PRINT370

PC-based remote printing for S/390
channel-attached printers

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Preface

Welcome to a high-performance product for driving S/390 channel printers from a PC.

The PRINT370 option enables your PC to drive up to six S/390 channel-attached printers at maximum speeds. PRINT370 is an enhancement for BARR/RJE, RJE+3270, BARR/3270, BARR/HASP, BARR/3780, and BARR/SPOOL products. The PRINT370 option also comes with BARR/AFP.

PRINT370 and CHANNEL OUT Adapters

PRINT370 supports different data transfer modes that require different adapters. The PRINT370 adapter supports the interlock transfer modes DCI Single Tag and DCI High Speed Transfer. The CHANNEL-OUT (BT) adapter supports the interlock transfer modes and the 3.0 and 4.5 megabyte data streaming transfer modes. Both adapters use the CHANNEL-OUT cable.

Which adapter you use depends on which transfer modes and transfer rates your printers support. To use any of your printers in data streaming mode, you need the CHANNEL-OUT (BT) adapter. When it operates in DCI High Speed Transfer Mode, the CHANNEL-OUT (BT) adapter maintains higher data transfer rates than the PRINT370 adapter.

Using this Manual

Throughout this manual, where it is necessary to distinguish between the two adapters, the corresponding adapter (PRINT370 adapter or CHANNEL-OUT (BT) adapter) is specified.

Follow step by step through this manual to install the PRINT370 software and connect your printers.

Barr Technical Support

Contact Barr Technical Support at 800-BARR-SYS Monday through Friday between 9 a.m. and 8 p.m. Eastern time if you have questions or problems with Barr hardware or software. Technical Support will ask for your adapter

serial number and software version number. When you call, please have this information on hand.

If you contact Technical Support via fax, e-mail, or the web site support page, please include the serial number and software version number in your correspondence.

You can obtain the adapter serial number from any of these places:

■ Software Operation screen when you select Advanced, Diagnostics, Hardware Queries, Show Serial Numbers
■ Label on the adapter box
■ Blue sticker on the adapter edge visible from the rear of the PC
■ Handwritten label on the back of the adapter

You can obtain the version number of the software from these places:

■ Second screen of the Installation Description
■ `Quit` option of the Operation screen

Contents

Notes:

Chapter

1 Introduction

If you are new to channel printing, review sections 1.1 through 1.4 to learn more about channel printing, supported printers, and product features.

Sections 1.5 through 1.8 describe PRINT370 package contents and PC requirements. Review these sections to make sure you have everything you need before you begin installation.

1.1 S/390 Channel Printing

Barr PRINT370 hardware and software enable your PC to directly connect to System/390 (S/390) channel-attached printers. This section discusses S/390 concepts and describes how PRINT370 replaces traditional S/390 configurations.

S/390 Channel Interface

The S/390 channel interface is a high-speed interface for attaching multiple devices, such as printers, to a single channel on an IBM System/390 mainframe. Devices are attached to the channel via control units, which can be built into the channel device or can be separate units. (S/390 printers have built-in control units.)

The channel interface uses one-inch thick bus and tag cables. The bus cable transmits data and has separate Bus In and Bus Out connectors. The tag cable controls the type of information on the bus and has separate Tag In and Tag Out connectors. The Bus In and Tag In connectors transmit information to the mainframe channel. The Bus Out and Tag Out connectors transmit information to the device's control unit.

Traditional S/390 Configuration

Traditionally, S/390 printers connected directly to mainframe computers via the channel interface (see Figure 1-1).
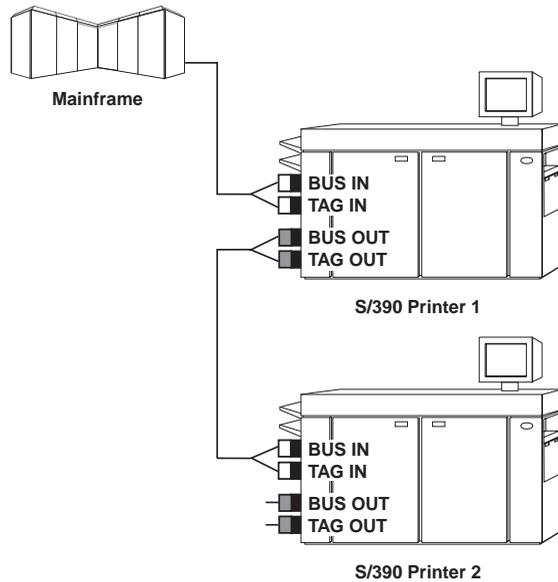
Figure 1-1. S/390 channel printers are designed to connect directly to a mainframe via the mainframe channel interface.

Other configurations, such as channel extender devices or Xerox 871-CM devices, evolved to allow printers to be remotely connected to the mainframe.

PRINT370 Configuration

PRINT370 is a modern, high-volume, remote printing solution that is more cost effective and simpler to use than traditional S/390 remote configurations (see Figure 1-2).
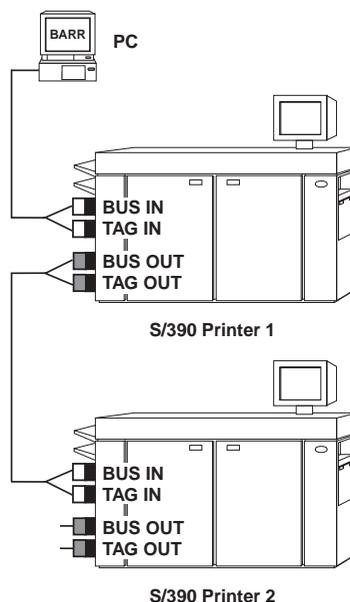
Figure 1-2. A PC with PRINT370 hardware and software replaces the printer connection to the mainframe channel.

The adapter and cable included in your PRINT370 package enable you to physically connect S/390 channel devices to the PC (see Figure 1-3).
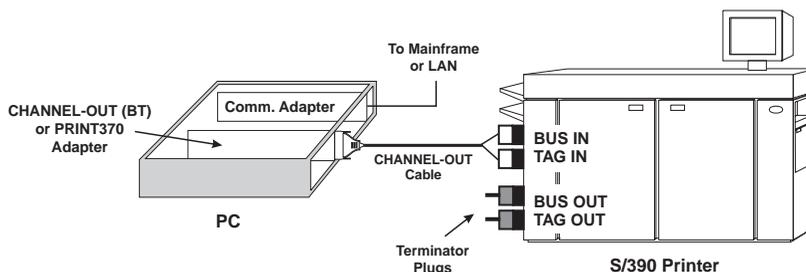
Figure 1-3. The PRINT370 adapter or CHANNEL-OUT (BT) adapter and CHANNEL-OUT cable connect channel printers to the PC.

The PC and the PRINT370 hardware and software supply the S/390 channel—normally the role of the mainframe. Because it supplies the channel interface, the Barr software controls the channel-attached printers. When data from the mainframe or local area network (LAN) arrives at your PC, PRINT370 sends the data through the adapter to the CHANNEL-OUT cable connecting the PC and the first printer.

You can attach multiple printers to the adapter by cabling, or daisy-chaining, the printers together. From the Barr software Assign Devices screen, you direct the data flow from sources to printers (see section 4.5 for more information). For example, you can direct data from the mainframe to the second channel printer. Data travels through the printer chain until it reaches the designated printer (see Figure 1-4).
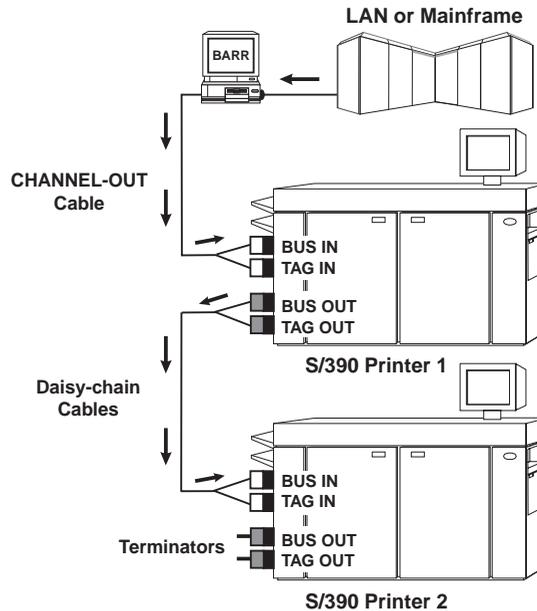
Figure 1-4. Data assigned to print on S/390 Printer 2 flows from the data source to the PC and then through S/390 Printer 1 before reaching Printer 2.

Barr S/390 Printing Solutions

Several different Barr printing solutions are available.

- BARR/SPOOL with PRINT370 connects your printers to the LAN only (see Figure 1-5).

- BARR/RJE with PRINT370 connects your printers to the mainframe and the LAN (see Figure 1-6). (For more information about the type of main-frame RJE systems supported, see your *BARR/RJE* manual.)

- BARR/AFP connects your printers to AS/400 systems and the LAN (see Figure 1-7).
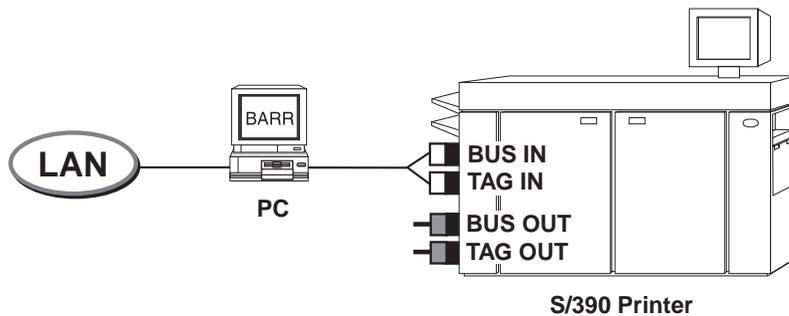
Figure 1-5. BARR/SPOOL with PRINT370 routes data from the LAN to S/390 channel printers.
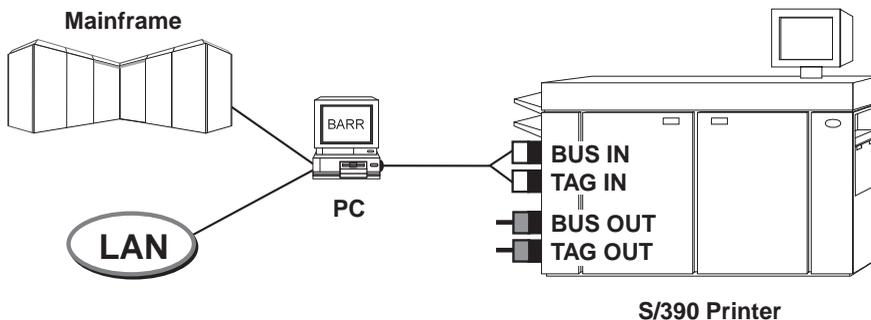
Figure 1-6. BARR/RJE with PRINT370 routes data from the mainframe and the LAN to S/390 channel printers.
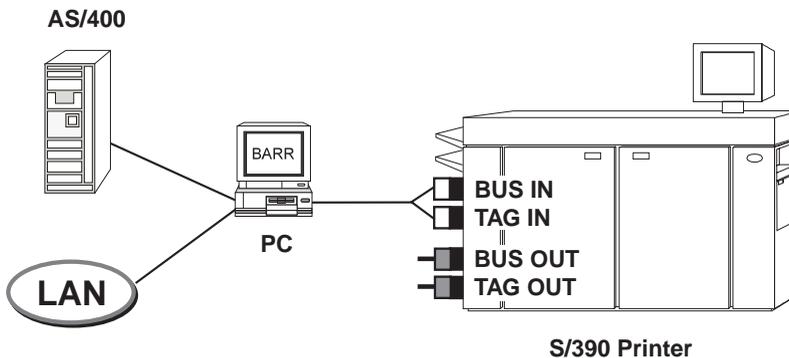
Figure 1-7. BARR/AFP routes data from the AS/400 and the LAN to S/390 channel printers.

You also can purchase software options that let you receive data from TCP/IP, UNIX, or VAX hosts, as described in section 1.4.

File Formats and Channel Commands

To write to channel printers, PRINT370 requires data to have specific formats and contain channel commands. Files can have the Barr S/390 file format, the ASCII format, or special Xerox formats. For more information about file formats and S/390 channel commands, see Appendixes A through C.

1.2 Supported S/390 Printers

This section lists the types of printers PRINT370 supports and discusses printer capabilities. Because channel-attached printers have various features and capabilities, different printers work with different Barr products.

Line printers, laser printers, and Océ (Siemens) 3800-3 Compatibility Mode printers can print data from Barr RJE, BARR/3270, or BARR/SPOOL products with PRINT370. Barr RJE products include BARR/RJE, RJE+3270, BARR/HASP, and BARR/3780.

AFP printers are controlled by the mainframe and can print data only from SNA-based products with the PRINT370 option. Barr SNA-based products include BARR/RJE, RJE+3270, BARR/3270, and BARR/AFP.

PRINT370 supports the printers listed in this section.

Line Printers and Plotters

Line or band printers are traditionally used with Remote Job Entry (RJE) workstations. They print on continuous-form paper and range in speed from 300 to 5,000 lines per minute. Line printers excel in applications that use pre-printed, multi-part forms. They can accept data from 3270 sessions, RJE sessions, PC LANs, and the Barr print spool feature.

PRINT370 supports these line printers and plotters:

- IBM 3203, 3211, 4245, 4248, and 6262
- IBM 3203 or 3211 type plotters
- STK 5000

Laser and Non-Impact Printers

Laser printers produce high-quality output on cut-sheet paper or continuous-form paper. Many have electronic forms overlay, graphics, and duplex capabilities. Some can print over 100 pages per minute. Laser printers can print data originating from 3270 sessions, RJE sessions, PC LANs, XPAF, and the Barr print spool feature.

Océ laser printers that operate in IBM 3800 Compatibility Mode can print on continuous-form paper. They can accept data from 3270 sessions, RJE sessions, PC LANs, and the Barr print spool feature. To use these printers with PRINT370, you must obtain software utilities from Océ (formerly Siemens Nixdorf Printing Systems).

PRINT370 supports these laser printers:

- Comparex 6890, 6900
- Nipson Series 3000
- Océ 2050-300, 2075-2, 2090-2, 2140-2, 2140-3, 2200-2, 2200-3, 2240-2, 2240-3, and 2300-2
- STK 6100-19, 6100-26
- Xerox 377 CF, 4050, 4075, 4090, 4135, 4635, 4650, 4850, 4890, 8790, and 9790

Advanced Function Printers (AFP)

AFP printers have graphics capabilities and range in speed from 20 to 100 pages per minute. Because the mainframe directly controls Advanced Function Printing (AFP), AFP printers can only print files sent from the IBM Print Services Facility (PSF). AFP printers cannot print files generated on the PC or files from the job entry subsystem (JES). Additionally, data received from PSF must be sent directly to the printer. PSF data cannot be written to the Barr print spool or to a PC disk.

AFP printers communicate with the mainframe via an SNA LU 6.2 session. They are divided into two groups, according to whether or not they implement SNA communications. Printers that can communicate with SNA (for example, the IBM 3820) are called VTAM-Attached IPDS printers. Printers that cannot perform SNA communications (such as the IBM 3825 and Océ 2050) are called IPDS Group 3 printers. For these printers, the PRINT370 software implements SNA communications.

PRINT370 supports these AFP printers:

- IBM 3820, 3825, 3827, 3828, 3835, 3900
- Océ 2030-2, 2050-200, 2075-200, 2090-4, 2140-4, 2240-4, 2300-4
- IPDS Group 3 equivalent printers

Software with AFP or IBM 3820 support is available at no additional charge.

Computer Output Microfiche Devices

Computer output microfiche devices write computer output to microfiche or microfilm at speeds from 30,000 to 35,000 lines per minute. They can print data originating from 3270 sessions, RJE sessions, PC LANs, XPAF, and the Barr print spool feature. Some devices include graphics capabilities.

PRINT370 supports these computer output microfiche devices:

- Anacomp DatagraphiX, XFP 2000
- Kodak Komstar, Optistar
- Micrographics Technology COM 6831

1.3 Communication and Print Speeds

BARR/RJE and PRINT370 are ideal for driving the fastest S/390 channel-attached printers. BARR/RJE supports high-speed communications at up to T1 (1.536 Megabits-per-second) and E1 (2.048 Megabits-per-second) speeds. Print speeds range from 1,000 lines per minute to more than 20,000 lines per minute, depending on the mainframe communications speed, printer capabilities, data type, and page density.

Determining Print Speed

Refer to Table 1-1 or Table 1-2 to determine the print speed you can achieve for a given line speed. Use Table 1-1 if you only need a rough estimate or you do not know the page density. Use Table 1-2 for a more accurate estimate, especially for graphics-based data or for data other than standard ASCII or EBCDIC.

To determine the possible print speed, find the speed for your printer in one of the tables, and then note the required communications line speed. If your line speed is greater than or equal to the value in the chart, Barr software can drive the printer at its rated speed. For example, if you have a 120-page-per-minute printer and print data that contains no graphics, you can drive the printer at full speed with a 56 kilobits-per-second (Kbps) line. If your line speed is less than the value in the chart, use the Barr print spool feature, if possible, to drive the printer at full speed, or consult mainframe personnel to determine if they can increase the line speed.

Table 1-1. Communication Speeds Based on Printer Speed

Lines per minute	Pages per minute	Communications Speed (bps)
660 - 1440	20	9,600
1320 - 2880	40	19,200
2640 - 5760	80	38,400
3850 - 8400	116	56,000
4400 - 9600	133	64,000
8800 -19200	266	128,000

Note: Print rates in this table are for average density, character-only data. For graphics-based data, see the notes below.

AFP Printing: AFP printers do not support compression. Double the line speed in this table to achieve the corresponding print speed.

Graphics Printing: Triple the line speed in this table if the data contains mostly graphics.

Files that contain many graphics or consist of IBM AFP data or Xerox metacode have a greater page density than character-only files. (The mainframe processes the data and adds printing instructions before

transmitting the data to the PC. Also, the data requires printer-loaded resources, such as fonts.) As a result, you need to consider page density when estimating the line speed required to drive the printer. In Table 1-2, the bytes per page column represents the total amount of data transmitted, including printer instructions. Line speeds in bits per second (bps) are provided for SDLC and 802.2 connections.

Table 1-2. Communication Speeds Based on Page Density

Bytes per Page	Pages Per Minute	SDLC bps at 90% Line Efficiency	802.2 bps (Actual Throughput)
5,000	50	30,000	33,333
10,000	50	60,000	66,666
20,000	50	120,000	133,333
5,000	100	60,000	66,666
10,000	100	120,000	133,333
20,000	100	240,000	266,666
5,000	200	120,000	133,333
10,000	200	240,000	266,666
20,000	200	480,000	533,333
5,000	400	240,000	266,666
10,000	400	480,000	533,333
20,000	400	960,000	1,066,666

Calculating the Line Speed for Graphics-Based Data

Graphics-based data is more dense than character-based data. Print rates for graphics-based data are based on the number of bytes per page and the pages-per-minute speed of the printer. If Table 1-2 does not contain the values you need to estimate the line speed required to drive the printer, use one of the following formulas.

SDLC Equation

(Maximum bytes per page) x (Pages per minute) x
(8 bits per byte/60 seconds per minute) x (Line efficiency) =
N bits per second (bps)

Obtain the SDLC line efficiency value from your network manager. For SDLC communication links, a line efficiency of 90 percent is common.

802.2 Equation

$$(Maximum\ bytes\ per\ page) \times (Pages\ per\ minute) \times$$
$$(8\ bits\ per\ byte/60\ seconds\ per\ minute) =$$
$$N\ bits\ per\ second\ (bps)$$

802.2 networks are rated at 4 or 16 Mbps per second. Because of factors such as network traffic and bridge and router load balancing, the maxi- mum throughput available to the Barr software ranges from 300 to 400 Kbps. (Very fast PCs with PCI network adapters might be able to achieve speeds of 600 Kbps to 1.5 Mbps.) If the calculated line speed is too slow to drive your printer, consult your network manager to see whether network tuning is possible.

1.4 Features

This section describes standard PRINT370 features and features provided by other software options.

Standard Features

When you use PRINT370 with BARR/RJE software, you can take advantage of all the RJE features, including true full-duplex communication (DATMODE=FULL), data compression and compaction, and remote console commands. For a complete list of BARR/RJE features, see the Features chapter of your *BARR/RJE* manual.

