RS232

A synchronous communications adapter supporting speeds up to 64,000 bps.

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Preface

Welcome to a product that offers synchronous communications at speeds of 64 Kbps using an RS232 communications line interface. Follow the step-by-step instructions in this manual to install the RS232 adapter.

- Chapter 1 describes the package contents and system requirements. Review this chapter to be sure you have everything needed before beginning installation.
- Chapter 2 provides detailed instructions for installing the RS232 adapter and SCC1 cable. The adapter is installed in a PC with an ISA or EISA bus.
- Chapter 3 tells you how to enter adapter information in the Barr software.
- Chapter 4 explains how to run the Barr loopback test to verify that the adapter is functioning properly.

Barr Technical Support

Contact Barr Technical Support if you have any questions or problems. When calling Technical Support, please have your adapter serial number and the software version number on hand. When contacting Technical Support via Fax or E-mail, please include the serial number in your correspondence.

You can obtain the adapter serial number from the:

- Adapter box
- Sticker on the adapter edge that is visible from the rear of the PC
- Handwritten label on the back of the adapter

Notes:

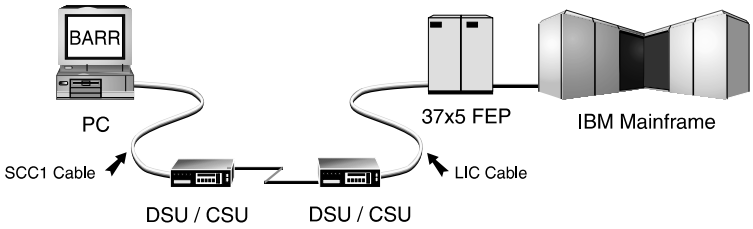
Contents

Chapter

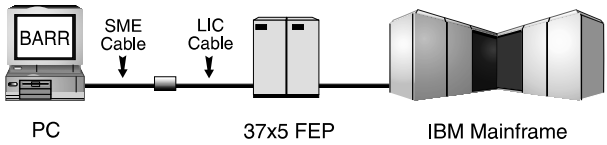
1 Introduction

The RS232 adapter is an 8-bit synchronous communications adapter. It supports the SDLC, X.25, and Binary Synchronous (BSC) communications protocols at line speeds ranging from 1200 bps to 64,000 bps.

Designed for use with Barr communications software, the RS232 adapter allows the PC to connect to an external synchronous modem via an SCC1 cable. Alternatively, it can connect to a front-end processor via an optional SME connector.



Remote SCC1 connection



Local SME connection

1.1 Features

Speeds up to 64 Kbps

When the RS232 adapter is used with a 386 or faster processor, data rates up to 64,000 bits per second — at full-duplex or half-duplex — can be achieved. (At speeds greater than 19,200 bps the V.35 interface is commonly used because it provides better electrical noise immunity.)

Full-Duplex Communications

The RS232 adapter and BARR/RJE software support true full-duplex operation. The original SDLC protocol developed by IBM required that acknowledgments to each frame be sent before additional frames could follow. The VTAM parameter **DUPLEX=FULL** was used to allow frames to be sent to one device on a multidrop line while simultaneously receiving data from another device. The SDLC protocol later was improved to support simultaneous sending and receiving to a single device. The VTAM parameter for this is **DATMODE=FULL**.

To this day, very few downstream devices — including SNA gateways and controllers — can support **DATMODE=FULL**, even though virtually every front-end processor can. In fact, this mode is normally used for mainframe-to-mainframe SDLC links. Independent laboratory testing has demonstrated that **DATMODE=FULL** operation can actually *double* the amount of bi-directional traffic that can be handled at a given SDLC link speed. Even when most of the SNA traffic is going in one direction, performance can be significantly improved because acknowledgments are transmitted at the same time data is received. BARR/RJE software provides support for the **DATMODE=FULL** protocol when used with the RS232 adapter.

Direct Memory Access

The RS232 adapter supports Direct Memory Access (DMA). When DMA is enabled, data is transferred from memory in blocks rather than individual bytes. This greatly enhances performance. Full-duplex operation uses two DMA channels.

