determines whether or not the modem automatically monitors the line quality and requests a retrain whenever the received data signal quality falls below a threshold that may affect data reliability.

AT%E0 **Disabled (DEFAULT).**
AT%E1 Enabled.

Auto Fall forward/fallback Enable (V.32bis only). This command selects whether the modem will automatically initiate a change to a higher 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.

AT%G0 **Disabled (DEFAULT).**
AT%G1 Enabled.

Report Line Signal Quality. Returns a “high-order” byte of the calculated EQM (“eye quality monitor”). The modem will automatically retrain if enabled by the AT%E1 command.

AT%Q(0-7) No retrain.

AT%Q(8-255) Modem performs a retrain (if configured for %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 following table lists the modem's registers and their functions.

Register	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	0-32	ASCII	8	Backspace character.
S6	2-255	seconds	2	Wait time for Dialing.
S7	1-255	seconds	60	Wait for carrier after dial.
S8	0-255	seconds	2	Pause time for dial delay.
S9	1-255	seconds	6/10	Carrier detect.
S10	1-255	seconds	14 (1.4)	Lost Carrier to Hang Up Delay.
S11	1-255	milliseconds	95	DTMF Tone Duration.

Register	Range	Units	Default	Definition
S12	0-255	1/50 sec.	50(1)	Escape code guard time.
S13				Reserved.
S14	Bit Mapped	NA	NA	Bit mapped registers.
S15				Reserved
S16	Bit Mapped	NA	NA	Modem test options.
S17				Reserved.
S18	0-255	seconds	0	Test timer.
S19				Reserved.
S20				Reserved.
S21	Bit Mapped	NA	NA	Bit mapped registers.
S22	Bit Mapped	NA	NA	Bit mapped registers.
S23	Bit Mapped	NA	NA	Bit mapped registers.
S24				Reserved.
S25	0-255	seconds	5	Asynchronous DTR Delay.
S26	0-255	seconds	1	RTS to CTS Delay Interval.
S27	Bit Mapped			Bit mapped registers.
S28				Reserved.
S29				Reserved.
S30	0-255	seconds	10	Sleep Mode Timer.
S37	0-12		0	Maximum Speed Attempted
S90	0-255	minutes	0	Disconnect Inactivity Timer.
S108	0-3			Retrain Signal Quality Selector

0=no retrain
1=low-quality retrain after many errors
2=medium-quality retrain after some errors
3=high-quality retrain after few errors

NOTE: Default is 1 when V.32 and 2 when V.32bis.

S109	Bit-mapped		62	Line Speeds Permitted
				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=10 (bits 2, 4, 5 not supported)	
			V.32bis S109=62	

Result Codes

Basic Result Codes

Numeric Verbose Code 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
14	CONNECT 9600
16	CONNECT 12000
17	CONNECT 14400
+F4	+FCERROR

Modified Result Codes

Numeric Verbose Code Code

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
32	CONNECT	300/REL-MNP

Extended Result Codes

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

Extended Result Codes (contd)

Numeric Code	Verbose Code
-------------------------	-------------------------

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

Appendix K: 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 bracket of the SE1440.

Appendix L: Servicing Your Boca Product

If your SE1440 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 28.8 Kbps 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 sections 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 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. 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 SE1440 to Boca Research, Inc. for repairs, please be sure to include:
 - **the SE1440 (*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 M: 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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