Multiple S/390 Channel-Attached Printers

PRINT370 supports simultaneous use of up to six S/390 channel-attached printers from a single PC.

Transfer Modes

The PRINT370 PCI option supports the 3.0 and 4.5 megabyte Data Streaming transfer modes and the interlock transfer modes (DCI Single Tag and DCI High Speed Transfer).

The PRINT370 option supports the interlock transfer modes.

Print Spooling

Barr RJE uses functionally complete, mainframe-like features to receive files to disk while simultaneously printing other files. For example, you can view files before printing them and you can print multiple copies of a file.

LAN Print Server

If the PC with PRINT370 is on a LAN, any PC on the LAN can submit DOS files to print on an S/390 printer.

Printing from XPAF

You can send documents generated by the Xerox Printer Access Facility (XPAF) to channel printers.

Xerox Metacode

SNA transparency ensures that all non-character data is received correctly. This feature is important for Xerox metacode and other binary data.

AFP Printing from PSF

PRINT370 supports Advanced Function Printing (AFP) to channel-attached page printers at remote locations. You can print full-page graphics files and formatted documents created by your favorite applications at high speeds. See Chapter 7 for more information about AFP support.

AFP support or IBM 3820 AFP support is available at no additional charge.

Loopback Diagnostic Program

The loopback test is an important diagnostic tool used to verify the correct operation of the PRINT370 or CHANNEL-OUT (BT) adapter and CHAN-NEL-OUT cable. (A separate loopback test is provided for the Barr synchro-nous communications adapter and cable.)

Optional Features

You can purchase additional option software for your Barr products. Contact a Barr sales representative for more information about these options.

PRINT/CHANNEL

Emulate up to eight 3211-type channel printers. PRINT/CHANNEL lets you route mainframe print jobs to network printers and share your mainframe printer with the network. This option is available only for BARR/SPOOL.

PRINT/TWINAX

Print from an AS/400 to a PC. This option emulates 5250 series printer on an S/390 printer. One adapter provides six print sessions and two adapters provide 12 print sessions. PRINT/TWINAX supports DJDE and metacode pass-through for Xerox channel-attached laser printers.

BARR/PRINT for LAT

Print from a DEC VAX/VMS computer to a PC. This option uses the Local Area Transport (LAT) protocol. It supports up to eight concurrent printer sessions and allows up to four TCP/IP connections to hosts on the network.

BARR/PRINT for TCP/IP (LPD)

Print from UNIX hosts to a PC, over a TCP/IP (Ethernet) network. This option uses the BSD Line Printer Daemon (LPD) protocol to service Line Printer Remote (LPR) requests.

1.5 Printer Requirements

You must configure your printer to work with PRINT370. This section describes the required printer settings. Some S/390 printers are configured with switches while others are configured with software. To determine which method is used to set up your printer, consult your printer manual or contact your printer vendor.

All Printers

The requirements described below apply to all S/390 printers used with Barr PRINT370. They define the type of communication between the channel and the printer.

If you have a laser printer, also see Laser Printers later in this section. If your printer comes from Océ, also see Océ Printers later in this section.

Interface Connection Mode

The printer interface connection determines how input/output operations are handled. Your printer supports two interface connection choices, Burst Mode and Byte Mode. Because PRINT370 provides a block multiplex channel, it supports only Burst Mode. Block multiplex means that the software allows multiplexing between data blocks. In Burst Mode, the printer maintains the channel connection until an entire data block is transferred. Be sure to configure your printer for Burst Mode.

Data Transfer Mode

The printer settings Two Tag and Four Tag specify the technique for transferring data on the channel. PRINT370 automatically detects and adapts to either method, so you must configure the data transfer option only on the printer.

The Two Tag option, also known as DCI Single Tag, uses one signal pair (Service In and Service Out) to control data transfer on the channel.

The Four Tag printer option, also known as Double Tag or DCI High Speed Transfer (HST), uses two signal pairs (Service In, Service Out, and Data In, and Data Out) to control data transfer on the channel.

Unlike the Two Tag and Four Tag options, the Data Streaming printer setting is not adversely affected by signal delays introduced by long cable lengths. Because the software cannot detect the data streaming data rate, you must specify the data rate (3.0 or 4.5 megabyte) in the software. You can use data streaming only if you purchased the CHANNEL-OUT (BT) adapter.

IMPORTANT: The PRINT370 adapter does *not* support data streaming data transfer. If you purchased the PRINT370 adapter, verify that data streaming is not enabled on your printers, otherwise the results might be unpredictable.

Laser Printers

When they print mainframe data, many laser printers work better if data translation is disabled at the mainframe. In fact, for Xerox laser printers to work correctly, you *must* disable translation.

Historically, data translation was used with line printers to change lower-case letters to uppercase and to change special characters that did not appear

on the print train to blanks. Because laser printers can print upper- case, lowercase, and special characters, data translation is unnecessary.

Xerox laser printers require special data types to print graphics images or bar codes and to download fonts. If data translation is enabled, data will not print correctly.

The JES2 TRANS parameter controls translation. Ask the mainframe systems programmer to set this parameter to TRANS=NO. This parameter must be explicit, because mainframe systems automatically use TRANS=YES if the TRANS parameter is not specified. For older versions of JES, the TRANS parameter is set only on the PRINTDEF statement. For newer versions of JES, this parameter can be set on the Remote Printer Statement.

VSE/POWER: The VSE/POWER operating system does not allow you to disable data translation. Be careful if you try to use Xerox laser printers in the VSE/POWER environment.

Océ Printers

Mode Setting

Océ printers can operate in AFP Mode, Compatibility Mode, Line Mode, or Page Mode. PRINT370 supports only the first three modes. It does *not* support Page Mode.

The operating mode defines the printer capabilities and is controlled by software you use to boot the printer. You must use different boot software for each operating mode, so be sure to use the correct version.

Bypass Switch Setting

When you use PRINT370 with Océ 2200 model printers, you must disable the printer's Select Bypass Switch.

SNPFORM and SNPIMAGE Utilities

If your printer is operating in IBM 3800 Compatibility Mode, you must obtain the SNPIMAGE and SNPFORM software utilities from Océ. If you are using an Océ 2050 or 2075 printer, you must obtain the 2050FORM utility. See Chapter 5 for more information about these utilities.

1.6 PC Requirements

You can install PRINT370 on a PC that meets the following requirements:

■ A PCI bus for the CHANNEL-OUT (BT) adapter, or an ISA or EISA bus for the PRINT370 adapter.

■ At least 640 kilobytes of memory. (Your PC might need additional memory depending on your application, the printer model, and which Barr base product you use.)

■ A 486-type processor.

■ DOS 3.0 or later version. (For best results, use version 6.2 or later.)

If you use Océ printers in IBM 3800 Compatibility Mode, your PC needs additional PC processing power, memory, and disk space to support the printer's backspace feature.

■ You need a true 80386 DX PC or faster processor for storing data to and retrieving data from extended memory. An SX-type machine is not satisfactory.

■ For each Océ printer, you need from 1.5 to 2 Megabytes of PC extended memory. As it sends pages of a job to the printer, PRINT370 stores the pages in PC memory to allow the data to be re-sent if an error occurs.

For more information about the backspace feature, see Chapter 5.

1.7 Package Contents

The PRINT370 package contains the items listed in your PRINT370 Adapter manual or *CHANNEL-OUT (BT)* manual. It also includes a software disk:
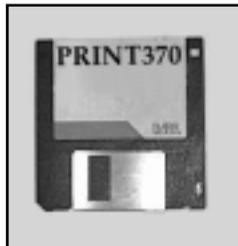
PRINT370 software

1.8 Additional Hardware Required

If you are connecting more than one printer, you need bus and tag cables to daisy chain the printers. For more information about daisy chaining printers, see Chapter 3. To obtain bus and tag cables, contact your printer vendor.

Notes:

2 Installation Overview

This chapter outlines the installation steps for the PRINT370 hardware and software. It also describes the PRINT370 software files. Usually, you install the PRINT370 option and your Barr base product at the same time.

During hardware installation, you need to refer to the printer manufacturer's manual and the Barr hardware manual (*PRINT370 Adapter* or *CHANNEL-OUT (BT)*). During software installation, you need to refer to the Barr software manuals listed in Table 2-1.

Table 2-1. Software Installation Manuals by Product

Product	Installation Manuals
PRINT370 without other Barr software	*PRINT370* manual
BARR/RJE with PRINT370	*PRINT370* manual *BARR/RJE* manual
BARR/SPOOL with PRINT370	*PRINT370* manual *BARR/SPOOL* manual
BARR/AFP	*PRINT370* manual *BARR/AFP* booklet *BARR/SPOOL* manual

2.1 PRINT370 Installation Steps

The Software Installation chapter of your *BARR/RJE* or *BARR/SPOOL* manual lists general installation steps for the Barr base software and any Barr software options. Follow the steps below when you install software that includes PRINT370. Figure 2-1 illustrates these steps.

1. Configure the printers.

2. Install the hardware.

3. Load the software files.

4. Configure the software.
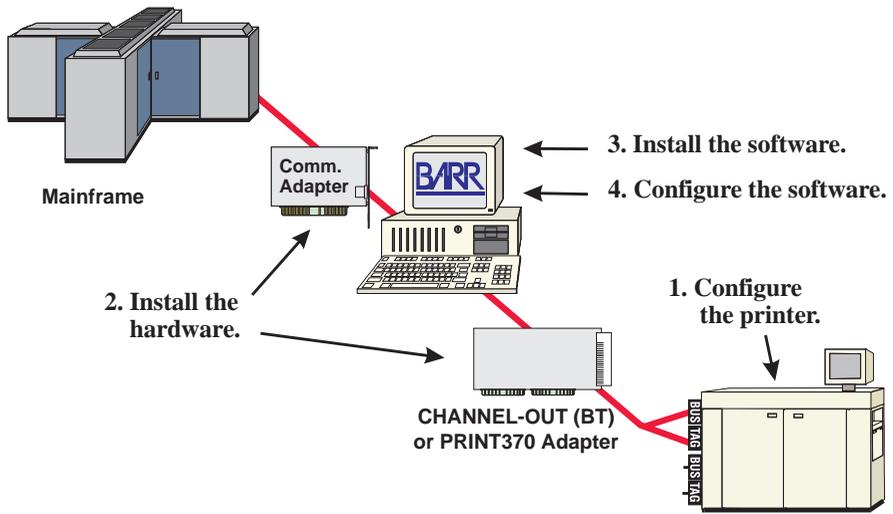
Figure 2-1. To install PRINT370, you must configure the S/390 channel printer, install PC adapters and cables, and install and configure the Barr software.

1. Configure the printer.

Your printer must be configured to work with PRINT370. See section 1.5 of this manual for printer configuration requirements.

Note: For some printers, the printer service representative must configure the printer or connect cables. Consult your printer manual to determine if you need to schedule this service.

2. Install the hardware.

Install the hardware for the Barr base software and PRINT370. Hardware installation includes installing any communications adapters, option adapters, cables, and terminator plugs. During this phase, you need to refer to the printer manual, the Barr hardware manual (*PRINT370 Adapter* or *CHANNEL-*

OUT (BT)), the *PRINT370* manual, and any other option hardware manuals for hardware installation instructions.

   a. **Install the PRINT370 hardware.** See your Barr hardware manual to install the PRINT370 adapter. See Chapter 3 of this manual to connect the CHANNEL-OUT cable to the adapter and the first printer and to install terminator plugs.

   b. **Install any additional hardware.** If you purchased a communications adapter to use with BARR/RJE or purchased additional option adapters, install them now. See the corresponding Barr adapter manuals for instructions.

3. Load the software files.

Follow the steps in the Software Installation chapter of your *BARR/RJE* or *BARR/SPOOL* manual to load the software onto your PC. The installation program loads files for both the base software and PRINT370. The Software Installation chapter of the base software manual describes the base software files. Section 2.2 of this manual describes the PRINT370 reference files.

4. Configure the software.

Enter the installation Ssettings for the base software and PRINT370. If you purchased the PRINT370 drivers as a standalone product without base software, skip Chapters 4 through 8 and go directly to Chapter 9 of this manual.

If you purchased software with PRINT370, follow the steps below.

   a. **Configure the PRINT370 software settings.** After you load the BARR/RJE, BARR/AFP, or BARR/SPOOL software, see Chapter 4 of this manual for instructions to configure the PRINT370 settings.

   b. **Configure additional options.** If you attach AFP printers, see Chapter 7. If you want to print to your S/390 printers from DOS, see Chapter 9.

   c. **Configure the base software.** See the base software manual (*BARR/RJE* manual, *BARR/SPOOL* manual, or *BARR/AFP* booklet) for instructions to configure the remaining software options.

Appendixes A through D contain technical information about S/390 printing that might be useful for advanced applications.

2.2 PRINT370 Software Files

The PRINT370 option software is combined with the base software (BARR/RJE, BARR/AFP, or BARR/SPOOL) in a single program file. The software disk also contains some reference files. When the INSTALL program loads the software files onto your PC, PRINT370 reference files are copied to the C:\BARR\PRINT370 directory. These files are required only for certain applications, as described in this section.

Text File

The following text file is provided on the software disk. Read this file.

P370READ.ME

A text file that describes the PRINT370 reference files. You can check this file to see if the reference files have changed since this manual was published.

Printer Initialization Files

Printer initialization files from Barr Systems include UCS buffer (UCSB) files and special printer command files. These files apply only to printers that must load a UCS buffer, such as the IBM 3203 and IBM 3211.

For more information about using these files, see the **Initialization file** field description under Printer Options in section 4.4.

UCS*

Standard UCSB images corresponding to the mainframe SYS1.IMAGELIB library. If you need to use a nonstandard UCSB, contact Barr Systems for information about how to create one. Barr Systems supplies these standard UCS files:

UCS1AN	UCS1SN	UCS2TN	UCS3QNC
UCS1APL	UCS1TN	UCS3262	UCS3RN
UCS1HN	UCS1XN	UCS3AN	UCS3SN
UCS1PCAN	UCS1YN	UCS3APL	UCS3TN
UCS1PCHN	UCS1ZN	UCS3HN	UCS3XN
UCS1PN	UCS2AN	UCS3PCAN	UCS3YN
UCS1QN	UCS2G11	UCS3PCHN	UCS3ZN

```
UCS1QNC        UCS2HN         UCS3PN
UCS1RN         UCS2PN         UCS3QN
```

The letters that follow the UCS number identify the image. For example, **UCS3PN** is the **PN** character image.

ALLOW

Command that sets the printer to allow Data Check error messages. Normally, the printer issues a Data Check when it receives instructions to print a character that is not available on the print band. The printer usually substitutes a character space for the unavailable character.

BLOCK

Command that sets the printer to block Data Check error messages. As a result, the printer does not issue Data Check error messages.

FOLD

Command that sets the printer to fold lowercase letters to uppercase.

UNFOLD

Command that sets the printer to cancel folding lowercase to uppercase. The printer prints mixed uppercase/lowercase.

6LPI
8LPI

Commands that set the printer to the corresponding lines-per-inch setting.

Utility Files

You can use utility files to determine the channel printer address, translate files from S/370 channel format to ASCII, and separate diagnostic information. Use of these files is optional. Some files apply only to the PRINT370 or CHANNEL-OUT (BT) adapter, as noted.

P37MFIND.EXE

For the CHANNEL-OUT (BT) adapter. A utility to determine the channel printer address. The utility also displays the adapter address and IRQ settings. If more than one printer is attached, the utility displays the addresses for all printers. To determine which address corresponds to each printer, send a test file to one printer at a time

from the Barr software. For more information about the printer address, see the **Printer address** field description in section 4.4.

P370FIND.EXE

For the PRINT370 adapter. A utility to determine the channel printer address. The utility prompts you to enter the PRINT370 adapter address and IRQ settings. If more than one printer is attached, the utility displays the addresses for all printers. To determine which address corresponds to each printer, send a test file to one printer at a time from the Barr software. For more information about the printer address, see the **Printer address** field description in section 4.4.

S370ASCI.EXE

A utility to translate files from S/370 channel format into ASCII. This utility is useful if a file received using **S/370 Channel** receive mode must later be printed on an ASCII printer. For more information about file formats, see section 4.5 of this manual and the Assign Devices, Receive Mode section of your *BARR/RJE* or *BARR/SPOOL* manual.

SPLIT370.EXE

A utility to separate the communications line trace and S/370 trace into separate files. To display command syntax, type the command at the DOS prompt. For more information about the S/370 trace, see section 8.5.

DOS Device Driver Files

You might want to print to the S/390 channel printer or perform diagnostics on the PRINT370 adapter without loading the BARR/RJE, BARR/AFP, or BARR/SPOOL software. The DOS device driver files allow you to print or perform diagnostics from the DOS prompt.

Use of these files is optional. See Chapter 9 for installation instructions.

Device Driver Files

Some files apply only to the PRINT370 or CHANNEL-OUT (BT) adapter, as noted.

P37MBASE.EXE

> For the CHANNEL-OUT (BT) adapter. Device driver that controls adapter and channel operations.

P370BASE.EXE

> For the PRINT370 adapter. Device driver that controls adapter and channel operations.

PRINT370.EXE

> Device driver that controls output to your channel-attached printers.

370DIAG.EXE

> For the PRINT370 adapter. Diagnostic tests to test the adapter without loading the base software.

Translation Table Files

The DOS device drivers include a default data translation table. You can use utility files to change the translation table. See section 9.3 for more information about using these files.

P370XLAT.EXE

> DOS program that loads a new translation table into the device driver.

P370XLAT.ASM

> Source code for P370XLAT.EXE that enables you to modify the translation table.

MAKE.BAT

> Batch file that builds P370XLAT.EXE from P370XLAT.ASM.

AFP File

If you use Advanced Function Printing (AFP), this file enables you to maintain font resources. For more information about AFP, see Chapter 7. When the software files are loaded onto your PC, this file is copied to the C:\BARR\AFP directory.

RESOURCE.EXE

> A utility that enables you to maintain PC-stored fonts.

Notes:

3 Connecting Your Printers

After you install the adapter (as described in the *PRINT370 Adapter* or *CHANNEL-OUT (BT)* manual), you need to perform these steps to connect your printers.

1. Connect the PRINT370 or CHANNEL-OUT (BT) adapter to the first printer (see section 3.1).

2. Daisy chain additional printers, if any (see section 3.2).

3. Connect terminator plugs to the last printer (see section 3.3).

Note: For some printers, the printer service representative must connect the cables. Consult your printer manual to determine whether you need to schedule this service.

3.1 Connect the Adapter to the First Printer

Connect the PRINT370 or CHANNEL-OUT (BT) adapter to the first S/390 printer (see Figure 3-1) with the supplied CHANNEL-OUT cable (see Figure 3-2). Detailed instructions follow the diagrams.
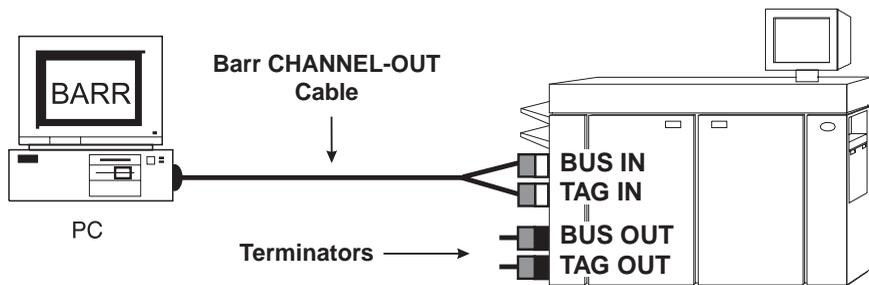
Figure 3-1. Attach the printer to the PC. If you have only one printer, also attach terminator plugs.

Plug into adapter →

← **Plug into printer**

Figure 3-2. CHANNEL-OUT cable

1. One end of the CHANNEL-OUT cable has a single plug. This end connects to the adapter. Insert the cable plug into the connector on the PRINT370 adapter.

   Note: If you also have the CHANNEL-IN (ES) adapter for connecting to an SNA host (requires the PRINT/CHANNEL option), be sure to correctly connect the adapters and cables. Connect the CHANNEL-IN cable to the adapter labeled IN. Connect the CHANNEL-OUT cable to the adapter labeled OUT. The IN and OUT adapter labels are visible from the rear of the PC.

2. The other end of the CHANNEL-OUT cable has separate Bus and Tag plugs that connect to the Bus In and Tag In connectors on the printer.

   a. Attach the Bus plug to the Bus In printer connector.

   b. Attach the Tag plug to the Tag In printer connector.

   c. Use a screwdriver to tighten the screws that secure each connector.