Modem or SME Connection

The RS232 adapter can be attached to either a modem or a front-end processor. Because the adapter provides clock output, it can be directly connected to a front-end processor or to another PC via a synchronous modem eliminator (SME) connector. The SME connector plugs into the SCC1 cable and eliminates the need for a synchronous modem eliminator box.

Loopback Diagnostics

Barr software can perform comprehensive diagnostic tests on the RS232 adapter. These tests allow you to verify that the adapter is functioning properly. Diagnostic software includes:

- Send/receive tests using the loopback Test plug that is included with the SCC1 cable
- Line signal tests
- Checks for Address and Interrupt Request conflicts

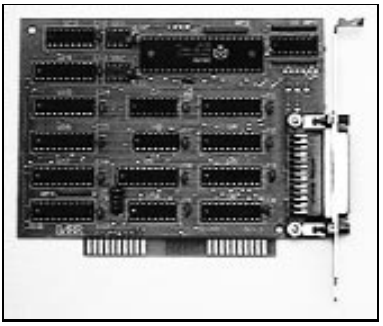
1.2 PC Requirements

The RS232 adapter requires:

- ISA or EISA bus
- An open 8-bit or 16-bit slot for installing the RS232 adapter

1.3 Package Contents

The RS232 adapter box includes:



RS232 synchronous communications adapter

2.5-meter (8-foot) Barr SCC1 cable with Test plug

Chapter 2

Install the RS232 Adapter

The RS232 adapter is installed in an open 8-bit or 16-bit slot in your PC, using the same method as any other card. Before inserting the adapter, the Address is selected using a jumper on the adapter.

Once the adapter is installed, it can be connected to a modem using the supplied SCC1 cable. Direct connection to another PC or to a host front-end processor also is possible using a synchronous modem eliminator (SME) connector. Refer to Appendix A for cable specifications. Modems are discussed in Appendix B.

Follow these steps to install the adapter:

Step 1 Set the Address jumper (refer to section 2.1).

Step 2 Follow the instructions in the PC owner's manual to install an adapter card.

> ***Caution:*** Disconnect your PC and all attached devices from power sources before installing the RS232 adapter.

> ***Note:*** For the PC XT, the RS232 adapter does not function in slot 8 (the slot nearest the fan).

Step 3 Connect the adapter and modem (refer to section 2.2).

2.1 Adapter Settings

The Address is set both on the adapter and in the software. The Interrupt Request and DMA levels are selected only in the software. Software settings are discussed in Chapter 3.

Address Jumper

Before installing the adapter, identify which addresses are in use by adapters already installed in your PC. If you do not know which device addresses are available, do *not* change the setting of the RS232 adapter. You will find out with certainty whether there is a conflict after initially installing the adapter and booting up your PC.

The Address on the RS232 adapter is selected using a jumper on the top edge of the adapter. The adapter is preset to hexadecimal Address **280** (includes 281-287). Other Address choices are **290**, **2A0**, and **2B0**.

> ***Note:*** Change this setting only if you verify a conflict with other equipment in the PC.

The RS232 adapter only decodes the low 10 address lines. This means that the RS232 will conflict with any other adapter whose low 10 address lines match the RS232 address. The low 10 address lines specify hexadecimal addresses from 0000 to 03FF.

If you have verified an Address conflict with another adapter, move the jumper to one of the other settings. The settings are clearly marked on the adapter.

After you have completed the RS232 adapter installation, you need to check the Address setting in the Barr software to make sure it matches the adapter setting.

2.2 Connection to a Host

Once the adapter is installed in the PC, it can be connected to a modem using the SCC1 cable. Direct connection to another PC or to a host front-end processor also is possible using a synchronous modem eliminator (SME) connector.

Refer to Appendix A for cable specifications and SME installation instructions. Modems are discussed in Appendix B.

Chapter

3 Adjust Software Settings

The Installation chapters of your Barr software manual completely describe software installation. This chapter covers the additional RS232 adapter parameters you need to specify.

In the Barr software, you need to enter the Interrupt Request level (IRQ), Address, and DMA settings for the adapter.

To run the Barr software, at the DOS prompt enter the Barr software startup command followed by the letter **i**. For example, for BARR/RJE enter:

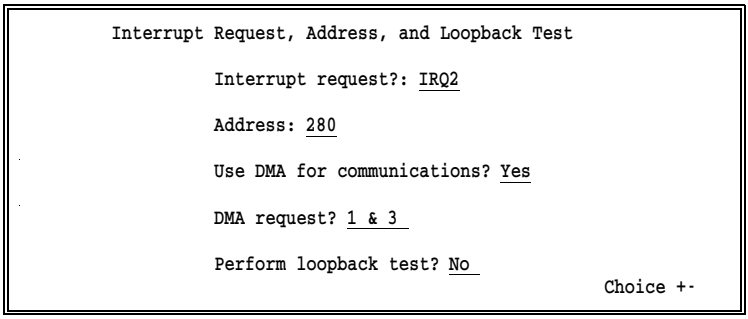
```
BARRSNAR i
```

The sample screens are for BARR/RJE software. If you have a different Barr product, the information on your screen may differ slightly. To reach the software settings, from the Installation Description screen:

```
                Installation Description


        RJE Description
        Communication Link
        Devices and Printers: LPT, COM, NET, SEND, LAN
        Print Spool Description
        Assign Devices
        Monitor and Adapter
        Modem Type and Dialing Instructions
        Printer Forms
        Function Keys
        Commands Sent at Startup
        Startup Screen Notes
        Interrupt Request, Address, and Loopback Test
        Tuning Data

        Exit and Save Changes


                                              Selection ↑↓→←
```

➤ Select **Interrupt Request, Address, and Loopback Test**.

3.1 Interrupt Request, Address, and Loopback Test Screen



The following options are specified:

Interrupt request?

Barr software automatically loads the Interrupt Request level. The default value is **IRQ2**. Other choices are **IRQ3**, **IRQ4**, and **IRQ5**. You probably will not need to change the setting. However, a conflict is not uncommon if you are using a Local Area Network adapter. LAN adapters typically use **IRQ2**.

> ***Note:*** Change the default setting only if you verify a conflict with other equipment in the PC. **IRQ5** is the best alternate setting.

Address:

The Address in the software must match the Address jumper setting on the adapter. The default value is **280**, both on the adapter and in the software. Other choices are **290**, **2A0**, and **2B0**. (If the software and adapter addresses do not match, the choices displayed on your screen may differ from the ones listed in this manual.)

> ***Note:*** Change the default setting only if you verify a conflict other equipment in the PC.

Use DMA for communications?

Direct Memory Access (DMA) is a time-honored way to achieve high transfer rates between memory and a peripheral device. Special hardware implements Direct Memory Access so that the software only has to initiate the transfer of a *block* of memory. Without DMA, software has to process each *byte* of memory.

Yes Default. Use DMA. At speeds of 19,200 bps or greater, DMA is recommended.

No DMA is not used. At speeds less than 19,200 bps you may want to disable DMA to avoid possible conflicts with other equipment in the PC.

DMA request?

Use of DMA increases performance. The default value of **1 & 3** uses two DMA levels. Other possible settings are DMA level **1** or level **3**. Which value you choose depends on your PC type and whether you are using full-duplex or half-duplex communications.

On most PCs, both DMA levels **1** and **3** are available. (On the PC XT, only DMA request **1** is available.) For full-duplex (when **DATMODE=FULL** is specified in the **Communication Link**) use DMA request **1 & 3**. For half-duplex, use either DMA **1** or **3**.

Perform loopback test?

The loopback test verifies that the adapter and cable are installed correctly and that the adapter and software settings are correct. This test requires the loopback Test plug that is provided with the SCC1 cable.

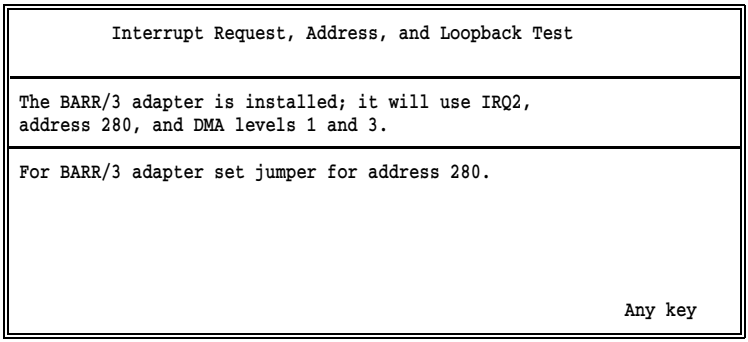
No Default. Do not perform the test.