3. If you connect only one printer, follow the instructions in section 3.3 to attach terminator plugs to the printer.

3.2 Daisy Chain Multiple Printers

You can attach up to five more S/390 printers by daisy chaining one printer to another with pairs of bus and tag cables, as shown in Figure 3-3. Daisy-chain cables are available from your printer vendor.
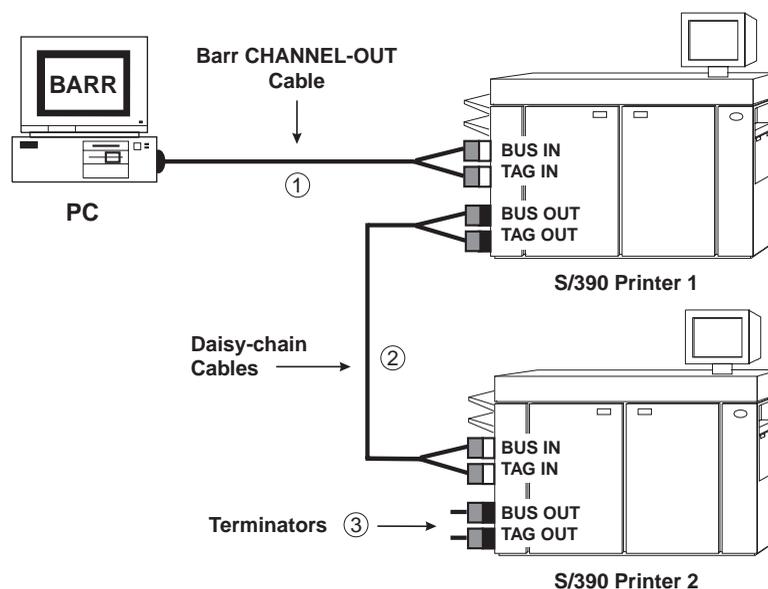
Figure 3-3. You can daisy chain printers with bus and tag cables.

Connect Two Daisy-chain Cables

If your bus and tag cables are not long enough to span the distance between two printers, you can extend the cable length by connecting two pairs of bus and tag cables. However, you must correctly connect the cables to each other. Plugs at opposite ends of the cable have different colored edges. Usually the cable has plugs with black edges at one end and plugs with white or gray edges at the other end. Attach plugs of opposite colors, as shown in Figure 3-4.
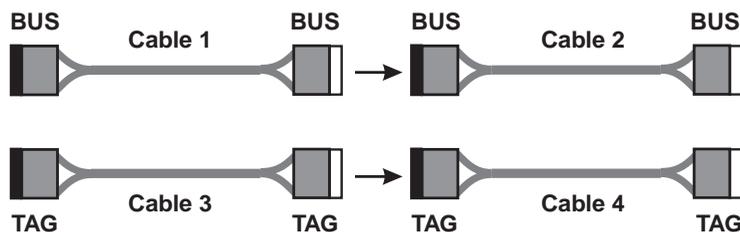
Figure 3-4. Attach Cable 1's white Bus plug to Cable 2's black Bus plug. Attach Cable 3's white Tag plug to Cable 4's black Tag plug.

Connect Two Printers

Bus cables have a Bus connector at each end and tag cables have a Tag connector at each end. The connectors are distinguished by color-coded edges. Each cable has one connector with a black edge and one connector with a white or gray edge. When you connect bus and tag cables to printers, be sure to attach connectors of opposite colors.

Connect the printers as follows:

1. Cable the Bus Out connector on Printer 1 to the Bus In connector on Printer 2.

    a. Attach the bus cable's black plug to Printer 1's white Bus Out connector.

    b. Attach the bus cable's white plug to Printer 2's black Bus In connector.

2. Cable the Tag Out connector on Printer 1 to the Tag In connector on Printer 2.

    a. Attach the tag cable's black plug to Printer 1's white Tag Out connector.

    b. Attach the bus cable's white plug Printer 2's black Tag In connector.

Performance tuning: To maximize performance, put the fastest printers at the end of the chain. For example, put slower impact printers nearest to the adapter, and put faster laser printers farthest from the adapter.

Maximum cable distance: When you daisy chain printers, the total distance from the PC to the last printer must not exceed 60 meters (200 feet). This distance includes the lengths of the cables and the printers.

3.3 Attach Terminator Plugs

Finally, connect the bus and tag terminator plugs to the printer. If you connect multiple printers, attach the terminators to the last printer in the chain. Connect the terminators as follows:

1. Attach the Bus Terminator to the printer's Bus Out connector.

2. Attach the Tag Terminator to the printer's Tag Out connector.

3. Tighten the terminator screws by hand.

Chapter

4 Configuring the PRINT370 Software

This chapter describes settings specific to PRINT370. The sample screens in this manual are for BARR/RJE. If you have BARR/AFP or BARR/SPOOL, the information on your screen will look slightly different. Software configuration settings for the base software are described in the *BARR/RJE* manual, *BARR/AFP* booklet, or *BARR/SPOOL* manual.

When you enter software settings, remember to periodically save your changes with the **Exit and Save Changes** option to preserve your work in case of an unexpected power failure. You can return to the Installation Description after you save your changes.

4.1 Enter Software Options

You must enter software settings for the PRINT370 or CHANNEL-OUT (BT) adapter and the S/390 channel-attached printers. To reach the installation settings for PRINT370, follow these steps.

1. Run the installation program by typing the software startup command followed by the letter i. For example, for BARR/RJE type this command:

   barrsnar i

2. Press ⌷Enter⌷ until you reach the Installation Description screen.

```
                    Installation Description


            RJE Description
            Communication Link
            Devices and Printers: LPT, COM, NET, SEND, LAN
            S/390 Channel Attached Printers
            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 and Global Options

            Exit and Save Changes


                                            Selection ↑↓→←
```

➤ Select **S/390 Channel Attached Printers**.

```
                S/390 Channel Attached Printers


            PR0E    Enabled    3211  Equivalent
            PR1E    Disabled   3211  Equivalent
            PR2E    Disabled   3211  Equivalent
            PR3E    Disabled   3211  Equivalent
            PR4E    Disabled   3211  Equivalent
            PR5E    Disabled   3211  Equivalent

                 Escape

                 AFP Options
                 Adapter Description

                                            Selection ↑↓→←
```

You can access PRINT370 settings from the S/390 Channel Attached Printers screen. You can enable or disable printers grouped at the top of the screen as needed. Typically you will use the **AFP Options** and **Adapter Description** items at the bottom of the screen only during initial installation.

Follow the steps listed below to enter the PRINT370 settings.

1. **Adapter Description** - Enter the adapter settings described in section 4.2.

2. **Adapter Diagnostics** - Test the adapter and CHANNEL-OUT cable to verify that you installed them correctly. See section 4.3.

3. **Printer Options** - Configure options for each S/390 printer by selecting printers from the list. See section 4.4.

4. **AFP Options** - If you will use the AFP Resource Saving feature, configure the AFP options. See Chapter 7.

5. **Route Data** - When you finish entering the PRINT370 settings, you need to direct data to printers from the Assign Devices menu. See section 4.5.

4.2 Enter Adapter Settings

First, you must enter software settings that pertain to the adapter. Follow the steps that correspond to the adapter you purchased.

CHANNEL-OUT (BT) Adapter Settings

For the CHANNEL-OUT (BT) adapter, you must set the data streaming rate and maximum channel command length in the software. Start at the S/390 Channel Attached Printers screen.

```
                    S/390 Channel Attached Printers


            PR0E    Enabled     3211  Equivalent
            PR1E    Disabled    3211  Equivalent
            PR2E    Disabled    3211  Equivalent
            PR3E    Disabled    3211  Equivalent
            PR4E    Disabled    3211  Equivalent
            PR5E    Disabled    3211  Equivalent

                 Escape

                 AFP Options
                 Adapter Description

                                                    Selection ↑↓→←
```

➤ Select **Adapter Description**

```
                              Adapter Description


            Interrupt request of CHANNEL-OUT (BT) adapter? IRQ15

            Address of CHANNEL-OUT (BT) adapter? FFA0

            Data streaming rate? 3.0 MByte
              (Note: This setting is only used when a printer is
               configured for data streaming.)

            Maximum channel command length?   512

            Perform Diagnostics on CHANNEL-OUT (BT) adapter? No


                                                            Choice? + -
```

Note: For the CHANNEL-OUT (BT) adapter, you do not need to set the interrupt request or address in the software.

Data streaming rate?

>   If you configure your printer to use the data streaming data transfer mode, choose which type of data streaming the software should support. If you set your printer for DCI High Speed Transfer, PRINT370 ignores this setting.

>   **4.5 MByte**

>   >   Default. The adapter communicates with the printer via 4.5 megabyte data streaming.

>   **3.0 MByte**

>   >   The adapter communicates with the printer via 3.0 megabyte data streaming.

Maximum channel command length?

>   Specify the maximum channel command length required for printing. This value should be equal to or greater than the largest data record you will send to the printer. The default value is **512** bytes for most printer types and **16000** for AFP or 3800-compatible printers. (The **Printer type** setting is described in section 4.4.) The maximum value is **16000**. If PRINT370 receives a record larger than the specified command length, it displays an error message on the console. See section 8.4 for a description of the error message.

>   The maximum channel command length is stored in PC memory. Your PC must have enough available conventional memory to store the

buffer. This memory requirement is in addition to the amount you specify for `Memory allocated for buffers` on the Tuning and Global Options, Trace and Memory Options screen.

Perform Diagnostics on `CHANNEL-OUT (BT)` adapter?

Verify correct operation of the CHANNEL-OUT (BT) adapter and CHANNEL-OUT cable. Make sure you installed the adapter properly by testing the adapter immediately after you install it.

No   Default. Do not test the adapter.

Yes   Test the adapter and cable. See section 4.3 for instructions.

PRINT370 Adapter Settings

For the PRINT370 adapter, you must set the adapter interrupt request and address in the software. Start at the S/390 Channel Attached Printers screen.

```
                S/390 Channel Attached Printers


        PR0E    Enabled    3211  Equivalent
        PR1E    Disabled   3211  Equivalent
        PR2E    Disabled   3211  Equivalent
        PR3E    Disabled   3211  Equivalent
        PR4E    Disabled   3211  Equivalent
        PR5E    Disabled   3211  Equivalent

            Escape

            AFP Options
            Adapter Description

                                          Selection ↑↓→←
```

➤ Select **Adapter Description**

```
                Adapter Description


    Interrupt request of BARR/370 adapter? IRQ15

    Address of BARR/370 adapter? 298

    Perform Diagnostics on BARR/370 adapter? No

                                            Choice? + -
```

Note: Change the interrupt request and address settings only if you
verify a conflict with other equipment in the PC. If a conflict exists, the
software will not function correctly when you attempt to start or operate
it. To determine whether or not a conflict exists, run the adapter diagnos-
tics described in section 4.3.

Interrupt request of BARR/370 adapter?

Hardware line over which the processor and PRINT370 adapter
communicate. The interrupt request (IRQ) carries signals to get the
processor's attention when the adapter is ready to receive or send
information.

The default value for PRINT370 is **IRQ15**. Other choices are **IRQ10**,
IRQ11, **IRQ12**, and **IRQ7**.

PC AT Computers: **IRQ7** is the only IRQ available for the eight-bit
slot of a PC AT.

Address of BARR/370 adapter?

PC address for the PRINT370 adapter. The address you select on this
screen must match the address jumper setting on the adapter. The
default setting both on the adapter and in the software is **298**. Other
choices are **288**, **2A8**, and **2B8**.

Perform Diagnostics on BARR/370 adapter?

Verify correct operation of the PRINT370 adapter and CHANNEL-OUT
cable. Make sure you installed the adapter properly by testing the
adapter immediately after you install it.

No Default. Do not test the PRINT370 adapter.

Yes Test the adapter and cable. See section 4.3 for instructions.

4.3 Run Adapter Diagnostics

Adapter diagnostics confirm that you installed the PRINT370 or CHANNEL-
OUT (BT) adapter and CHANNEL-OUT cable correctly and that they
function properly. Run this test immediately after you install the adapter and
cable or if you suspect a hardware error.

To perform the test, you need the loopback test plugs that come with the
CHANNEL-OUT cable. You can test different components by running the
test several times with the test plugs installed at different locations. To test

the adapter and CHANNEL-OUT cable, install the test plugs on the CHANNEL-OUT cable. To test the printer connectors and daisy-chain cables, install the test plugs at other locations along the printer chain.

Test the Adapter and CHANNEL-OUT Cable

During the loopback test, the software sends a data string of 256 characters to the adapter. The test plugs return the data through the receive side of the adapter, and the software verifies that the data received matches the data that was sent.

Follow the instructions that correspond to the adapter you purchased.

CHANNEL-OUT (BT) Adapter Test

The diagnostic test consists of these phases:

- Interrupt test
- Tag loopback test
- Bus loopback test

Software screens guide you through the test phases.

Start the Test

How you start the test depends on which software you have. If you have BARR/RJE, BARR/AFP, or BARR/SPOOL software, start the test from the Installation Description screen. If you have only the Barr device drivers described in Chapter 9, unload the device drivers and then use the 370DIAG.EXE utility. Follow these steps to start the test.

1. Navigate to the PRINT370 Adapter Description screen and set **Perform diagnostics on CHANNEL-OUT (BT) adapter** to **Yes**.

2. Press `Enter`.

Adapter Location Test

The software first checks whether the CHANNEL-OUT (BT) adapter is installed. When you press `Enter` from the Adapter Description screen, a message at the bottom of the screen notifies you that the software found the adapter.

```
CHANNEL-OUT (BT) adapter found at address 298 and IRQ15.
```

If the software cannot locate the adapter, a warning message displays.

```
CHANNEL-OUT (BT) adapter not found.
```

If you see this message, make sure the adapter is seated firmly in the slot.
Also verify that there are no adapter setting conflicts in BIOS. See the
CHANNEL-OUT (BT) manual for more information.

Connect the Test Plugs

Next, the software displays instructions for connecting the bus and tag test
plugs.

```
                    CHANNEL-OUT (BT) Adapter Diagnostics


    This is a test of the CHANNEL-OUT (BT) adapter, cable, and
    installation data.

    Connect the CHANNEL-OUT cable to the CHANNEL-OUT (BT) adapter,
    then connect the BUS & TAG test plugs to the other end
    of the CHANNEL-OUT cable.


                                                            Any key
```

The test plugs are labeled Bus Loop and Tag Loop. Follow these steps to
install the test plugs, as illustrated in Figure 4-1.

1. Connect the Bus Loop plug to the CHANNEL-OUT cable's Bus connector.

2. Connect the Tag Loop plug to the CHANNEL-OUT cable's Tag connector.
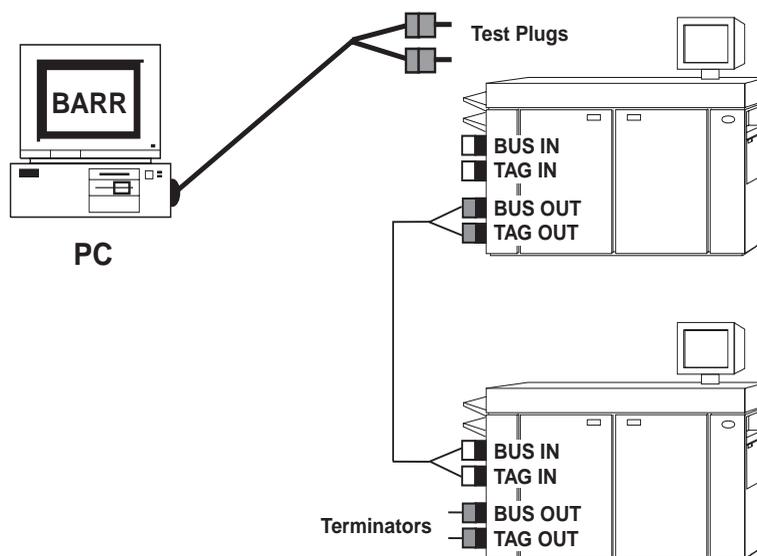
Figure 4-1. To test the adapter and CHANNEL-OUT cable, install the test plugs on the CHANNEL-OUT cable.

If you do not install the test plugs, the following message displays at the bottom of the screen when you start the test:

```
No TEST plugs detected. Please verify the TEST plugs
have been installed properly to ensure proper testing.
```

Run the Adapter Test

1. Press [Enter] to start the test.

Test results indicating success or failure display on the screen as each phase completes. If the test phase detects no errors, **test passed** displays, as shown in this example:

```
IRQ test passed.
TAG loopback test passed.
BUS loopback test passed.
Diagnostics passed.
```

If a test phase fails, **test failed** displays and the test pauses, as shown in this example:

```
IRQ test passed.
TAG loopback test failed.
```

2. Note the test results. If a test phase fails, correct the problem reported by
   the first phase that failed (see Table 4-1) and repeat the test.

   Note: Bent pins on the CHANNEL-OUT cable's Bus and Tag plugs
   can cause the test to fail. Check the plugs and straighten any bent
   pins.

Table 4-1. Reasons for Test Failure

Test	Indicates
IRQ test	Adapter does not generate interrupts. The adapter might be faulty or you might need to check the BIOS IRQ setting.
Tag loopback test	The adapter, tag cable, or tag test plug is defective.
Bus loopback test	The adapter, bus cable, or bus test plug is defective.

3. When the test completes successfully, press ⌊Enter⌋ to return to the
   S/390 Channel Attached Printers screen.

PRINT370 Adapter Test

The diagnostic test consists of these four phases:

- **Register Test** - The Register Test writes to and reads from the adapter
  registers to verify that they work properly.
- **Loopback Input/Output Test** - The Input/Output Test sends data to the
  cable and reads it back to verify that the input/output portions of the
  adapter work properly.
- **Transfer Test** - The Transfer Test checks the adapter's ability to send and
  receive data.
- **Interrupt Test** - The Interrupt Test verifies the adapter's ability to
  perform hardware interrupts to get the PC processor's attention.

Software screens guide you through the test phases.

Start the Test

How you start the test depends on which software you have. If you have BARR/RJE, BARR/AFP, or BARR/SPOOL software, start the test from the Installation Description screen. If you have only the Barr device drivers described in Chapter 9, unload the device drivers and then use the 370DIAG.EXE utility. Follow these steps to start the test.

1. Navigate to the PRINT370 Adapter Description screen and set `Perform diagnostics on BARR/370 adapter` to `Yes`.

2. Press `Enter`.

Adapter Location Test

The software first checks whether the PRINT370 adapter is installed. When you press `Enter` from the Adapter Description screen, a message at the bottom of the screen displays the adapter settings.

```
BARR/370 adapter found at address 298 and IRQ15
```

If the software cannot locate the adapter at the address specified in the software, a warning message displays.

```
No BARR/370 adapter found at the address specified.
Please verify the address jumper on the adapter and
the value entered on the Adapter Description screen.
```

If you see this message, make sure the address jumper setting on the PRINT370 adapter matches the address on the screen. Also verify that the address setting does not conflict with other equipment in the PC.

Connect the Test Plugs

Next, the software displays instructions for connecting the bus and tag test plugs.

```
                        BARR/370 Adapter Diagnostics


        This is a test of the BARR/370 adapter, cable, and
        installation data.

        Connect the CHANNEL-OUT cable to the BARR/370 adapter, then connect
        the BUS & TAG test plugs to the other end of the CHANNEL-OUT cable.


                                                                    Any key
```
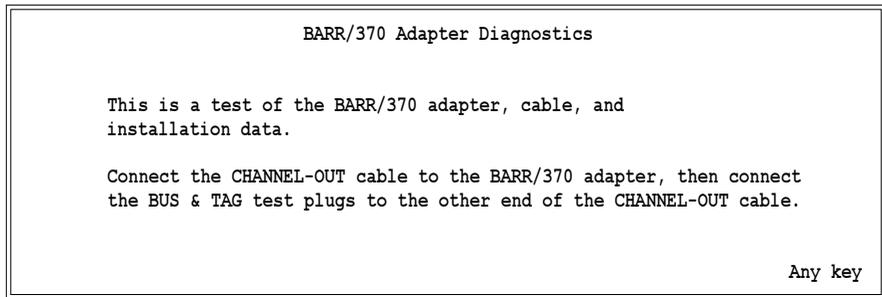
The test plugs are labeled Bus Loop and Tag Loop. Follow these steps to install the test plugs, as illustrated in Figure 4-2.