Yes Run this test after hardware and software installation, whenever the settings on this screen are changed, or if a hardware error is suspected. The loopback test performs diagnostics of the synchronous adapter, cable, and modem. Instructions display on the screen for each step. Refer to Chapter 4 for detailed information about the loopback test.

3.2 Additional Adapter Information

When you finish entering the adapter settings on the **Interrupt Request, Address, and Loopback Test** screen, additional adapter information displays.

If the software and adapter address settings match, this screen confirms the RS232 adapter settings. (The RS232 adapter was previously named BARR/3 adapter.)



If the software and adapter address settings do not match, instead you will see suggested settings for several different Barr adapters. The information that displays for the RS232 adapter tells you how to set the adapter jumper to match the Address value you entered on the previous screen.

Chapter 4

Perform the Loopback Test

Barr software features the loopback test. This test verifies that the adapter is functioning properly by performing diagnostics of the RS232 synchronous adapter, SCC1 cable, and your modem. The loopback test consists of three phases: Adapter Installation and Settings, All Adapter Functions, and Cable and External Modem.

Phase 1 — Adapter Installation and Settings

The first phase can be run as is — you do not need the Test plug or a modem connection. This phase verifies that the adapter is installed correctly and that all settings are correct.

Phase 2 — All Adapter Functions

The second phase requires the Test plug that comes strapped to the modem cable. To run this phase, insert the Test plug into the adapter. Any problem reported in this phase is with the adapter or Test plug.

Phase 3 — Cable and External Modem

The third phase requires you to set your modem to analog loopback (AL) mode, or local loopback (LL) mode on some modems. Data does not enter the telephone line in this mode. Instead, data loops back into the receive side of the modem.

In this phase the PC sends data:

- through the send side of the Barr adapter,
- into the cable,
- from the cable to the modem, and
- through the send side of the modem.

The data returns:

- through the receive side of the modem,

- from the modem to the cable,
- from the cable into the Barr adapter,
- through the receive side of the Barr adapter, and
- into the PC.

4.1 Loopback Test Steps

Steps for running the loopback test are listed below. Detailed instructions for performing each step follow the list.

Step 1 At the DOS prompt, run the Barr installation software. For example:

```
BARRSNAR i
```

Step 2 From the Installation Description screen:

➤ Select **Interrupt Request, Address, and Loopback Test**.

Step 3 From the Interrupt Request, Address, and Loopback Test screen:

➤ Select **Perform loopback test? Yes** and press Enter.

➤ Press Enter to exit the Additional Adapter Information screen.

Step 4 Follow the instructions that display on the screen for each step of the loopback test.

Step 1

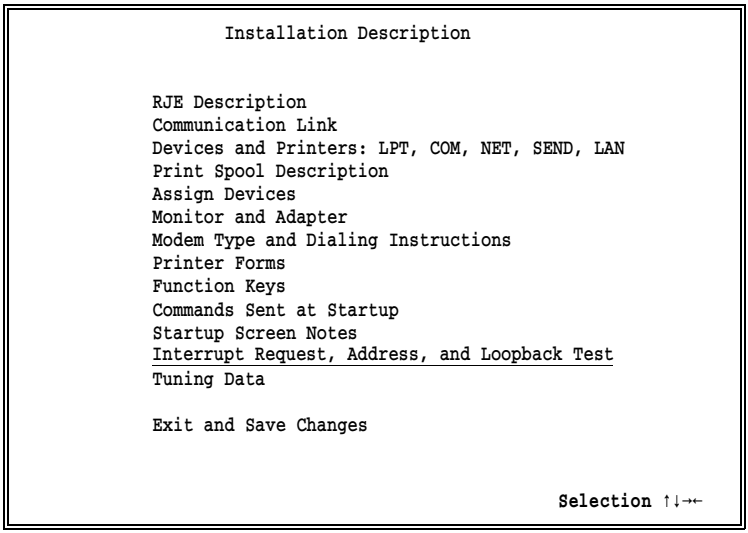
The loopback test is run using Barr installation software. For more information about Barr installation software, refer to the *Installation* chapter of the Barr software manual.

To run the Barr software, at the DOS prompt enter your software startup command followed by the letter **i**. For example, for BARR/RJE enter:

```
BARRSNAR i
```

Step 2

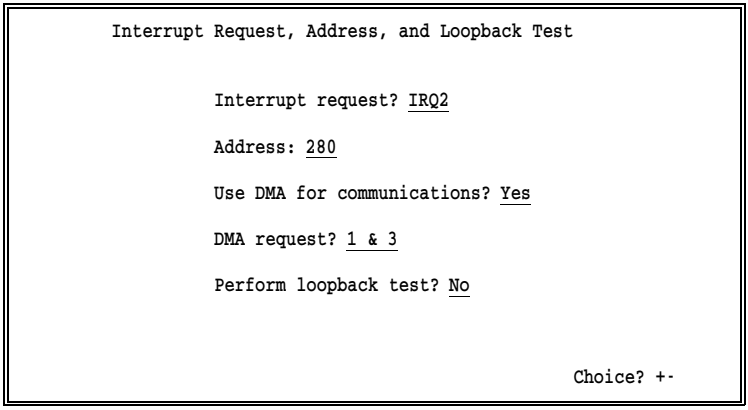
From the Installation Description screen:



➤ Select **Interrupt Request, Address, and Loopback Test**.

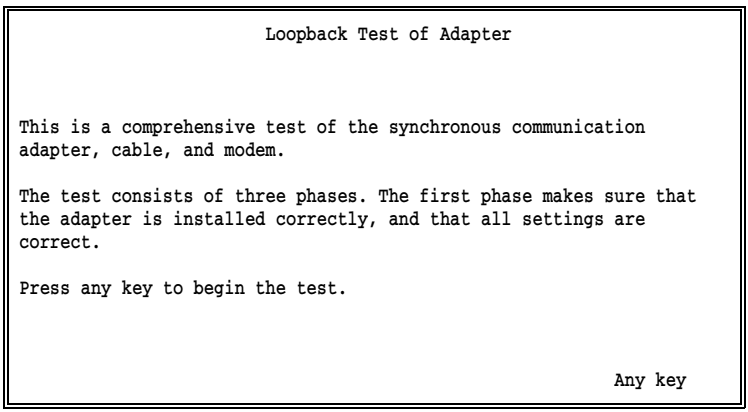
Step 3

The Interrupt Request, Address, and Loopback Test screen displays.



➤ To run the loopback test, at **Perform loopback test?** select **Yes**.

When you press Enter, additional adapter information displays. The screen shows the IRQ, Address, and DMA settings assigned (refer to section 3.2). Press Enter again to advance to the first screen of the loopback test.



Step 4

A different screen displays for each phase of the loopback test. Follow the instructions that display on the screen.

4.2 Loopback Test Results

If the loopback test fails, you need to know which phase failed. Watch the messages on the screen. **TEST PASSED** or **TEST FAILED** displays for each phase. Then at the end of the loopback test, a summary message displays. The summary message of **TEST PASSED** indicates all phases passed. The summary message of **TEST FAILED** indicates one or more phases failed.

A failure in Phase 1 or Phase 2 most likely indicates a problem with the adapter. Check the following:

- Is the adapter installed correctly? Make sure the adapter is firmly in the slot.
- Is the adapter making a clean connection? Try cleaning the adapter slot connectors with a pencil eraser.
- Is there an Interrupt Request conflict with another adapter? If so, follow the instructions in Chapter 3 to reset the IRQ.
- Is the Address specified in the program the same as the jumper settings on the Barr adapter? If not, follow the instructions in Chapter 3 to change the Address in the software.