1. Connect the Bus Loop plug to the CHANNEL-OUT cable's Bus connector.

2. Connect the Tag Loop plug to the CHANNEL-OUT cable's Tag connector.
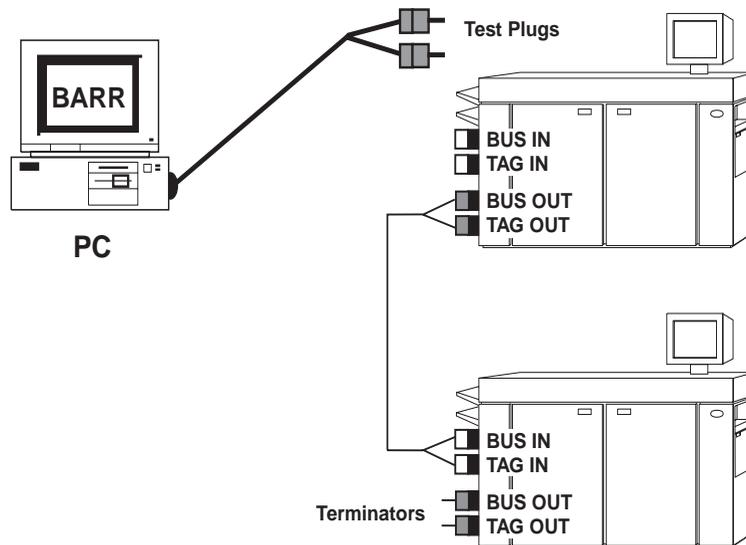
Figure 4-2. To test the adapter and CHANNEL-OUT cable, install the test plugs on the CHANNEL-OUT cable.

If you do not install the test plugs, the following message displays at the bottom of the screen when you start the test:

```
            No TEST plugs detected. Please verify the TEST plugs
            have been installed properly to ensure proper testing.
```
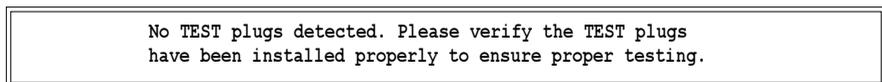
Run the Adapter Test

1. Press [Enter] to start the test.

The following screen displays while the Register Test (the first test phase) runs. The other phases follow in quick succession. The software updates information on the screen during each phase of the test and then displays the test phase results.

```
                     BARR/370 Adapter Diagnostics

                             Register Test



     A display of data read and written is shown below.
     The colors of the data imply: SEND   RECEIVE   ERROR

     Write port=288    Read port=288

        A5 A5    D2 D2    69 69    B4 B4    5A 5A    2D 2D    96 96    4B 4B
        A5 A5    D2 D2    69 69    B4 B4    5A 5A    2D 2D    96 96    4B 4B
        A5 A5    D2 D2    69 69    B4 B4    5A 5A    2D 2D    96 96    4B 4B
        A5 A5    D2 D2    69 69    B4 B4    5A 5A    2D 2D    96 96    4B 4B
        A5 A5    D2 D2    69 69    B4 B4    5A 5A    2D 2D    96 96    4B 4B
        A5 A5    D2 D2    69 69    B4 B4    5A 5A    2D 2D    96 96    4B 4B
        A5 A5    D2 D2    69 69    B4 B4    5A 5A    2D 2D    96 96    4B 4B
        A5 A5    D2 D2    69 69    B4 B4    5A 5A    2D 2D    96 96    4B 4B
        A5 A5    D2 D2    69 69    B4 B4    5A 5A    2D 2D    96 96    4B 4B
        A5 A5    D2 D2    69 69    B4 B4    5A 5A    2D 2D    96 96    4B 4B

                       ===  Test  Passed  ===
                                                                    Any key
```

The results indicate success or failure of each phase. The message **Test Passed** displays if the test phase detects no errors, but the next phase begins quickly so you might not see the message.

If a test phase fails, the message **Test Failed** displays and the test pauses (see Table 4-2). On the screen, error locations appear in red for color monitors or reverse video for monochrome monitors.

2. Note the test results and then press [Enter] to advance to the next test phase. If any phase of the test fails, correct the problem reported by the first phase that failed (see Table 4-2) and repeat the test.

Table 4-2. Reasons for Test Failure

Test	Indicates
Input/Output Register Test	Failure usually indicates that settings for other equipment conflict with the PRINT370 adapter, or that the adapter or cable is faulty.
Transfer Test	Failure usually means the adapter is faulty.
Interrupt Test	Failure indicates an IRQ conflict or faulty adapter.

Note: Bent pins on the CHANNEL-OUT cable's Bus and Tag plugs can cause the test to fail. Check the plugs and straighten any bent pins.

When all test phases complete without errors, the following screen displays.

```
                    BARR/370 Adapter Diagnostics

                          Test Complete




                    ===  Test  Passed  ===
                                                        Any key
```

3. When the test completes, press [Enter] to return to the S/390 Channel Attached Printers screen.

Test Printer Connectors and Daisy-chain Cables

Perform this test if the adapter and CHANNEL-OUT cable test passes but you still suspect a malfunction in the printer chain. This test is the same as the adapter and CHANNEL-OUT cable test, except that you install the test plugs on printers or daisy-chain cables instead of on the CHANNEL-OUT cable. You can perform this test for either the PRINT370 or CHANNEL-OUT (BT) adapter.

First, test the entire printer chain. If the test reports an error, you can systematically rule out problems with each cable or printer by running the test several more times, each time with the test plugs attached to the next cable or printer in the chain.

Install the test plugs according to the instructions that follow. To run the test, from the PRINT370 Adapter Description screen set **Perform diagnostics on CHANNEL-OUT (BT) adapter** to **Yes** and press Enter.

Prepare for the Test

Before you attempt the test, perform these steps.

1. Power off all printers. The test is not accurate if the printers are turned on.

2. Cut the test plugs from the end of the CHANNEL-OUT cable. Be careful not to misplace the test plugs because you might need them later. You might want to re-attach the test plugs to the cable when you finish testing.

Test Entire Printer Chain

To determine if a hardware problem exists, follow these steps to test the entire printer chain. Figure 4-3 shows how to connect the cables and test plugs.

1. Re-attach the CHANNEL-OUT cable to the first printer's Bus In and Tag In connectors.

2. Remove the terminator plugs from the last printer.

3. Install the test plugs on the last printer's Bus Out and Tag Out connectors.
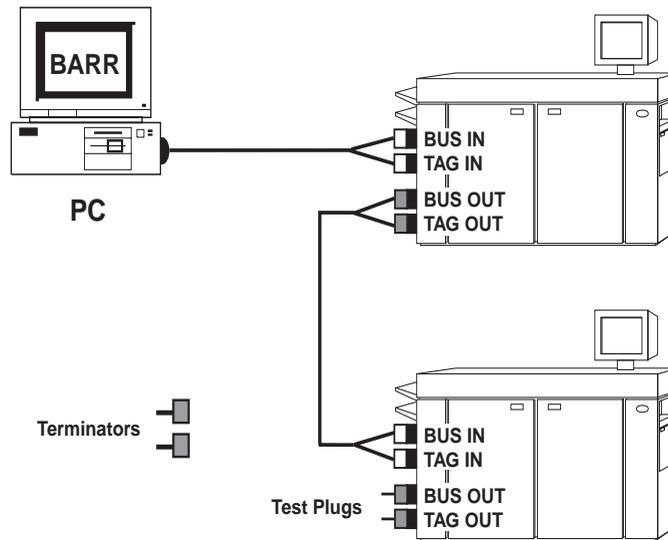
4. Run the test.

Figure 4-3. To test the entire printer chain, install the test plugs on the last printer.

If the test passes, all of the hardware components are functioning properly. If the test fails, see Isolate the Error.

Isolate the Error

If the test of the entire printer chain fails, you must determine exactly which component is at fault. To isolate the error, perform the test one time for each piece of equipment. For example, if you have two channel printers, run the test three more times: once for each of the printers and once for the daisy-chain cables. Run the test with the test plugs installed on the first printer, run the test again with the test plugs installed on the daisy-chain cables, and then run the test with the test plugs installed on the second printer.

If the test fails at any stage, you will know exactly which device in the chain is at fault. For example, if the test passes when you connect the test plugs to the first printer but fails when you connect the test plugs to the daisy-chain cables, the daisy-chain cables are faulty. Correct the problem by repairing or replacing the faulty equipment. Then test the new equipment by attaching the test plugs to it and running the test again. Remember to continue the test for the rest of the components in case more than one device is faulty.

Note: Bent pins on the cable's Bus and Tag plugs or the printer's connectors can cause the test to fail. If the test fails, check the plugs and connectors and straighten any bent pins.

Test the First Printer

Follow these steps to test the first printer in the chain. Figure 4-4 shows how to connect the cables and test plugs.

1. Remove the test plugs from the last printer.

2. Disconnect the daisy-chain cables from the first printer.

3. Connect the test plugs to the first printer's Bus Out and Tag Out connectors.

4. Run the test. If the test passes, go to the next test step. If the test fails, contact Barr Technical Support or your printer vendor for assistance and then repeat the test after you correct the problem.
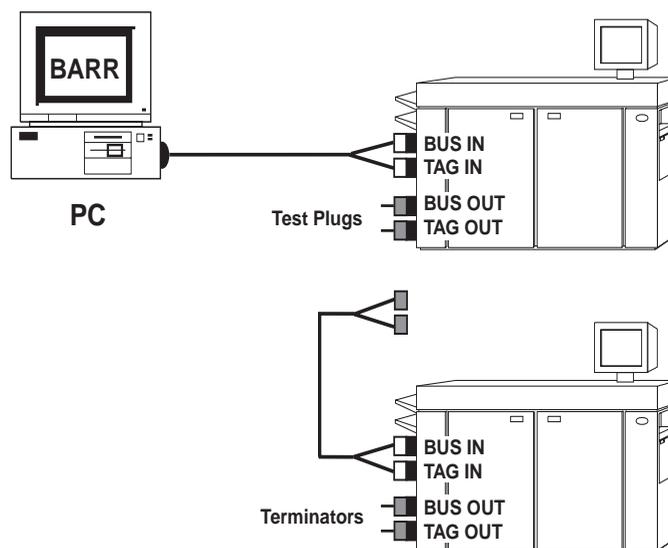
Figure 4-4. To test the first printer in the chain, install the test plugs on the first printer.

Test the Daisy-chain Cables

Next, test the first set of daisy-chain cables. Figure 4-5 shows how to connect the cables and test plugs.

1. Remove the test plugs from the first printer.

2. Reconnect the daisy-chain cables to the first printer's Bus Out and Tag Out connectors.

3. Disconnect the daisy-chain cables from the second printer and connect the test plugs to the free end of the daisy-chain cables.

4. Run the test. If the test passes, go to the next step. If the test fails, contact Barr Technical Support or your printer vendor for assistance and then repeat the test after you correct the problem.
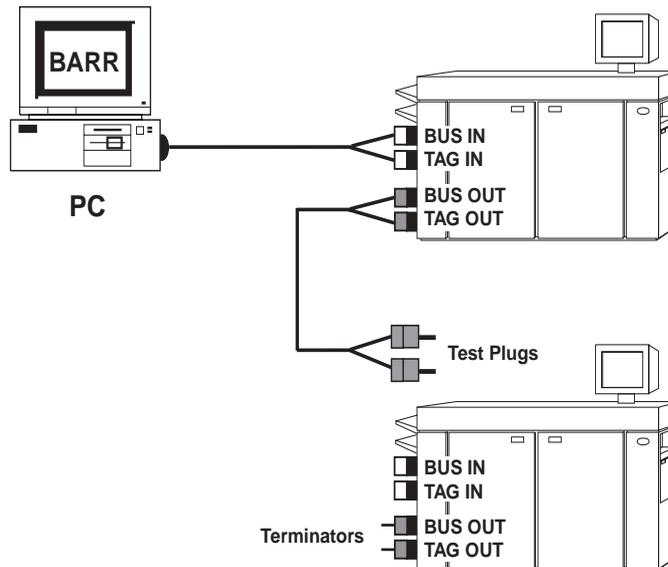
Figure 4-5. To test the daisy-chain cables, install the test plugs on the daisy-chain cables.

Test the Next Printer

Follow these steps to test the next printer in the chain, as illustrated in Figure 4-6.

1. Remove the test plugs from the daisy-chain cables.

2. Re-attach the daisy-chain cables to the second printer's Bus In and Tag In connectors.

3. Remove the terminator plugs from the second printer.

4. Connect the test plugs to the second printer's Bus Out and Tag Out connectors.

5. Run the test. If the test passes, go to the next test step. If the test fails, contact Barr Technical Support or your printer vendor for assistance, and then repeat the test after you correct the problem.
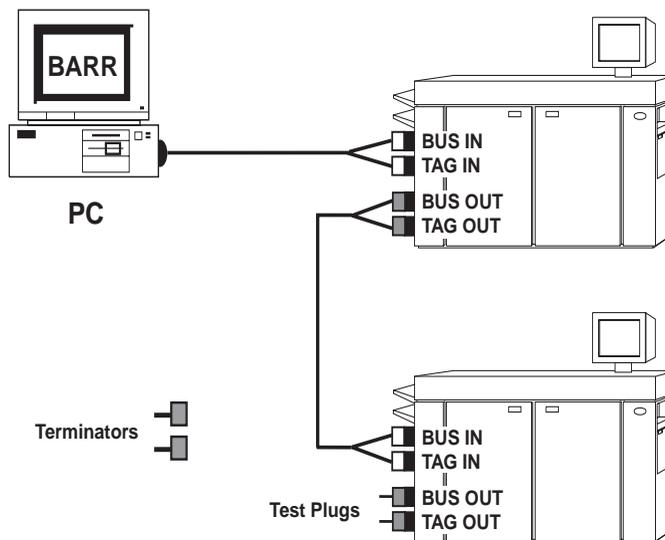
Figure 4-6. To test the second printer in the chain, install the test plugs on the second printer.

If you have more than two printers, repeat the daisy-chain cable test and printer test for each additional printer.

When you finish the test, remember to re-install the terminator plugs on the last printer's Bus Out and Tag Out connectors. Note where you store the test plugs in case you need them again.

4.4 Specify Printers

You must specify options on the printer definition screen for each S/390 channel printer you attach. To reach the printer definition screen, select a printer from the printer list on the S/390 Channel Attached Printers screen.

You can distinguish printers by their addresses. In the Barr software, device names for the S/390 channel printers begin with the letters **PR** followed by the printer address. The default device names are **PR0E** to **PR5E**.

```
                 S/390 Channel Attached Printers


          PR0E     Enabled     3211  Equivalent
          PR1E     Disabled    3211  Equivalent
          PR2E     Disabled    3211  Equivalent
          PR3E     Disabled    3211  Equivalent
          PR4E     Disabled    3211  Equivalent
          PR5E     Disabled    3211  Equivalent

                 Escape

                 AFP Options
                 Adapter Description

                                                     Selection ↑↓→←
```

➤ Select **PR0E**, the first printer listed.

Define the Printer

The printer definition screen displays the enable/disable status, device address, and printer type for each channel printer.

```
              S/390 Channel Attached Printer Definition


              Enable or Disable device? Enabled

              Printer address: 0E

              Printer type? 3211  Equivalent



                      Escape

                      Set printer options
                      Printer control data

                                                     Selection ↑↓→←
```

Some option values depend on the printer type. If you have an Océ printer, also see Chapter 5. If you are replacing a Xerox 871-CM device with PRINT370, also see Chapter 6. If you have an AFP printer, also see Chapter 7.

AFP: The `Set printer options` and `Printer control data` menu choices at the bottom of the screen do not apply to AFP printers. For more information about options for AFP printers, see Chapter 7.

Enable or Disable device?

Choose whether to enable or disable the channel printer in the software. Each channel printer you enable displays as a destination device on the Assign Devices screen.

Enabled

Enable this device. You must enable the printer before you can print to it.

Disabled

Disable this device. The printer will not be used.

Printer address:

The printer's two-digit channel address. The address on this screen must match the printer's actual address. If your printer's address differs from the address shown on this screen, enter the correct address. If your printer has a three-digit address, enter the last two digits.

Depending on your printer make and model, the address might appear on the front of the printer, on hardware inside the printer, or on a software menu on the printer.

If you cannot find the printer address, use the P370FIND.EXE utility included with the PRINT370 reference files or contact your printer service representative. If the printer was previously attached to a mainframe computer, you can obtain the address from mainframe personnel.

Printer type?

PRINT370 uses the printer type to preset the Advanced Printer Options and to interpret codes the printer sends to the software during error recovery. Select the printer type that matches your printer. If your printer is not listed, select `3211 Equivalent`.

3211 Equivalent

Functionally equivalent to the IBM 3211 line printer.

IBM 3203 model 5

IBM 3203 model 5 line printer.

IBM 6262

> IBM 6262 line printer.

Océ (Siemens) 2050/2075

> Océ 2050 laser printer.

Xerox Laser

> Xerox laser printer.

Kodak Komstar

> Kodak Komstar or Optistar computer output microfiche device.

Océ (Siemens) 3800-3 Compatible

> Océ printer operating in IBM 3800 Compatibility Mode.

3825 3827 ... IPDS Group3

> AFP printers equivalent to the IBM 3825, IBM 3827, or IPDS Group 3 type printers. These printers cannot implement SNA communications.

3820 VTAM Attached IPDS

> AFP printers equivalent to the IBM 3820. These printers can implement SNA communications.

Comparex

> Comparex line printer or laser printer.

Set Printer Options

You can enter additional PRINT370 settings on the Printer Options screen. These printer options do not apply to AFP printers. For more information about AFP printers, see Chapter 7.

To reach the Printer Options screen, start at the printer definition screen.

```
┌─────────────────────────────────────────────────────────────────────┐
│                                                                       │
│                 S/390 Channel Attached Printer Definition             │
│                                                                       │
│                                                                       │
│              Enable or Disable device? Enabled                        │
│                                                                       │
│              Printer address: 0E                                      │
│                                                                       │
│              Printer type? 3211  Equivalent                           │
│                                                                       │
│                                                                       │
│                                                                       │
│                        Escape                                         │
│                                                                       │
│                        Set printer options                            │
│                        Printer control data                           │
│                                                                       │
│   ┌──┐                                                                │
│   │🗏 │                                                               │
│   └──┘                                                   Selection ↑↓→← │
└─────────────────────────────────────────────────────────────────────┘
```

➤ Select **Set printer options**.

```
┌─────────────────────────────────────────────────────────────────────┐
│                                                                       │
│                          Printer Options                              │
│                                                                       │
│                 Enable or Disable device? Enabled                     │
│                                                                       │
│                 Printer address: 0E                                   │
│                                                                       │
│                 Printer type? 3211  Equivalent                        │
│                                                                       │
│     Printer performance optimized? No                                 │
│           (combines channel commands to produce fewer operations,     │
│            NOT recommended for high speed Laser printers.)            │
│                                                                       │
│     Conditional new page at end of file? Yes                          │
│                                                                       │
│     Audible alarm on printer error? No                                │
│                                                                       │
│     Modify advanced printer options? No                               │
│                                                                       │
│     Forms overlay directory: _____     │
│                                                                       │
│     Initialization file: _____     │
│                                                                       │
│                                                        Choice? + -     │
└─────────────────────────────────────────────────────────────────────┘
```

These options affect how the software processes files at print time. Printer definition information displays at the top of the screen to help you remember which printer the options apply to.

Printer performance optimized?

Choose whether to optimize printer performance by converting data as it is sent to the printer.

No   Default. The software sends data to the printer unaltered.

Yes   The software optimizes printer performance by altering the data as follows:

- Converts blank lines to line feeds (**L F**).
- Converts horizontal tab characters to the required number of blanks to emulate tab settings at eight-character intervals.

Note: You can use this option for files in S/370 channel format that you send to line printers. Do not use this option for ASCII files or for printers that buffer data, such as high speed laser printers.

Conditional new page at end of file?

Choose whether the software should add a Skip to Channel 1 command to the end of a file, if needed, to ensure that each file begins at the top of a new page. Some files do not contain channel skips.

Yes   Default. At the end of each file, the software looks for a Skip to Channel 1 or determines if data on the last page reached the maximum page length. If neither condition is met, the software adds a Skip to Channel 1 to ensure that the next file begins at the top of a new page. The software remembers when it adds a Skip to Channel 1. If the next file begins with a Skip to Channel 1, the software removes that command to prevent printing a blank page.

No   The software does not add channel skips to or remove channel skips from files.

Audible alarm on printer error?