A failure in Phase 3 most likely indicates a problem in the cable and/or modem, not in the adapter. Check the following:

- Is the modem set to analog loopback (AL) mode?
- Is the modem cable connected correctly?
- If you are not using the supplied Barr cable, does the cable meet the specifications in Appendix A? In particular, standard async modem cables do not work with the RS232 adapter because pins 15 and 17 are not connected.

Notes:

Appendix

A Barr SCC1 Cable Specifications

Barr Systems provides an SCC1 cable for connecting the RS232 adapter to an external modem. An optional SME Modem Eliminator connector is available for converting the SCC1 cable into a synchronous modem eliminator cable.

A.1 Barr SCC1 Modem Cable

The Barr SCC1 cable is used to connect the RS232 adapter to an external synchronous modem. A 2.5 meter (8-foot) cable is provided. It has a female D25 connector that plugs into the adapter, and a male D25 connector that plugs into the external modem.

> ***Note:*** A standard asynchronous cable does not work with the RS232 adapter because pins 15 and 17 are not connected.

Cable Specifications

All pins on the supplied cable are connected straight through from the male to the female (D25) connectors. A radio frequency shielding wrap is connected to pin number 1.

Pinouts for D25 connector:

Pin Number	Name	Description
1	PRO-GND	Protective Chassis Ground
2	TXD	Transmit Data
3	RXD	Receive Data
4	RTS	Request to Send
5	CTS	Clear to Send
6	DSR	Data Set Ready
7	SIG-GND	Signal Ground
8	DCD	Data Carrier Detect

Pin Number	Name	Description
15	TXC	Transmission Signal Element Timing (DCE Source)
17	RXC	Receiver Signal Element Timing (DCE Source)
20	DTR	Data Terminal Ready
22	RI	Ring Indicator

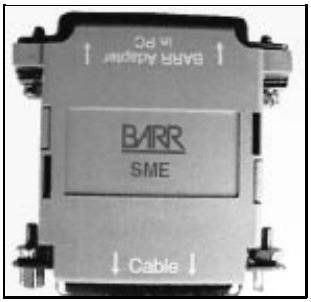
A.2 Synchronous Modem Eliminator Cable

If your PC is located within 30 meters (100 feet) of the mainframe, you can use a synchronous modem eliminator (SME) cable to directly connect the PC to the front-end processor or mainframe communications controller. An SME cable eliminates the need for modems or a modem eliminator box, because the RS232 adapter produces the modem clock signal, and the SME cable is wired to accept the clock signal from the RS232 adapter. However, the front-end processor is still configured for a modem connection.

The RS232 adapter produces a clock signal on pin 24 for transmit and receive timing. This clock is connected to the send and receive clocks (pins 15 and 17) on both the RS232 adapter and the front-end processor.

Barr SME Connector

An optional Barr Synchronous Modem Eliminator (SME) connector converts your Barr SCC1 cable to an SME cable.



Barr SME connector

The SME connector attaches to the male end of the SCC1 cable, converting it to a female connector. Thus, both ends of the converted SCC1 SME cable have female D25 connectors.

Cable Specifications

In the cable specifications below, the ends of the converted cable are referred to as PC and Host.

- The end of the SME connector labeled **Barr Adapter in PC** plugs into the RS232 adapter. Thus, it is referred to as the PC connector.
- The other end of the SCC1 cable plugs into a Line Interface Coupler (LIC) cable on the front-end processor and is referred to as the Host connector.

Cable wiring between PC and Host Connectors:

PC Pins		Host Pins	PC Pins		Host Pins
1	-	1	8	-	5
2	-	3	15	-	15
3	-	2	20	-	22
5	-	8	22	-	20
7	-	7			

Jumpers within the PC Connector:

4 - 5
6 - 22
15 - 17
17 - 24

Jumpers within the Host Connector:

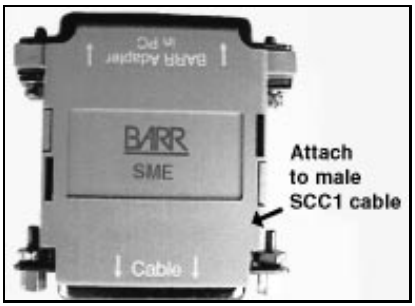
4 - 5
6 - 22
15 - 17

Connect the PC to the Front-End Processor

These instructions describe how to connect the RS232 adapter to the front-end processor or mainframe communications controller, using the Barr SCC1 cable and SME connector.

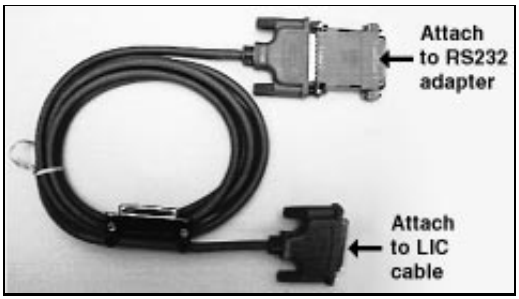
The end of the cable with the SME connector plugs into the PC adapter. The other end connects to a cable extending from the front-end processor's Line Interface Coupler (LIC).

> ***Note:*** Two types of LIC cables are available. One type connects to a modem eliminator box, while the other type connects to a modem. Because the RS232 adapter produces the modem clock signal, you must use the LIC cable that is designed for connecting to a *modem.* Additionally, the front-end processor must be configured for a modem connection.



Barr SME connector

Step 1 One end of the SME connector is labeled **Cable**. Attach this end to the male end of the SCC1 cable.



SCC1 cable with SME connector attached

Step 2 The other end of the SME connector is labeled **Barr Adapter in PC**. Plug this end into the RS232 adapter.

Step 3 Plug the other end of the SCC1 cable into the LIC cable that extends from the front-end processor.

Step 4 Finally, set the communications speed in the Barr software.

- From the Installation Description screen, select **`Tuning Data`**, then select **`Modem and Line Control`**.
- For **`Communications speed when using synchronous modem eliminator cable`**, enter the correct speed.

This parameter is documented in the Tuning Data chapter of your Barr software manual.

Notes:

Appendix

B Modems

Data transmission between the PC and the central computer is completed through telephone lines. The PC sends signals in digital form to a modem. The modem translates these digital signals to the analog signals transmitted by the telephone lines.

When the PC is transmitting, the modem converts (modulates) the digital signals to the analog signals used by the telephone system. When the PC is receiving, the modem restores (demodulates) the signal to digital form. The word *modem* is derived from *mo*dulate-*dem*odulate.

The modems at each end of the transmission line — the host's modem and the remote PC's modem — operate at the same speed [bits per second (bps)], but must also keep in *step* with one another. Asynchronous and synchronous are the two methods of timing communications. Barr products support synchronous communications and require synchronous modems.

Asynchronous transmission communicates with a single character preceded by a start bit and followed by one or two stop bits. Essentially, the transmission message contains one character with no restriction on the length of time between messages. Low-speed terminals use asynchronous transmission (referred to as *start-stop* transmission) to communicate with interactive systems.

Synchronous transmission incorporates a clocking mechanism coded in the signal carrier that does not need start bits. Successive characters are sent without any intervening start and stop bits. The receiver stays in *sync* with the sender by constantly evaluating the clock periods in the received signal. The transmission message consists of many characters; therefore, the inefficiency of stopping and starting between characters is eliminated.

Modems used on dial-up telephone lines communicate at various speeds and code bits of data using various modulation techniques. These modulation techniques are defined by modem standards.

Synchronous Modem Standards

Standard	Speed (bps)
Bell 212A	1200
Bell 201C	2400
Bell 208B	4800
CCITT V.22	2400
UDS 9600	9600
CCITT V.29	9600
CCITT V.32	9600

Any modem you choose to use on the dial-up or dedicated line must conform to the standard that the host computing center supports. If you do not yet have a modem, speak with the computing center consultant about the type of modem that is compatible with the host installation. The modem should be equipped with an RS232 connector. The SCC1 cable connects the Barr adapter to the external modem.

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the 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 and used 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:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and 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.

You also are warned that any changes to this certified device will void your legal right to operate it.

Note: A shielded and grounded cable is required.

Notes:

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(2) Repair or replace the Product Hardware within a reasonable period of time if it should prove defective, or

(3) Provide or authorize a refund of the purchase price of the Licensed Software or the Product Hardware.

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