The PC makes a shrill beep when the software detects an error or paper condition. The alarm stops when you correct the condition or press any key on the keyboard. The alarm is especially useful for laser printers because you might not hear a laser printer stop when a problem occurs.

No   Default. Disable alarm.

Yes   Enable alarm.

Modify advanced printer options?

Options on the Advanced Printer Options screen affect how the software modifies the print data before it sends the data to printer. This option allows printouts from a remotely attached channel printer to more closely resemble output from a locally attached channel printer. In most cases you do not need to change the advanced options. The advanced options are discussed later in this section.

No   Default. Do not view or modify the Advanced Printer Options.

Yes   View or modify the Advanced Printer Options. Change the advanced options only if directed to do so by Barr Technical Support or this manual.

Forms overlay directory:

Many laser printers have a forms overlay feature that sets up a form to print automatically on every page of a job. A form overlay is the electronic version of a pre-printed form. You can use the Barr forms overlay feature to send information to the printer immediately before each print file. The form overlay file can contain electronic forms, additional printer control data, or printer resources.

Enter the name of the directory where you will store overlay or resource files. Include the drive letter and full directory path. Remember to create the actual directory with the DOS make directory (**m d**) command. If you do not plan to use this feature, leave the directory name blank.

Overlay file format: If the channel printer will print data from the mainframe, you must create the form overlay files in either ASCII or Barr S/390 file format. For a description of S/390 format, see Appendix A.

Overlays with Xerox printers: Do not use the forms overlay feature to send DJDE strings to Xerox printers. For best results, DJDEs must be received with the data from the host system and must follow the banner page in the print file. Information sent to the printer before the banner page will be lost during the Xerox printer's special processing of the banner page. Overlays are sent to the printer at the start of the file and, thus, will be lost.

For more information about the forms overlay feature, see the Devices and Printers chapter of your *BARR/RJE* or *BARR/SPOOL* manual.

Initialization file:

This option sends a single file with initialization information to the printer each time you start the software.

In the `Initialization file` field, enter the name of the file you will use to initialize the printer. Include the complete file path. When you start the Barr software, the software automatically sends the initialization file to the printer. See the examples later in this discussion.

If you do not need to use this feature, leave the `Initialization file` field blank.

Océ printers that operate in IBM 3800 Compatibility Mode require the initialization file INIT that comes with the SNPFORM and SNPIMAGE utilities from Océ. See Chapter 5 for more information.

Some line or band printers such as the IBM 3203 and IBM 3211 require that you load a UCS Buffer (UCSB) and special command files. The Barr software disk contains a library of special commands and UCSB images corresponding to the mainframe library SYS1.IMAGELIB. For a list of these files, see section 2.2. UCSBs provide an alternate character image when a printer's default character set does not match the print train or band installed in the printer. If you need special characters or you get illegible results, try using a different UCSB image. Look for the UCSB name on the inside surface of the print train or band or refer to your printer manual to determine which images you need.

For example, if you have an IBM 3203 printer with a 3PN print train you need to load the UCS3PN file supplied by Barr Systems. Enter the name of this file in the `Initialization file` field. Include the complete file path or copy the file to the directory where the BARR/RJE, BARR/SPOOL, or BARR/AFP software resides.

If you have an IBM 3203 printer with a 3PN print train (UCS3PN) and you want to fold lowercase to uppercase (FOLD) and block data check errors (BLOCK), you need to use three initialization files. Because you can enter only one file name in the `Initialization file` field, you must combine the three files into a single file. For example, enter the file name `23203init`. Then create a file named `03203init` that contains a single text line listing the names of the UCS file and command files,

including the file paths. You must start the list with two pound signs
(the Barr *send files* instruction) and separate the file names with a
character space, as shown below.

```
##c:\barr\print370\UCS3PN c:\barr\print370\FOLD c:\barr\print370\BLOCK
```

If you specify more than one file name, you must precede each file
name with its complete file path.

Set Advanced Printer Options

Advanced printer options affect how the software processes files at print
time. The software automatically sets the value of these options when you
select the **Printer type**.

Note: Do not change these options unless Barr Technical Support or
another section of this manual directs you to do so.

If you have a Xerox laser printer, additional options display at the bottom of
the screen. See Advanced Printer Options for Xerox Printers later in this
section for a description of the additional options.

These printer options do not apply to AFP printers. For more information
about AFP printers, see Chapter 7.

To access the advanced printer options, from the Printer Options screen set
Modify advanced printer options to **Yes**.

```
                        Advanced Printer Options


                  PR0E  printer type:  3211 Equivalent

          Printer character set? EBCDIC

          Pad zero length records? Yes
          Pad zero length Skip to Channel 1? Always

          Type of Sense Codes? 3211,3203,4245
          Log Printer Sense Errors? No

          Send 3211 FCB Information? Yes

          Issue TOF when space past Channel 12? No

          Display number of printed: Lines



     Warning: These advanced options should only be changed when directed
     to by a support representative or by your PRINT370 manual.
                                                            Choice? + -
```

Printer character set?

This option specifies how the PRINT370 software treats ASCII files before it sends the files to the printer. You usually create ASCII files on the PC or receive them from a LAN. (This option does not affect files received with **S/370 Channel** receive mode.)

EBCDIC

Default. The software translates ASCII files to EBCDIC. Use EBCDIC for printers that do not handle ASCII data.

ASCII

The software does not translate ASCII files to EBCDIC. Use this selection if the file to be printed comes from a DOS application and the printer accepts ASCII data.

Pad zero length records?

Zero-length (blank) records contain no data but can contain carriage control commands. Some printers require that zero-length records contain character spaces. This option controls how the software handles zero-length records. The software automatically sets the default value when you select the **Printer type**.

Yes   Default for most printer types. The software pads zero-length records with character spaces at print time. When they route data to remote workstations, most mainframe systems truncate character spaces from the end of data records. However, carriage control commands will not execute on some printers if the trailing character spaces are missing from data records. If your printer requires non-blank lines to print correctly, use this selection to add character spaces to blank lines

No   Default for the **Kodak Komstar**, **Oce (Siemens) 3800-3 Compatible**, and **Compare**x printer types. The software does not pad zero-length records.

> *PRINT/CHANNEL:* If you have the PRINT/CHANNEL option, you must set this option to **No** when you direct data from the mainframe to S/390 printers (for example, **CH0E→PR0E**). Unlike output received through JES, mainframe output received with PRINT/CHANNEL is not padded.

Pad zero length Skip to Channel 1?

This option is similar to the **Pad zero length record**s option. It affects how the software handles zero-length (blank) records that contain a Skip to Channel 1 command. Usually, Skip to Channel 1 is defined to be at the top of the form.

Always

Default for most printer types. At print time, the software always pads records containing a Skip to Channel 1 command with character spaces.

No   Default for the **Kodak Komstar**, **Oce (Siemens) 3800-3 Compatible**, and **Comparex** printer types. The software does not pad zero-length records containing a Skip to Channel 1 command.

> *PRINT/CHANNEL:* If you have the PRINT/CHANNEL option, you must set this option to **No** when you direct data from the mainframe to S/390 printers (for example, **CH0E→PR0E**). Unlike output received through JES, mainframe output received with PRINT/CHANNEL is not padded.

Consecutive Blank

Default for the **Xerox Laser** printer type. If a record with Skip to Channel 1 and no data follows another record with Skip to Channel 1 and no data, the software pads the second record with character spaces.

For example, the consecutive records

Skip Immediate to Channel 1
Skip Immediate to Channel 1

become the records

Skip Immediate to Channel 1
Write a Space and Skip to Channel 1

Consecutive non-blank

If a record with a Skip to Channel 1 command and no data follows a record with a Skip to Channel 1 command and data, the second record is padded with blanks.

For example, the consecutive records

Write and Skip to Channel 1
Skip Immediate to Channel 1

become the records

Write and Skip to Channel 1
Write a Space and Skip to Channel 1

Type of Sense Codes?

Select which of the two sense code types best matches the format used by your printer. Your selection determines what action the software takes when it encounters various errors.

3211, 3203, 4245

Default for most printer types. The software uses the sense codes for the IBM 3211, 3203, and 4245 printers.

6262, 4248, 3800

Default for the **IBM 6262** and **Oce (Siemens) 3800-3 Compatible** printer types. The software uses the sense codes for the IBM 4248, 6262, and 3800 printers.

Log Printer Sense Errors?

Choose whether to display printer sense codes on the Barr console.

Note: This option does not affect display of the backspace
message for Océ 3800-3 Compatibility Mode printers. See section
5.2 for more information about the backspace message.

No Default for most printer types. Printer sense codes do not display
on the Barr console.

Yes Default for the **Comparex** printer type. Printer sense codes other
than sense **4000xxxx** display on the console. For a description of
the message format, see section 8.4.

Send 3211 FCB Information?

This option allows you to control if and when the software sends Forms
Control Buffer (FCB) information to the printer. FCB information is
stored in the Barr file header. It originates from Set Vertical Format
information from the mainframe or from user-defined printer forms in
the Barr software. For more information about FCBs, see Appendix F
of the *BARR/RJE* manual.

Yes Default for most printer types. The software sends the FCB
information to the printer with each job. Most printers require
Yes for this option.

No, FCB not Sent

Default for the **Oce (Siemens) 3800-3 Compatible** and **Comparex**
printer types. Some laser printers and microfiche devices do not
accept the standard 3211 FCB Load commands. With this
selection, the software does not send the FCB. If the device
requires a different format for FCB Load, you can create a
custom FCB with one of these options: **Printer Control Data**,
Forms overlay directory, or **Initialization file**

When FCBFCB or Formname Changes

Send the FCB when the FCB information or the form name
changes. When two jobs that use the same FCB and form are sent
to the printer consecutively, the software sends the FCB only
with the first job. When multiple copies of the same job are sent
to the printer, the software sends the FCB only with the first copy
of the job.

Note: The method you use to mount forms is not a factor. If you mount forms by FCB name, an FCB name change or form name change causes the software to send the FCB. The same is true if you mount forms by form name.

If you notice that the top line of consecutive jobs shifts down the page (for example, three jobs that should each begin on line 3 instead begin on lines 3, 6, and 9, respectively), use this option to eliminate the shift. Barr Systems recommends that you set Skip to Channel 1 only at line 1. If you set Skip to Channel 1 at another line number, this selection ensures that the software properly aligns consecutive jobs that use the same FCB.

Only when FCB Changes
Similar to the previous option, except the FCB is sent only when the FCB information changes, not when the form name changes.

Issue TOF when space past Channel 12?
This option controls whether the software issues a top of form command (TOF), also known as a Skip to Channel 1, when it encounters a Skip to Channel 12 (channel stop C).

No   Default. The software does not issue TOF when the printer tries to space past Channel 12.

Yes   When the software encounters Skip to Channel 12 and more lines remain to be printed, it advances the printer to the top of the next page. This choice is useful for sites that use a Skip to Channel 12 to indicate the last print line of a page.

Display number of printed:
This option controls whether the Status Line displays the number of lines printed or the number of pages printed.

Lines
Default. The software displays the number of lines printed.

Pages
The software displays the number of pages printed. If you use the print spool feature, the **Pages** selection makes it easier to position large files for reprint.

Set Advanced Printer Options for Xerox Printers

This section describes additional options that display at the bottom of the Advanced Printer Options screen when you select **Xerox laser** as the printer type. These options apply only to PC-generated resource files with the Xerox LPS or Interpress IMG format. For more information about how the software handles special Xerox files, see Appendix C.

When the Barr software sends an LPS or Interpress resource file to the printer, the software automatically generates a Dynamic Job Descriptor Entry (DJDE) record that instructs the printer to store the file. If you generate files in these formats, use the options at the bottom of the Advanced Printer Options screen to specify the DJDE record format that your printer requires. When the software generates a DJDE, it formats the DJDE according to the options described in this section.

If you do not know the DJDE format for your printer, contact your Xerox printer representative.

Note: The Xerox 8700 and 9700 printers *do not* support this method for loading resource files.

```
                      Advanced Printer Options

                 PR0E  printer type:  Xerox Laser

         Printer character set? EBCDIC

         Pad zero length records? Yes
         Pad zero length Skip to Channel 1? Consecutive Blank

         Type of Sense Codes? 3211,3203,4245
         Log Printer Sense Errors? No

         Send 3211 FCB Information? Yes

         Issue TOF when space past Channel 12? No

         Display number of printed: Lines

         DJDE Offset: __0 Prefix: _____ Skip: __0
         DJDE Character Set? EBCDIC

  Warning: These advanced options should only be changed when directed
  to by a support representative or by your PRINT370 manual.
                                                       Choice? + -
```

DJDE Offset:

Indicates where the DJDE string begins in the record. The printer requires DJDEs for all files to begin at the same character position within the DJDE record. Different Xerox printers require different DJDE offsets. For some printers, blank characters must precede the DJDE string. To calculate the offset, note the column position where the DJDE identifier begins and then subtract 1. For example, if the DJDE identifier begins in column position 3, the offset is 2 (calculated from 3 - 1 = 2).

Prefix:

The DJDE identifier string that precedes each DJDE command. The prefix enables your printer to distinguish DJDE commands from printable data. The prefix must contain at least one alphanumeric character. A common value is **$DJDE$**.

Skip:

Indicates the length of the DJDE identifier string. When you calculate the length, include the offset value, the prefix length, and any trailing blanks. For example, a DJDE string with an offset of 2, a 6-character prefix (**$DJDE$**), and 2 trailing blanks has a length (or skip) of 10.
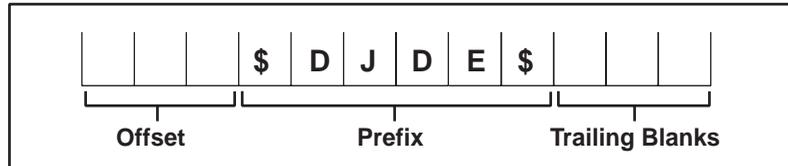
DJDE Character Set?

Specify whether the printer requires EBCDIC or ASCII DJDE strings.

EBCDIC

Default. The printer requires EBCDIC DJDE strings.

ASCII

The printer requires ASCII DJDE strings.

Enter Printer Control Data

Printer control data is optional for most PRINT370 applications, but it might be required for special applications. If you use printer control data with S/390 printers, the data must be in a specific format.

For a complete description of printer control data, see the Devices and Printers chapter your *BARR/RJE* or *BARR/SPOOL* manual.

Printer control data does not apply to AFP printers. For more information about AFP printers, see Chapter 7.

To access printer control data for S/390 channel printers, start at the printer definition screen.

```
                 S/390 Channel Attached Printer Definition


               Enable or Disable device? Enabled

               Printer address: 0E

               Printer type? 3211  Equivalent



                     Escape

                     Set printer options
                     Printer control data

                                                     Selection ↑↓→←
```

1. Select **Printer control data**

```
                          Printer Control Data

                    PR0E  printer type:  3211 Equivalent

 (The following information is optional.)

 Printer Control Data inserted at start of a file. 00 00 marks end of data.
 See Appendix B in your BARR/RJE manual for hex coding of ASCII control
 characters. See also the Printer Control Data section of your PRINT370 manual.

     HEX: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
     HEX: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
     HEX: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
     HEX: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
     HEX: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
     HEX: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
     HEX: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
     HEX: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
     HEX: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
     HEX: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

                                                          Enter hex data
```

2. Type the hexadecimal codes for the printer control data.

Printer control data for S/390 channel printers must be in the Barr S/370 format described below. See Appendix A for more information about the Barr S/370 file format.

Each control string must include the S/370 file header followed by one or more records. Each record must contain beginning and ending length codes and a channel command. Optionally, data can follow the command. The format is as follows:

```
Header  BLB   CC   Data   ELB
```

Header   The four-byte S/370 format header, which is **76 1A FF 00**. You must include this header at the beginning of each printer control string.

BLB
ELB   Beginning and ending length bytes represent the number of bytes between length codes (that is, the carriage control character plus the data length).

CC   Machine carriage control character. See Appendix A or your printer manual for a description of these characters.

Data   Printer control data. Use the character set (EBCDIC or ASCII) your printer requires.

For example, to place an extra page at the beginning of a job, enter this data string:

```
HEX: 76 1A FF 00 01 8B 01 00 00 00 00 00 00 00 00 00 00 00 00 00
```

These codes cause the printer to eject an extra page. Byte **01** appears as the beginning and ending length bytes and byte **8B** is the carriage control character Skip to Channel 1 Immediate.

If you include data in the printer control data string, put the data after the carriage control characters as shown below.

```
HEX: 76 1A FF 00 06 8B C8 C5 D3 D3 D6 06 00 00 00 00 00 00 00 00
```

Byte **06** appears as the beginning and ending length bytes. The software sends the data to the printer with an **8B** command. These codes cause the printer to write the data (HELLO) at the current line and then Skip to Channel 1. See Appendix A for a list of machine carriage control commands.

4.5 Assign Devices, Receive Mode, and Options

When you finish entering information about your printers from the S/390 Channel Attached Printers screen, you need to direct output to the channel printers from the Assign Devices screen. You also need to set the **Receive Mode** to **S/370 Channel** and **Carriage control** to **normal** for most host source devices that receive data for the channel printers. You also can set options for each device.

Note that AFP printers do not display on the Assign Devices screen. See Chapter 7 for more information about AFP.

Route Data to S/390 Printers

The following example shows you how to direct output from the mainframe RJE printer stream **PR1** to the channel printer **PR0E**.

For more information about the Assign Devices screen, see the Assign Devices chapter of your *BARR/RJE* or *BARR/SPOOL* manual.

Start at the Installation Description screen.

```
                         Installation Description


              RJE Description
              Communication Link
              Devices and Printers: LPT, COM, NET, SEND, LAN
              S/390 Channel Attached Printers
              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 and Global Options

              Exit and Save Changes


                                                  Selection ↑↓→←
```

1. Select **Assign Devices**.

```
                              Assign Devices


SEND1→RD1  SEND2→SCREEN  KEYBOARD→COMMAND  CON→SCREEN  LOG→NUL  PR1→SPOOL*
PR2→LPT1  PU1→SUSPEND  SPOOL1→PR0E


                        Select  SOURCE→DESTINATION.   Escape  Selection ↑↓→←
```

2. Select the source device. For example, select **PR2**.

```
                              Assign Devices


DESTINATION? (FILE) SCREEN NUL SUSPEND LPT1 COMMAND RD1 PR0E


                                                  Selection ↑↓→←
```

3. Select the S/390 printer as the destination device. For example, select
   PR0E

Convert Data to ASCII or S/370 Format

Files you send to channel printers must have the ASCII format or Barr
S/370 file format. Most files generated on the PC or LAN have the ASCII
format. Files you receive from an IBM mainframe or a midrange host system
(such as an AS/400, UNIX, or VAX) must be converted to one of these
formats. Use the **Receive mode** option to control data conversion.

For more information about other receive modes, see the Assign Devices,
Receive Mode section of your *BARR/RJE* or *BARR/SPOOL* manual. For more
information about the Barr S/370 file format, see Appendix A. If your ASCII
files contain the hexadecimal control character **1F**, the software performs
special processing, as described in section B.2.

Select the Receive Mode Option

When you assign a source device to write to an S/390 channel printer
destination (for example, **PR2→PR0E**), the **Receive mode** option displays at the
bottom of the Assign Devices screen.

```
                         Assign Devices


 SEND1→RD1  SEND2→SCREEN  KEYBOARD→COMMAND  CON→SCREEN  LOG→NUL  PR1→SPOOL*
 PR2→PR0E  PU1→SUSPEND  SPOOL1→PR0E


    Continue    Escape    Receive mode    Options    Help
```

➤ Select **Receive mode**.

A list of receive mode choices displays at the bottom of the screen:

```
                         Assign Devices


 SEND1→RD1  SEND2→SCREEN  KEYBOARD→COMMAND  CON→SCREEN  LOG→NUL  PR1→SPOOL*
 PR2→PR0E  PU1→SUSPEND  SPOOL1→PR0E

  ASCII    N ASCII lines   Variable ASCII lines  Transfer files  Transparent
  Binary   DOS (obsolete)  Fixed length          S/370 Channel   PostScript ↑↓→←
```

Assign ASCII Receive Mode

When the software receives EBCDIC files from a host system it can convert
them to ASCII format. ASCII files do not take advantage of all the printer

channel commands, but they are easier to view on the PC screen than S/390 files. PRINT370 supports a maximum print width of 512 for ASCII files.

To assign ASCII receive mode, perform this step:

```
                            Assign Devices


SEND1→RD1   SEND2→SCREEN   KEYBOARD→COMMAND   CON→SCREEN   LOG→NUL   PR1→SPOOL*
PR2→PR0E   PU1→SUSPEND   SPOOL1→PR0E

ASCII      N ASCII lines    Variable ASCII lines   Transfer files   Transparent
Binary     DOS (obsolete)   Fixed length           S/370 Channel    PostScript ↑↓→←
```

➤ Select **ASCII**.

```
                            Assign Devices


SEND1→RD1   SEND2→SCREEN   KEYBOARD→COMMAND   CON→SCREEN   LOG→NUL   PR1→SPOOL*
PR2→PR0E   PU1→SUSPEND   SPOOL1→PR0E

   Continue    Escape    Receive mode    Options    Help
```

The options at the bottom of the Assign Devices screen redisplay.

Assign S/390 Channel Receive Mode

The software can convert EBCDIC files it receives from a host system to the Barr S/370 file format. The S/370 file format retains all printer channel skips.

To assign **S/370 Channel** receive mode, perform these steps:

```
                            Assign Devices


SEND1→RD1   SEND2→SCREEN   KEYBOARD→COMMAND   CON→SCREEN   LOG→NUL   PR1→SPOOL*
PR2→PR0E   PU1→SUSPEND   SPOOL1→PR0E

ASCII      N ASCII lines    Variable ASCII lines   Transfer files   Transparent
Binary     DOS (obsolete)   Fixed length           S/370 Channel    PostScript ↑↓→←
```

1. Select **S/370 Channel**.

Xerox 4235: The Xerox 4235 is not a channel printer. It requires **Transparent** receive mode.

```
                              Assign Devices


SEND1→RD1  SEND2→SCREEN  KEYBOARD→COMMAND  CON→SCREEN  LOG→NUL  PR1→SPOOL*
PR2→PR0E*  PU1→SUSPEND  SPOOL1→PR0E

Carriage control: normal
Add 0x40 to S370 records ending in 0xff? No
Use package format instead of S370 format? No
                                                              Choice? + -
```

2. Set the receive mode options.

Carriage control:
Select which type of carriage control to use.

normal
Default. Barr Systems recommends that you use this setting.

Machine
If *all* your mainframe jobs have a record format of FBM or VBM
and the jobs do not print correctly with **normal** carriage control,
specify RECFM=FB or RECFM=VB in the job control language
(JCL) and **Carriage control: Machine** in the Barr software.
With this selection, the software uses the first byte of each
record as machine carriage control.

Add 0x40 to S370 records ending in 0xff?
This option is for Océ printers that interpret hexadecimal **FF40** at the
end of print records as the font reset command. Choose whether to add
a character space (hexadecimal **40**) to records that end with hexadeci-
mal **FF** as files are received to the PC. Because JES truncates trailing
blanks, the **40** gets discarded when the file is sent from the host, and
the command becomes invalid.

No Default. Do not change records that end with the hexadecimal
character **FF**.

Yes Add a character space (hexadecimal **40**) to records that end with
hexadecimal **FF**.

Use package format instead of S370 format?
This option is for mainframes that use the Fujitsu Network Architecture
(FNA). To use this option, your mainframe must be set up to support

package format. Choose whether to use package format or S/370 format for files received to the PC.

No Default. Do not use package format. Use the Barr S/370 channel format.

Yes (always)
Use package format for all files.

Only when FCB name is "XRX"
Use package format only for files with an FCB name of **XRX**. For all other files, use the Barr S/370 channel format.

```
                             Assign Devices


SEND1→RD1  SEND2→SCREEN  KEYBOARD→COMMAND  CON→SCREEN  LOG→NUL  PR1→SPOOL*
PR2→PR0E*  PU1→SUSPEND  SPOOL1→PR0E



   Continue    Escape    Receive mode    Options    Help
```

After you finish entering the receive mode options, the menu selections redisplay at the bottom of the screen. When you assign a **Receive mode** other than ASCII, an asterisk (*****) after the destination device.

Set Receive Mode for the Print Spool

When you assign channel output to the Barr print spool, be sure to set the **Receive mode** on the correct source device. Print spooling requires two source devices. The software sends data to the print spool directory (**PR1→SPOOL***) and then directs it from a spool printer to an S/390 printer (**SPOOL1→PR0E**). The receive mode takes effect as the data is received. Thus, you must set the receive mode for the device that receives the file to the print spool directory, not for the spool printer device that sends the file to the printer. On the following screen, **PR1→SPOOL*** is set for **S/370 Channel** receive mode, not **SPOOL1→PR0E**.

```
                              Assign Devices


 SEND1→RD1  SEND2→SCREEN  KEYBOARD→COMMAND  CONS→SCREEN  LOG→NUL PR1→SPOOL
 PU1→SUSPEND   SPOOL1→PR0E


     Continue     Escape     Receive mode     Options     Help
```

Convert from ASA to Machine Carriage Control

Some host or PC applications produce ASCII files with ASA carriage control. You can print these files to S/390 printers if you set up the software to convert ASA carriage control to machine carriage control.

For LAN files, use the spool PRT utility and set the **ASCII ASA** option to **Yes** on the Spool Controls screen or set **ASA=YES** in the batch command when you submit the file to the print spool.

For host files you have two choices. Both choices require you to set the **Receive mode** to **ASCII**

- On the Assign Devices Options screen, set **ASCII data with ASA carriage control** to **Yes**.
- On the Assign Devices Options screen, set **OUTPUT statement used in file** to **Yes**. Change your application to produce files that include the Barr OUTPUT statement and specify the parameter **ASCIIASA=Y**.

See your *BARR/RJE* or *BARR/SPOOL* manual for more information about these options.

Correct the Receive Mode

Because receive modes are printer dependent, you must set the receive mode according to the printer's requirements. In most cases, if you receive a file with a receive mode that is incorrect for the intended printer, you cannot correct the file format at the PC. To correct the format, you must change to the receive mode the printer requires and receive the file again. For example, if the printer requires **S/370 Channel** receive mode but you receive the file with **Binary** receive mode, you must change the receive mode setting and receive another copy of the file. The exception is that you can convert S/370 format to ASCII at the PC, as described at the end of this section.

Xerox printers: The Xerox 4235 printer, which requires `Transparent` receive mode, is sometimes used as a backup for Xerox channel printers (such as the Xerox 4090), which require `S/370 Channel` receive mode. If your channel printer fails, you cannot print the S/370 format files to the Xerox 4235. You must change the receive mode to `Transparent` and receive the files again before you can print them on the 4235.

Convert S/370 Format to ASCII

If you receive a file with `S/370 Channel` receive mode and you need to print the file on an ASCII printer instead of a channel printer, you can use the S370ASCI.EXE utility to convert the file to ASCII format. The S370ASCI.EXE file is included with the Barr PRINT370 reference files.

Disable Record Padding

You can disable zero-length record padding for individual source devices. The padding options you set from the Advanced Printer Options screen affect all files that are sent to a specific printer. To disable the padding options for a source device, from the Assign Devices Options screen set `Disable S/390 printer padding` to `Yes`.

5 Using Océ Printers

This chapter discusses how to set up Océ utility files and Barr software options for use with these printers:

- Océ 2050 and 2075
- Océ printers that operate in IBM 3800 Compatibility Mode

5.1 Océ 2050 and 2075 Printers

If you are using an Océ 2050 or 2075 printer, review this section for information about setting up the 2050FORM utility and the Barr software.

Océ 2050FORM Utility

The Océ 2050 and 2075 printers store resources within the printer. When an Océ 2050 or 2075 printer is directly attached to the mainframe, the printer receives a special FCB record with each job. The FCB triggers the printer to load the stored forms. The first portion of the FCB is identical to the FCB used for IBM 3211 equivalent printers. The rest of the FCB contains an Océ Printer Control Language (PCL) command that instructs the printer to load resources.

When these printers are remotely attached to the mainframe, the FCB records are not provided. Instead, you must use the Océ 2050FORM utility at the PC to create FCB records with the required PCL load resources command. This interactive utility produces a file that you must copy to the Barr forms overlay directory. When a job is ready to print, PRINT370 sends the file to the printer immediately before the print job, which causes the printer to load the required resources.

Barr Software Settings

You can set up the Océ 2050 and 2075 printers to operate either as an Océ 2050 or as an IBM 3211 equivalent printer. If you use PCL commands to load printer-stored resources, select **Oce (Siemens)**

2050/2075 as the printer type and use the Océ 2050FORM software to generate FCBs that contain PCL commands. If you do not use PCL commands, select **IBM 3211 Equivalent** as the printer type. For a detailed discussion of the options listed in the following steps, see Chapter 4.

These instructions assume you have completed the Adapter Description according to the instructions in section 4.2.

Printing without PCL Commands

If you will not use the Océ 2050FORM software, use the default settings for the **IBM 3211 Equivalent** printer type, as described in section 4.4.

Printing with PCL Commands

If you will use the Océ 2050FORM software to create FCBs that contain PCL commands, follow these steps to set printer options in the Barr software.

1. Enter the printer definition settings.

Start at the S/390 Channel Attached Printers screen.

a. Select a printer. The S/390 Channel Attached Printer Definition screen displays.

b. Set **Enable or Disable device** to **Enable**

c. Enter the two-digit **Printer address**. The value in the software must match the value set on the printer with switches or firmware.

d. Set **Printer type** to **Oce (Siemens) 2050/2075**.

2. Set the printer options.

To reach the printer options, start at the S/390 Channel Attached Printer Definition screen.

a. Select **Set printer options**. The Printer Options screen displays.

b. Set **Modify advanced printer options** to **Yes**. (The Advanced Printer Options screen displays when you finish with the Printer Options screen.)

c. Define a **Forms overlay directory**. This is the directory where you will store the FCBs generated by the 2050FORM software.

d. Press [Enter].

3. Set the advanced printer options.

When you press [Enter] from the Printer Options screen, the Advanced Printer Options screen displays.

a. Make sure that **Send 3211 FCB Information** is set to **No**, the default setting.

b. Press [Enter] to preserve your changes, then press [Esc] until you reach the Installation Description screen.

4. Set the forms options.

If you have BARR/SPOOL or BARR/AFP, skip this step. If you have BARR/RJE software, set the forms options. Start at the Installation Description screen.

a. Select **Tuning and Global Options**, and then select **Printer Control**.

b. On the Tuning and Global Options, Printer Control screen, set **Mount forms by** to **SETUP=PDIR FORMNAME**. (You also must enable this option at the mainframe. See Appendix F of your *BARR/RJE* manual.)

c. Press [Enter] to preserve your changes.

d. Press [Esc] to return to the Installation Description screen.

5. Assign source and destination devices.

Set up Assign Devices according to the instructions in section 4.5.

6. Save your installation changes.

Remember to save your changes from the Exit and Save Changes screen.

7. Set up the FCBs.

a. Use the Océ 2050FORM utility to create FCB records that contain PCL commands.

b. Copy the resulting FCB files into the forms overlay directory.

5.2 Océ 3800-3 Compatibility Mode Printers

These printers can operate in IBM 3800 Compatibility Mode:

■ Océ 2200-2, 2200-3, 2140-2, 2140-3, 2240-2, and 2240-3
■ STK 6100

SNPFORM and SNPIMAGE Software

Océ 3800-3 Compatibility Mode printers require resource information (or print instructions) such as fonts, form overlays, FCBs, and mode commands. When the printer is locally attached to the mainframe, these resources are sent from the mainframe to the printer. However, SNA remote printing does not support these resources (the resources cannot be expressed in SNA formats). Because the resources cannot be sent from the mainframe to the PC, when you are printing from the Barr software you must create resource information on the PC.

To create resource files for use with PRINT370, you must obtain the SNPFORM and SNPIMAGE software utilities and user manuals from Océ. SNPIMAGE creates the actual resources, and SNPFORM creates a forms overlay file containing the created resources. The Océ software package includes many standard fonts.

The user manuals from Océ provide detailed instructions for creating resource and overlay files. First, you create a control file containing command statements that define a resource, such as an FCB. Then you use SNPIMAGE to convert the control file into a resource file. Next, you create a file that lists all the resources needed for a job. Finally you use SNPFORM to convert the resource list into an overlay file. Different overlay files can share some of the same resources.

When you enter installation options in the Barr software, you define the directory that contains the newly created overlay files to be the forms overlay directory. You also must specify a command string on the Printer Control Data screen.

When files are sent to the Océ printer, the Barr software forms overlay feature sends the appropriate printer command string and form overlay file to the printer with each job.

Supported Océ Features

This section describes some PRINT370-specific features of Océ printers. For a description of other features, see the SNPFORM and SNPIMAGE user manuals.

Backspace

The term *backspace* means to reprint a portion of data to the Océ printer. As pages of a job are sent to the printer, PRINT370 stores them in PC memory until the printed pages are placed in the printer's stacker. If a printer error occurs, the software can send the data to the printer again from memory. For example, if the Océ printer detects a forms error, the printer clears its page buffer and requests that PRINT370 perform a backspace. Additionally, the software automatically performs a backspace when data gets lost because of a paper line error.

When a backspace occurs on an Océ printer operating in IBM 3800 Compatibility Mode, PRINT370 displays this message on your PC screen:

```
PRxx Backspaced
Sense: 00000000 00000000 00000000 00000000 00000000 00000000
```

The sense message displays all 24 sense code bytes to help you determine what caused the backspace.

Table Reference Character (TRC)

The TRC feature allows you use multiple fonts on one page. You enable TRC with the SNPFORM utility. When the TRC option is used, the PRINT370 software substitutes the load character set command (select CHARS) for the first character of each print line. You can use the TRC option only with files received in the S/370 format. To use this feature with files in ASCII format, you must first use the Océ SNPSPOOL utility to convert the ASCII files to S/370 format. See the Océ SNPFORM user manual for more information.

Load Copy Number

Some printer instructions, such as form overlays, are based on the current copy number. For example, if you are printing three copies of a document you might want to use a different form overlay file for each copy. You might

want a customer copy, store copy, and corporate copy. You can use the copies option of the Barr print spool feature to print each copy of the document with a different form overlay. As each copy of the document completes, the copy number changes on the Print Spool screen, triggering the next form overlay. This results in collated copies (customer copies in one stack, store copies in another stack, corporate copies in a third stack).

To group copies of each page (all three copies of page 1 in one stack, all three copies of page 2 in another stack), you must print three copies of one page before advancing to the next page. For the grouped method, use the SNPFORM COPYG feature and set the print spool copies value to 1. See the SNPFORM user manual for more information about the COPYG command.

Barr Software Settings

In the Barr software, you need to enter the following:

- ■ S/390 printer settings
- ■ Printer control data settings
- ■ Print spool settings
- ■ Memory and forms overlay settings

Printer Setup

Follow these steps to set up the Barr software to drive the printer.

1. Enter the printer definition settings.

Start at the S/390 Channel Attached Printers screen.

a. Select a printer. The S/390 Channel Attached Printer Definition screen displays.

b. Set `Enable or Disable device` to `Enable`.

c. Enter the two-digit `Printer address`. The value in the software must match the value set on the printer with switches or firmware.

d. Set `Printer type` to `Oce (Siemens) 3800-3 Compatible`. This will set some of the printer options outlined below.

2. Set or verify the printer options.

To reach the printer options, start at the S/390 Channel Attached Printer Definition screen. You need to verify values for some options and set values for other options.

a. Select **Set printer options**.

b. On the Printer Options screen, verify that **Printer performance optimized** is set to **No**, the default setting.

c. Set **Conditional new page at end of file** to **No**.

d. Set **Audible alarm on printer error** to the value of your choice. **Yes** causes the PC to sound an alarm if the printer enters a Not Ready condition.

e. Set **Modify advanced printer options** to **Yes**. (The Advanced Printer Options screen displays when you finish with the Printer Options screen.)

f. For **Forms overlay directory**, enter **c:\imagelib**. This name must match the directory name you specified when you installed SNPFORM and SNPIMAGE. (See the Océ SNPFORM manual for details.) This enables PRINT370 to access the directory where the SNPFORM and SNPIMAGE utilities store their output files. (For more information about setting up a forms overlay directory, see the Devices and Printers chapter of your *BARR/RJE* or *BARR/SPOOL* manual.)

g. For **Initialization file**, enter **c:\imagelib\init**. The printer cannot print unless the software loads an initialization file. A file named INIT.CTL comes with the SNPFORM and SNPIMAGE software. Use SNPFORM to generate an overlay file named INIT from the INIT.CTL file. If you modify the INIT.CTL file, you must not include an FCB statement. The operator cannot check forms length on the printing system to prevent an FCB length Load Check error. See the Océ SNPFORM manual for a description of the INIT command.

3. Set the advanced printer options.

When you press [Enter] from the Printer Options screen, the Advanced Printer Options screen displays.

a. Verify that **Send 3211 FCB to printer** is set to **No**, the default setting.

b. Press [Enter] to preserve your changes. Then press [Pause] until you reach the Installation Description screen.

Printer Control Data

You must enter several printer commands on the Printer Control Data screen. Enter two command strings: one string to send before the start of each file and one string to send at the end of each file.

For more information about printer control data, see the Devices and Printers chapter of your *BARR/RJE* or *BARR/SPOOL* manual.

Set the Printer Control Data

You access printer control data from the S/390 Channel Attached Printer Definition screen.

1. Select **Printer control data**
2. Enter the start-of-file string starting in the first byte of the table. End the string with two bytes of zeros (**00 00**).
3. Enter the end-of-file string immediately after the first string. The end of file string must start with the prefix **F F**.

The format of the printer control data is described in section 4.4. Each control string must include the S/370 file header followed by one or more records. Each record within a string must contain beginning and ending length codes and a channel command. Optionally, data can follow the command.

Printer Control Data Example

This printer control data contains two strings.

```
HEX: 76 1A FF 00 01 87 01 01 07 01 01 8B 01 00 00 FF 76 1A FF 00
HEX: 01 17 01 01 87 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

The first string begins in the first byte of line one, which causes the software to send the string to the printer at the start of each file. Three command bytes wrapped in length codes follow the format header. The byte values result in the following actions:

■ The Clear Printer command (**87**) causes the printer to empty the page buffer.

■ The End of Transmission command (**07**) toggles the copy separator edge marks to the next sequence.

■ The Skip to Channel 1 Immediate command (**8B**) causes the printer to advance to the next Channel 1 stop, which usually appears on the first print line of the page.

The second string begins near the end of line one. The first byte is **FF**, which causes the software to send the string to the printer at the end of each file. Two commands wrapped in length codes follow the format header. The byte values result in the following actions:

■ At the end of the file, the Mark Form command (**17**) causes the printer to repeat the last page (data set trailer) and print end-of-job marks across the page perforations.

■ The Clear Printer command (**87**) causes the printer to empty the page buffer before continuing.

If you do not need the Mark Form or End of Transmission sequences, omit the corresponding command bytes from the control data and adjust the length bytes accordingly.

For page lengths of 8.5 inches or less, the Mark Form sequence repeats the last page three times. For all other page sizes, the Mark Form sequence repeats the last page five times. If the last page is not a job separator or trailer page, use the alternate control strings shown below.

```
HEX: 76 1A FF 00 01 87 01 01 07 01 01 8B 01 00 00 FF 76 1A FF 00
HEX: 01 8B 01 01 17 01 01 87 01 00 00 00 00 00 00 00 00 00 00 00
```

The first string in this example is the same as the previous example, but the second string contains a Skip to Channel 1 Immediate (**8B**) as the first command. This sequence produces blank pages that contain job separation marks.

Print Spool

You should use the Barr print spool feature to help with error recovery during printing and to support the Load Copy Number feature with SNPFORM-generated form overlays. For example, if a data error occurs because a required resource was not loaded, PRINT370 will suspend the output destination device. This action allows the Barr software operator to put the file on hold in the print spool until an appropriate resource file is created or the resource problem is resolved. Putting the file on hold allows

other jobs to print. If you did not use the print spool, you could not put the file on hold, and the device would remain suspended until the issue was resolved. Meanwhile, other jobs would become backlogged.

For instructions to set up the print spool, see the Print Spool Description chapter of your *BARR/RJE* or *BARR/SPOOL* manual. For more information about the `SUSPEND` destination, see the Assign Devices chapter of your *BARR/RJE* or *BARR/SPOOL* manual.

Memory and Forms Overlay

In the Barr software, you must increase the values for `Memory allocated for buffers` and `Extended memory allocated for buffers` to work with Océ 3800-3 Compatibility Mode printers.

1. Change the memory settings.

Start from the Installation Description screen.

a. Select `Tuning and Global Options`, and then select `Trace and Memory Options`.

b. For each Océ printer you are using in IBM 3800 Compatibility Mode, increase the value for `Extended memory allocated for buffers` by 1,500 to 2,000 kilobytes.

c. Increase the value for `Memory allocated for buffers` to a total of 200,000 to 300,000 bytes to provide necessary overhead for the extended memory buffers.

See the Tuning and Global Options, Trace and Memory Options section of your *BARR/RJE* or *BARR/SPOOL* manual for more information about extended memory support.

2. Set the forms overlay options.

When you use the Barr forms overlay feature, you might want to specify additional options. Forms overlay options control how forms overlay files are named and loaded and what action the software takes if an overlay file is not found.

See the Tuning and Global Options, Printer Control section of your *BARR/RJE* or *BARR/SPOOL* manual for a description of the forms overlay options.

Data Check and Load Check Error Recovery

When a Data Check or Load Check error occurs on an Océ 3800-3 Compatibility Mode printer, the printer halts and cannot continue without operator intervention. To alert you to the problem, the Status Line of the Operation screen and the printer Status on the Print Spool screen display the word **HALTED** for the affected printer. The operator must determine the cause of the error and take action to correct it.

For example, if a Load Check occurs because the wrong paper is loaded in the printer the operator has two choices:

- **Correct the problem immediately** - Load the appropriate paper. Then from the Operation screen, select **Advanced**, **PRINT370**, **PRxx**, where **PRxx** is the printer name. Select Continue on the Printer Commands menu. (The **Continue** option displays only when the printer status is **HALTED**.)

- **Correct the problem later** - Put the file on hold, and then reset the printer driver by selecting **Reset PRxx** from the Printer Commands menu. (You must put the file on hold before you select **Reset PRxx**, or the output will be lost.) The next job begins to print.

For more information about channel printer status messages that display on the Status Line and about the Printer Commands menu, see Chapter 8.

Notes:

Chapter

6 Replacing a Xerox 871-CM with PRINT370

BARR/RJE with PRINT370 can replace the Xerox 871 Communications Module (871-CM) for printing to Xerox Laser Printing System (LPS) devices. The 871-CM functions like an IBM 3777 remote workstation.

6.1 Comparing Features

BARR/RJE with PRINT370 supports features that are not available with the 871-CM. Use the chart below to compare the features of the two printing solutions. In particular, note that PRINT370 supports printers with an S/390 channel interface, while the 871-CM supports only printers with the non-channel, Offline interface used with the Xerox Host Interface Processor (HIP) software.

BARR/RJE with PRINT370	Xerox 871-CM
Printer requires Online (S/390 channel) printer interface	Printer requires Offline (HIP) printer interface
Uses Barr S/390 or ASCII file format	Uses ASCII file format
Supports Printer Carriage Control (PCC) or channel stops	Converts PCC to carriage return (CR), line feed (LF), and form feed (FF)
Drives up to six printers	Drives a single printer
Supports communications line speeds up to T1 (1.536 Mbps) or E1 (2.048 Mbps)	Supports communication line speeds up to 56 kbps
Supports DATMODE=FULL or DATMODE=HALF	Uses DATMODE=HALF
Supports MAXDATA of up to 1033 bytes	Supports MAXDATA of up to 521 bytes
Simultaneously prints and receives data	Cannot receive data while printing

6.2 Required Changes

When you replace an 871-CM with a PC, BARR/RJE, and PRINT370 software, you must make a few adjustments to the printer and the mainframe.

Changes to the Xerox Printer

The Xerox printer representative must make the following changes to the Xerox printer:

■ Replace the Offline interface and HIP used with the 871-CM with an Online (or S/390 channel) interface.

■ Change the Job Source Library (JSL) to work with the Online interface.

Online Interface

You must place the Xerox printer in Online mode to print data received on the S/390 channel interface. For example, you must use the channel interface when the printer is directly attached to the mainframe or attached to a PC running PRINT370.

Online JSL

Because the 871-CM and PRINT370 use different interfaces, they also require different JSLs in the printer. JSLs contain the text source statements to describe how the printer will input print data and output the image on paper. The Print Description Language (PDL) compiler converts the JSL into a Job Descriptor Library (JDL), which the printer references at receive and print time. The JSL varies depending on the printer's features. For example, PCC commands are valid for Offline mode but invalid for Online mode.

Xerox normally supplies the file ONLINE.JSL with the Online printer interface. You can customize this file to suit your needs or you can modify a JSL you used with the 871-CM to work with the Online interface.

If you modify an existing JSL, you might need to adjust some position-dependent statements. These statements are affected by the different ways the 871-CM and the Barr software handle channel commands. The 871-CM sends a channel command and data to the printer as a single record. The PRINT370 software sends the channel command first, and then sends the data record, so data records appear to be one column shorter than they would be on the 871-CM. (The PRINT370 method more closely mimics mainframe-attached printing.) As a result, you must reduce the column position by one in commands such as the DATA statement, IDEN prefix, FONTINDEX, and any commands that use the CRITERIA statement. You also must change the HOST and PCC statements. Consult your Xerox printer representative for guidance.

Using the Print Stream vs. the Punch Stream

BARR/RJE with PRINT370 and the Xerox 871-CM both support print data streams and punch data streams. However, for most RJE systems, you should use Barr software with print streams. Print streams can transport records longer than the default punch width of 80 bytes. Many print output files contain 132-character records and thus require the longer data stream. Print streams also can compress and compact data, which improves data throughput.

Refer to the systems documentation for your host RJE system or consult your mainframe systems programmer to determine if you should use a print stream or punch stream.

VSE/POWER: The VSE/POWER job entry system does not support transparency on the print stream. Use the punch stream if you print non-text data, such as Xerox metacode.

Converting Data

Jobs at the mainframe usually are tailored to work with the 871-CM, which supports only ASA and machine carriage control. Because the Barr software and the 871-CM handle carriage control differently, you might need to adjust format information at the mainframe or in the Barr software when you replace the 871-CM.

You have two choices for handling data you previously printed with an 871-CM. Which method you use depends on the format of the mainframe data.

■ For mainframe jobs with machine carriage control, you do not need to change format information at the mainframe. Use the 871-CM's JCL format, which specifies no carriage control, and set the Barr software `Carriage control` option to `Machine` (discards SCS carriage control).

■ For mainframe jobs with ASA carriage control, you must change the format information at the mainframe. Change the JCL format to specify the correct carriage control and set the Barr software `Carriage control` option to `normal` (converts SCS carriage control to machine carriage control). Barr PRINT370 does not support ASA carriage control.

Note: If you receive some files with machine carriage control and other files with ASA carriage control, you must use a different print stream for each carriage control type because the Barr software requires different carriage control settings for each type.

If you are not familiar with the JCL format of the files at the mainframe, try receiving a file from the mainframe with `Carriage control` set to `normal`. If the file does not print correctly, try printing it with `Carriage control` set to `Machine`. For more information about these methods, see the rest of this section.

Factors That Affect Data Format

For this discussion, keep in mind the factors that affect data format when a file is transferred from the mainframe to the PC.

■ **Mainframe format** - Files at the mainframe usually have a machine or ASA carriage control byte as the first character of each record.

■ **JCL format** - JCL statements specify the record format of the file to be sent to the remote. For example, RECFM=FBM indicates the file contains fixed-length records with machine carriage control.

■ **JES format** - The job entry system (JES) determines the file format from the JCL. Then, it converts machine or ASA carriage control to equivalent SCS carriage control characters and transfers the data to the remote. For files that do not have carriage control, JES simply inserts record separators.

■ **Barr format** - The `Carriage control` option for the `S/370 Channel` receive mode controls whether the software converts the SCS carriage control to machine carriage control (`Carriage control: normal`) or discards the SCS carriage control (`Carriage control: Machine`).

JES and Carriage Control

Remote job entry systems, such as JES, convert ASA and machine carriage control to SCS carriage control when they transfer data to a remote printing system. But the 871-CM cannot process SCS carriage control, so a method was devised to preserve the ASA and machine carriage control for the 871-CM. To prevent JES from converting the ASA and machine carriage control, you must specify an incorrect record format in the JCL. For example, you would specify that data with machine carriage control does not have carriage control. As a result, JES treats the machine carriage control as another data byte and does not convert the carriage control to SCS. The embedded machine carriage control byte is transferred to the remote with the data (see Figures 6-1 and 6-2).

Mainframe | M | Data |

JES | S | M | Data |

871-CM | M | Data |
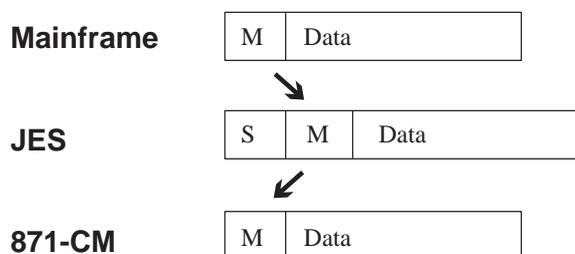
Figure 6-1. A mainframe job with machine carriage control (M) is routed to the 871-CM. Because the JCL record format specifies no carriage control, JES adds an SCS record separator (S) and treats the machine carriage control as data. The 871-CM discards the SCS byte and uses the machine carriage control.

Mainframe | A | Data |

JES | S | A | Data |

871-CM | A | Data |
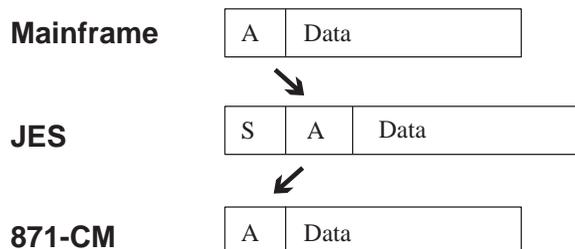
Figure 6-2. A mainframe job with ASA carriage control (A) is routed to the 871-CM. Because the JCL record format specifies no carriage control, JES adds an SCS record separator (S) and treats the ASA carriage control as data. The 871-CM discards the SCS byte and uses the ASA carriage control.

Data in this format is not what BARR/RJE with PRINT370 usually expects, but you can set up the Barr software to accept the embedded machine carriage control. For ASA carriage control, however, you must make other adjustments.

Machine Carriage Control

For machine carriage control, you can set up the PRINT370 software to use the 871-CM data format without making JCL changes at the mainframe. On the Assign Devices screen, select `S/370 Channel` receive mode and set `Carriage control` to `Machine` This tells the software that the data contains embedded machine carriage control. The software discards the SCS carriage control and recognizes the first data byte as machine carriage control.

Mainframe

M	Data

JES

S	M	Data

PRINT370

M	Data
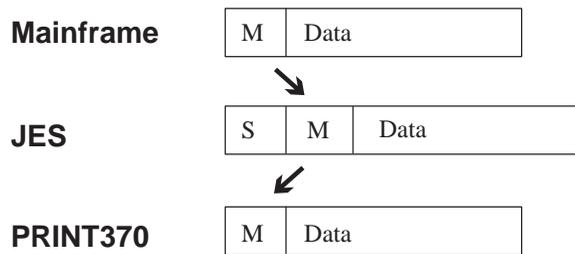
Figure 6-3. For a mainframe job with machine carriage control (M), set carriage control to machine in the Barr software to discard the SCS carriage control (S) and use the embedded machine carriage control (M).

ASA Carriage Control

PRINT370 does not support ASA carriage control, so you cannot use the incorrect JCL to embed the ASA carriage control as data. Instead, you must change the JCL format at the mainframe to correctly reflect the mainframe data format. Also, on the Assign Devices screen, select S/390 Channel receive mode and set `Carriage control` to `normal`. JES converts the ASA carriage control to SCS carriage control, and the Barr software converts the SCS carriage control to machine carriage control.

Mainframe	A	Data

$\downarrow$

JES	S	Data

$\downarrow$

PRINT370	M	Data
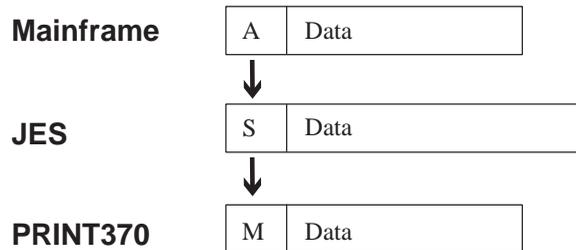
Figure 6-4. For a mainframe job with ASA carriage control (A), set the JCL to the correct format at the mainframe and set carriage control to normal in the Barr software. Barr software converts SCS carriage control (S) to machine carriage control (M).

Notes:

7 Using Remote AFP

Barr software supports two types of Advanced Function Printing (AFP) printers: IPDS Group 3 printers (for example, the IBM 3825 and 3827) and VTAM-attached IPDS printers (for example, the IBM 3820). You can request either type of AFP support at no additional charge.

This chapter describes AFP requirements, explains how AFP works, and lists the required mainframe parameters. It also tells you how to monitor the printer status from the Barr software and how to use the Barr AFP Resource Saving feature.

7.1 AFP Requirements

AFP printing is controlled by the mainframe, and thus requires a mainframe connection. To attach AFP printers to the PC, you must have BARR/RJE, RJE+3270, BARR/3270, or BARR/AFP software. Because you can control AFP printers with a 3270 terminal session, you should use BARR/3270 or RJE+3270.

You also should use a printer control application such as the SPOOL Display and Search Facility (SDSF) from IBM or the Interactive Output Facility (IOF) from Fisher International. IOF software allows you to change the form or class and start or drain the printer. To obtain SDSF, contact your nearest IBM representative. To obtain IOF, contact Fisher International Systems, Naples, Florida, at 941-643-1500.

7.2 How AFP Works

Because AFP printers communicate directly with the mainframe, they can only print data received directly from the IBM Print Services Facility (PSF). You cannot send RJE system files or PC-generated files to AFP printers and you cannot direct AFP files to the print spool or the PC disk. (Thus, AFP printers do not display on the Barr `Assign Devices` screen.) The only software options for AFP printers are those you can reach from the S/390 Channel Attached Printers screen.

PSF and IPDS

PSF at the mainframe controls the printer via an LU Type 6.2 session. The LU Type defines session characteristics such as the type of data stream the session uses and type of communication the session supports. LU Type 6.2 uses the Intelligent Printer Data Stream (IPDS) and supports full-duplex communication.

The mainframe writes AFP jobs to the JES spool and then JES sends the jobs to PSF, which formats the jobs and sends them to the remote printer. PSF converts AFP data or line data to IPDS. As the jobs arrive at the PC, the Barr software directs the data to the AFP printer. PRINT370 does not modify the data stream except to request job header information for jobs going to IPDS Group 3 printers.

IPDS Group 3 and VTAM-attached IPDS Printers

Because IPDS Group 3 printers work differently than VTAM-attached IPDS printers, the Barr software treats them differently.

The VTAM-attached IPDS printers process the IPDS data stream and implement SNA communications, so the Barr software simply passes the data and communications protocol between PSF and the printer. Data transfer from the mainframe LU to the Barr software is similar to the data pass-through in a gateway. Because VTAM-attached IPDS printers communicate directly with the mainframe, the Barr software does not know the nature of the data it sends and receives. The Barr software provides a 3270 session for viewing the status of VTAM-attached IPDS printers.

IPDS Group 3 printers only process the IPDS data. They do not implement SNA communications. The Barr software passes the data to the printer and performs the SNA communications. The Barr software also sends printer responses to PSF, which remains in full control of the printer. The printer status displays on the Barr Status Line.

For more information about the status for AFP printers, see section 7.4.

AFP Performance

Unlike RJE, PSF does not support data compression. Thus, AFP requires faster communication speeds to obtain the same printer output rate as an RJE application. To generate the same number of pages per minute as RJE, AFP requires about twice the line speed.

7.3 Enter Mainframe Parameters for AFP Printers

When you use Barr software with AFP printers, host systems programmers must enter specific mainframe definition parameters in VTAM, PSF, and JES2. The definition consists of five parts. The sample definition in this section shows the statements you need for one AFP printer. Figure 7-1 at the end of this section shows portions of the mainframe definitions that must match.

VTAM Definition

In VTAM, the host programmer must define a logical unit (LU), physical unit (PU) and LU macros, and a logmode table.

LU Definition

PSF uses an LU to communicate with the remote AFP printer. More specifically, it uses an application LU. The host programmer enters the LU definition in the SYS1.VTAMLST(APPL) library. The LU definition that the Barr software requires is shown below.

```
        VBUILD TYPE=APPL
psflu   APPL   AUTH=ACQ,EAS=1,SONSCIP=YES
```

The macro name (in this case, **psflu**), must match the **APPLID** value in the PSF definition.

PU and LU Macros

The PU and LU macros are part of the VTAM NCP definition. The host programmer enters these macros in the SYS1.VTAMLST(NCP) library. The PU and LU macros display in the Barr software after you enter the Communication Link parameters. See your Barr RJE or 3270 manual for more information about any parameters not discussed in this section.

The following example shows PU and LU macros for the AFP printer.

```
puname    PU     ADDR=C1,
                 PUTYPE=2,
                 IDBLK=xxx,
                 IDNUM=xxxxx,
                 DATMODE=FULL,
                 MAXDATA=nnn,
                 MAXOUT=7,
                 PASSLIM=7,
                 PACING=7,
                 DISCNT=NO,
                 VPACING=7

luname01 LU     LOCADDR=1,DLOGMOD=BarrPSF
luname02 LU     LOCADDR=2                          * RJE LU
 .
 .
 .
luname0n LU     LOCADDR=n                          * RJE LU
```

The **DLOGMOD** parameter must have the same value in the NCP LU macro,
VTAM Logmode Table definition, and the PSF printer definition.

DLOGMOD=bbbbbbbb
> Specify the name of the logon mode table entry, or logmode, for the
> PSF printer. See AFP Logmode Table later in this section for the logon
> mode table definition Barr Systems recommends.

LU Macro Sequence

Mainframe LUs must be defined in a certain sequence, depending on the
type of applications the LUs are used for. If LU1 is available, the host
programmer usually begins defining AFP printers with LU1.

If you are using both VTAM-attached IPDS and IPDS Group 3 printers, or if
the mainframe connection is through the BARR GATEWAY product, the
host programmer must use LU1 for the VTAM-attached IPDS printer.
Additionally, in the Barr software, you must set the option **Allow IPDS
Group3 printers to use LU1** to **No** from the Tuning and Global Options,
Modem and Line Control screen. This ensures that PSF uses LU1 for the first
VTAM-attached IPDS printer instead of the IPDS Group 3 type printer.

In the mainframe definition, the host programmer should assign the LUs in
this order:

- First, the host programmer assigns LUs to all VTAM-attached IPDS printers, beginning with LU1.

- If you are not using VTAM-attached IPDS printers or the BARR GATE-WAY, the host programmer can assign LU1 to the first IPDS Group 3 printer. Alternatively, if you are not using any VTAM-attached IPDS printers and you set **Allow IPDS Group3 printers to use LU1** to **No**, the host programmer can assign LU1 to the first RJE session.

After LUs are assigned to all the VTAM-attached IPDS printers, the host programmer can assign the remaining LUs first to any 3270 sessions, next to any IPDS Group 3 printers, and finally to RJE sessions.

The list below shows how the host programmer would assign LUs for two 3820 (VTAM-attached IPDS) printer sessions, one 3825 (IPDS Group 3) printer session, four 3270 sessions, and five RJE sessions.

Session Type	LU Number
3820	LUs 1 - 2
3270	LUs 3 - 6
3825	LU
RJE	LUs 8 - 12

AFP Logmode Table

This is an example of a typical AFP Logmode Table definition. The logmode is defined in the SYS1.VTAMLIB library.

```
BarrPSF MODEENT LOGMODE=BarrPSF,
                FMPROF=X'13',TSPROF=X'07',PRIPROT=X'B0',
                SECPROT=X'B0',COMPROT=X'D0B1',RUSIZES=X'nmnm',
                PSERVIC=X'060200000000000000002000',
                PSNDPAC=X'07',SRCVPAC=X'07',SSNDPAC=X'00'
```

PSF Procedures

PSF procedures describe the type of printer attachment (in this case, remote) and set up the different resource libraries needed for AFP printing. The host programmer must define a separate procedure in the SYS1.PROCLIB for each AFP printer. A sample definition follows.

```
//psfproc PROC LIB='JES2........'
//**************** THE PSF SNA WRITER PROCEDURE ***************
//STEP01  EXEC PGM=APSPPIEP,REGION=1750K
//STEPLIB DD  DSN=&LIB,DISP=SHR
//SYSUDUMP DD  SYSOUT=A
//JOBHDR OUTPUT PAGEDEF=V06483,       /* JOB SEPARATOR PAGEDEF       */
//       FORMDEF=010110,CHARS=GT12   /* JOB SEPARATOR FORMDEF     @H3C*/
//JOBTLR OUTPUT PAGEDEF=V06483,       /* JOB SEPARATOR PAGEDEF       */
//       FORMDEF=010110,CHARS=GT12   /* JOB SEPARATOR FORMDEF     @H3C*/
//DSHDR  OUTPUT PAGEDEF=V06483,       /* DS  SEPARATOR PAGEDEF       */
//       FORMDEF=010110,CHARS=GT12   /* DS  SEPARATOR FORMDEF     @H3C*/
//MSGDS  OUTPUT PAGEDEF=V06483,       /* MESSAGE DATASET PAGEDEF     */
//       FORMDEF=010110,CHARS=GT12   /* MESSAGE DATASET FORMDEF   @H3C*/
//*
//FONT01   DD  DSN=SYS1.FONT3820,DISP=SHR    /* SYSTEM FONTS      */
//         DD  DSN=MVS.PSF.FONTLIB,DISP=SHR  /* EXTRA FONTS       */
//PSEG01   DD  DSN=SYS1.PSEGLIB,DISP=SHR     /* SYSTEM PAGE SEG   */
//         DD  DSN=MVS.PSF.PSEGLIB,DISP=SHR  /* EXTRA PAGE SEGMENTS*/
//OLAY01   DD  DSN=SYS1.OVERLIB,DISP=SHR     /* SYSTEM OVERLAYS   */
//         DD  DSN=MVS.PSF.OVERLIB,DISP=SHR  /* EXTRA OVERLAYS    */
//PDEF01   DD  DSN=SYS1.PDEFLIB,DISP=SHR     /* SYSTEM PAGEDEFS   */
//         DD  DSN=MVS.PSF.PDEFLIB,DISP=SHR  /* EXTRA PAGEDEFS    */
//FDEF01   DD  DSN=SYS1.FDEFLIB,DISP=SHR     /* SYSTEM FORMDEFS   */
//         DD  DSN=MVS.PSF.FDEFLIB,DISP=SHR  /* EXTRA FORMDEFS    */
//*
//PRTxx    CNTL
//PRTxx    PRINTDEV FONTDD=*.FONT01, /* FONT    LIBRARY DD        */
//         OVLYDD=*.OLAY01,          /* OVERLAY LIBRARY DD        */
//         PSEGDD=*.PSEG01,          /* SEGMENT LIBRARY DD        */
//         PDEFDD=*.PDEF01,          /* PAGEDEF LIBRARY DD        */
//         FDEFDD=*.FDEF01,          /* FORMDEF LIBRARY DD        */
//         JOBHDR=*.JOBHDR,          /* JOB HEADER SEPARATOR OUTPUT */
//         JOBTRLR=*.JOBTLR,         /* JOB TRAILER SEPARATOR OUTPUT */
//         DSHDR=*.DSHDR,            /* DATA SET HEADER SEPARATOR  */
//         MESSAGE=*.MSGDS,          /* MESSAGE DATA SET OUTPUT    */
//         PAGEDEF=V06483,           /* DEVICE PAGEDEF DEFAULT     */
//         CHARS=(GT12),             /* DEFAULT FONT SET           */
//         FORMDEF=010110,           /* DEVICE FORMDEF DEFAULT     */
//         PIMSG=YES,                /* ACCUMULATE DATA SET MESSAGES */
//         DATACK=BLOCK,             /* DO NOT NOTIFY PSF OF DATA ERRORS*/
//         TRACE=NO,                 /* CREATE INTERNAL TRACE ENTRIES*/
//         FAILURE=WCONNECT,         /* PSF ACTION ON PRINTER FAILURE*/
//         MGMTMODE=OUTAVAIL,        /* START WHEN OUTPUT IS AVAILABL*/
//         TIMEOUT=REDRIVE,          /* PSF ACTION ON TIMEOUT      */
//         DISCINTV=10,              /*DISCONNECT INTERVAL IN SECONDS*/
//         APPLID=psflu,             /*VTAM APPLICATION PGM NODE NAME*/
//         LUNAME=luname01           /* VTAM LOGICAL UNIT NAME     */
//         LOGMODE=BarrPSF           /* VTAM LOGMODE TO BE USED    */
//         PRTxx ENDCNTL
```

The PSF procedure name (`psfproc`) and printer names (`PRTxx`) must match the values in the JES2 definition. The APPLID (`psflu`), LUNAME (`luname01`), and LOGMODE (`BARRPSF`) must match the values in the VTAM definitions.

JES2 Printer Definition

The example below shows the Printer Definition portion of the JES2 Remote Definition. Define AFP printers according to the example.

```
PRTxx    CKPTPAGE=100,
         CLASS=ACFJT,
         COPYMARK=JOB,
         DRAIN,
         FSS=fssname,
         MARK,
         MODE=FSS,
         PRESELCT=NO,
         PRMODE=(LINE,PAGE),
         ROUTECDE=Uxx,
         UCS=,
         WS=(W,R,Q,PMD,LIM,F/P)
DESTID   NAME=hostprn,DEST=Uxx
FSSDEF FSSNAME=fssname,PROC=psfproc
```

How the AFP Definitions are Related

It is helpful to understand how the five parts of the mainframe definition are related. Each part of the definition contains parameters that are common to another part. Make sure these values match, as illustrated in Figure 7-1.

Figure 7-1. The PSF definition shares some parameter values with the JES2 and VTAM definitions.

7.4 View AFP Printer Status Information

Barr software provides status information for the AFP printers. The status displays differently for the two types of AFP printers.

When you start the Barr software, the software requests the printer type and model of each AFP printer, and then displays this information on the Operation screen. Information for IPDS Group 3 printers displays on the Status Line. Information for VTAM-attached IPDS printers displays on the console portion of the screen.

Note: If the printer status information does not display, confirm that the printer is powered on and online.

IPDS Group 3 Status

The IPDS Group 3 printers appear on the Barr Status Line as **AFPxx**, where **xx** is the printer address. Status information includes a block count of data printed and the printer status.

```
CENTRAL HOST NAME    COMMUNICATION SCOPE:
DSR=0      0 |LPT1      0 normal | AFP0E      0  idle                    9:02:36




   BARR/RJE  (C)  Barr Systems, Inc. 1997     Version 97A6  03/30/1997  9:02:36

                              Operation
            Command to Host    Send Files to RD1         Advanced
            Quit               Send Files to SCREEN

                                                        Selection ↑↓→←
```

In this example, the status shows that zero blocks of data were sent to the printer **AFP0E** and that the printer is idle. The printer name is color-coded to indicate the connection status with the mainframe. If the printer has not bound to PSF, the status information is *red*. If the printer has bound to PSF, the status information is *yellow*.

For more information about the Status Line messages for AFP printers, see section 8.1.

VTAM-attached IPDS Status

You can view two types of status information for VTAM-attached IPDS printers. The console message displays the printer address and printer model and a separate Link Status screen displays more detailed information.

Console Message

```
CENTRAL HOST NAME   COMMUNICATION SCOPE:
DSR=0       0 |LPT1      0 normal |                                      9:02:36




  BARR/RJE  (C)  Barr Systems, Inc. 1997     Version 97A6  03/30/1997   9:02:36
  Product Options: RJE SDLC PRINT370 AFP
S/370 Device 1E responded with Device Type 3827 Model 01                9:02:36

                              Operation
          Command to    Send Files to RD1       Advanced
          Quit             Send Files to SCREEN

                                               Selection ↑↓→←
```

In this example, the software found a **3827 Model 01** printer at address **1 E**.

Link Status Screen

To view the status of the VTAM-attached IPDS printer, switch to the Barr 3820 session. For more information about switching between sessions, see the Advanced menu discussion in the Software Operation chapter of your *BARR/RJE* or *BARR/SPOOL* manual.

The `Link Status` screen displays the real-time status of the mainframe connection, local sessions, and the AFP printer LUs. When the state of the SNA links change, the software updates the status screen. Check this screen if a problem arises with 3820 printing.

```
                         Link Status

  Link                Receive   Send  Start  Last  Sessions  Status
  HOST                  18       17   12:29  12:32   20  20  Opening
  LOCAL                 14       12   12:29  12:32    5   5  Active
  S/370 CHANNEL LU       0        0    0:00   0:00    0   0  Opening
  S/370 1E               4        5   12:31  12:32    1   1  Active




  Link   Protocol        PU state    Buffers   Command
   0     SDLC            Inactive       0      None
                                 Home End PgUp PgDn ↑↓ Esc Enter Open Close
```

In this example, **S/370 CHANNEL LU** is an AFP printer awaiting activation and **S/370 1E** is an active AFP printer.

Link Information

A link is a communication channel that connects the Barr PC with the mainframe.

All communication with the mainframe goes through the **HOST** link, the first link on the screen. The **LOCAL** link represents all the RJE, 3270, and non-3820 AFP sessions. The remaining links are for the 3820 AFP printers. Each link is either disconnected from or connected to the mainframe.

The following information displays for each link.

Link
The link name.

Receive
The number of SNA frames received from the mainframe on this link since the link connection was made. For **HOST**, this is the sum of the frames received from the mainframe for all the links since you started the Barr software.

Send
The number of SNA frames sent to the mainframe from the link since the link connection was made. For **HOST**, this is the sum of the frames sent to the mainframe by all the links since the Barr software started.

Start
The time of day when the link connection was made.

Last
The time of day when data was last sent or received on this link.

Sessions
The first value is the total number of LUs requested by the Barr software. The second value is the number of LUs in use. If the first number does not equal the second number, the mainframe did not grant the total number of LUs you requested.

Status
The link status has four possible values.

Active

> The link is ready to exchange data.

Inactive

> The link is shut down and will not accept connection requests. Check the Operation screen for error messages that might indicate a problem.

Opening

> For the **HOST** link, the Barr software is trying to connect to the mainframe. For a 3820 link, the Barr software is trying to establish a session with the printer.

Closing

> The link connection was broken. This can happen at the end of user signoff, if the mainframe breaks the connection, or if you issue a **Close** command.

Additional Link Information

The following fields display at the bottom of the Link Status screen. They give more information about the current link, the link which is highlighted on the screen. You can change the current link selection with the cursor movement keys.

Link

> Each link has a unique number which helps you keep track of your place in the menu when many links appear in the list.

Protocol

> The communication protocol for this link, usually **SDLC**, **LOCAL**, **TOKEN RING LLC**, or **S/370 CHANNEL**

PU state

> For the **HOST** link, this is the SNA state of the PU maintained between the mainframe and the Barr software. No SNA communications can take place until the PU is active. The following values can display in this field.

Active

> Normal state. SNA communications can take place.

Inactive

>   The Barr software is waiting for ACTPU (Activate Physical Unit)
>   from the mainframe.

PendAct

>   Pending Active. The Barr software sent ACTPU but has received
>   no reply.

PendInact

>   Pending Inactive. Barr software sent DACTPU (for logoff or
>   Deactivate Physical Unit) but has received no reply.

Buffers

>   The number of SNA frames waiting to be transmitted on this link,
>   either to the mainframe or destination LU (local or 3820). This mea-
>   sures traffic on the link.

Link Commands

From the Link Status screen, you can issue commands to control the current
link (highlighted link).

Close

>   Press C (for Close) to disconnect the current link. Close is an abrupt
>   disconnect. All communications on that link will be interrupted and
>   data could be lost. For the **HOST** link, **Close** results in all other links
>   being closed as well.

Open

>   Press O (for Open) to make the current link available for connection.
>   Usually you only need to open links that were closed with the **C**lose
>   command or closed by an error condition.

Link LUs

>   You can get additional information about the **HOST** and session LUs by
>   selecting a link and pressing Enter. You can view two screens of
>   information (not shown in this text). To reach the second screen, press
>   the → key.

>   For the **HOST** and **LOCAL** links, you might see multiple LUs listed. For a
>   3820 link, only one LU will be listed.

These two screens list information for Barr Technical Support. If you call for support, you might be asked to provide some of the information on these screens.

7.5 Use AFP Resource Saving

If you use AFP with an IPDS Group 3 printer, you can use the resource saving feature. The only resource Barr software supports is fonts. Font resource saving stores frequently used fonts on the local PC hard drive. As a result, fonts need to be sent over the communications line only once instead of every time the printer uses the font.

To use font resource saving, follow these basic steps.

1. *Mark frequently-used fonts public* in PSF.

2. Enable the BARR/RJE software to use resource saving.

3. Maintain your stored fonts.

Mark Fonts Public

To enable font resource saving, you must mark each font *public* in PSF. This allows the font to be stored remotely. For the entire font to be marked public, you must mark each component of the font. Consult your host systems programmer to determine how to accomplish this step.

After you mark a font public, the mainframe computer checks for the font on the PC before it sends the font over the communication line. Your next step is to set up the Barr software so it can respond to the mainframe's inquiry.

Set Up the Barr Software

You need to enter settings on the PRINT370 AFP Description screen.

```
                        Installation Description


          RJE Description
          Communication Link
          Devices and Printers: LPT, COM, NET, SEND, LAN
          S/390 Channel Attached Printers
          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 and Global Options

          Exit and Save Changes

                                              Selection ↑↓→←
```

1. Select **S/390 Channel Attached Printers**.

```
              S/390 Channel Attached Printers

          PR0E     Enabled    3211  Equivalent
          PR1E     Disabled   3211  Equivalent
          PR2E     Disabled   3211  Equivalent
          PR3E     Disabled   3211  Equivalent
          PR4E     Disabled   3211  Equivalent
          PR5E     Disabled   3211  Equivalent


                Escape

                AFP Options
                Adapter Description

                                              Selection ↑↓→←
```

2. Select **AFP Options**.

You must fill in the two fields of the PRINT370 AFP Description screen. The
third field is optional.

```
                           PRINT370 AFP Description


            Enable Local Resources? No

            AFP Resource Directory: C:\BARR\AFP_____

            Log Job Start/End to Console? Yes




                                                              Choice? + -
```

Enable Local Resources?

Choose whether or not to enable AFP font resource saving.

No Default. Do not use AFP font resource saving.

Yes Use AFP font resource saving.

AFP Resource Directory:

Specify the directory where font resource files will be stored. The Barr software searches this directory when it needs to load a font. Include the drive and the full directory path. The default directory name is C:\BARR\AFP, the name of the directory where the RESOURCE.EXE file resides. If you specify a different directory name, remember to create the actual directory.

Log Job Start/End to Console?

Choose whether or not to display a console message at the start and end of jobs printed on the AFP printer.

No Default. Do not display a console message at the beginning and end of each job.

Yes Display a console message at the beginning and end of each job.

Maintain Stored Resources

After you set up the Barr software to use AFP resource saving, the software begins to store fonts on the PC. Each time the mainframe sends a print job that uses a public font to the PC, the mainframe checks for the font on the PC. Barr software checks if the font is stored. If the Barr software finds the font on the PC, it tells the mainframe not to send the font again. If the Barr software does not find the font, the mainframe sends a copy of the font to the PC. The Barr software stores the font on the PC disk for future use and loads the font into the printer for the current job.

Now you must manage the font files on your PC. Consider which fonts you use frequently enough to store on your PC. Do you want to store a font you only used once and will never use again? Is it worth your PC space to store a font for a twice-a-year print job? The Resource utility included on the Barr software disk helps you manage the AFP resource files stored on your PC.

AFP Resource Files

You use two files, RESOURCE.EXE and RESOURCE.DAT, to run the Resource utility.

The RESOURCE.EXE file comes on the Barr software disk. When you install the software files on your PC, the installation program puts RESOURCE.EXE in the C:\BARR\AFP directory. If you create a different directory for your AFP files, copy the RESOURCE.EXE file from the C:\BARR\AFP directory into your AFP directory. Remember, the name of the directory you create must match the directory name you specify on the PRINT370 AFP Description screen.

The Barr software creates the file RESOURCE.DAT the first time you run the software and store a font. RESOURCE.DAT contains information about your stored fonts. The Barr software uses this file to locate fonts and the Resource utility uses this file to manage font files.

Store your fonts in a separate subdirectory in the AFP directory. For example, store all fonts in a subdirectory named FONT. If you named your font directory C:\BARR\AFP, your directory listing might look like the following.

```
Volume in drive C is Barr System
Volume Serial Number is 1234-56AB
Directory of C:\BARR\AFP

.            <DIR>
..           <DIR>
RESOURCE EXE   29237 07-15-93   4:37p
RESOURCE DAT    2548 11-08-95   4:17p
FONT         <DIR>   11-08-95   3:37p
```

You can divide the FONT directory into separate subdirectories for each font
type stored on the PC.

AFP RESOURCE Utility

To maintain your font files, use the Resource utility. This utility lists stored
fonts, shows how often those fonts were used, and allows you to delete the
fonts that you rarely use. You must unload the BARR/RJE software before
you run the Resource utility. To run the Resource utility, type **resource** at
your DOS prompt.

Resource Utility Keys

While in the Resource utility, you can use the following keys:

Spacebar   List the valid options for a field.

Enter   Select a value from an option list when an option list displays.
               Otherwise, move to the next screen.

↑↓   Move between the screen fields.

Esc   Exit the utility.

Pg Up
Pg Dn   Navigate through the list of fonts.

AFP Resource Facility Screen

The initial Resource utility screen contains two options.

```
┌────────────────────────────────────────────────────────┐
│ │
│            BARR PRINT370 AFP RESOURCE UTILITY            │
│ │
│     ┌────────────────────────────────────────────┐      │
│     │                                              │      │
│     │   Resource Types   ALL RESOURCES             │      │
│     │                                              │      │
│     │   Sort Order    USAGE                        │      │
│     │                                              │      │
│     │   ↑ ↓ Enter   Esc   Space to edit            │      │
│     │                                              │      │
│     └────────────────────────────────────────────┘      │
│ │
└────────────────────────────────────────────────────────┘
```

Resource Types

Barr software supports only **FONT** resources.

Sort Order

Choose the order in which to list fonts.

Usage

Sort by total number of times the resource has been used.

Last Used

Sort by last date the resource was used.

Date Copied

Sort by date the resource was originally copied to the resource directory.

Resource ID

Sort numerically by resource ID.

AFP Resource List Screen

From the first screen of the Resource utility, press (Pg Up) or (Pg Dn) to reach this screen, which lists information about each font you stored.

```
                        BARR PRINT370 AFP RESOURCE UTILITY

— ID —Type— Member ——————— oooo   Use— Last Used——————— Copied ——————
  0001 │ FONT │ T1D0BASE  C0D0GT20 │ ♦  ♦ │ 015 │ 07-16-1995  08:26 │ 02-16-1995  14:35
  0000 │ FONT │ T1D0BASE  C0D0GT12 │ ♦  ♦ │ 007 │ 07-17-1995  08:24 │ 02-16-1995  14:34
  0002 │ FONT │ T1DABASE  C0S0BRTR │ ♦  ♦ │ 005 │ 07-16-1995  08:12 │ 02-16-1995  15:19
  0003 │ FONT │ T1DABASE  C0S0BRTR │ ♦  ♦ │ 005 │ 07-16-1995  08:12 │ 02-16-1995  15:20
  0004 │ FONT │ T1V10275  C0S0GT15 │ ♦  ♦ │ 005 │ 07-16-1995  08:12 │ 02-16-1995  15:20
  0005 │ FONT │ T1V10274  C0S0GT12 │ ♦  ♦ │ 003 │ 07-16-1995  08:12 │ 02-16-1995  15:21
  0008 │ FONT │ T1D0BASE  C0D0GT15 │ ♦  ♦ │ 003 │ 07-16-1995  08:25 │ 07-15-1995  17:10
  0009 │ FONT │ T1V10284  C0D0GT15 │ ♦  ♦ │ 003 │ 07-16-1995  08:25 │ 07-15-1995  17:10
  0006 │ FONT │ T1V10273  C0S0GT10 │ ♦  ♦ │ 001 │ 07-16-1995  08:24 │ 07-16-1995  08:24
  0007 │ FONT │ T1V10277  C0S0GT10 │ ♦  ♦ │ 001 │ 07-16-1995  08:24 │ 07-16-1995  08:24
  0011 │ FONT │ T1DFBASE  C0S0SI10 │ ♦  ♦ │ 001 │ 07-16-1995  08:15 │ 07-16-1995  08:15
  0012 │ FONT │ T1V10274  C0S0ST12 │ ♦  ♦ │ 001 │ 07-16-1995  08:15 │ 07-16-1995  08:15

                                                              1/12    0 ——————

— Member ——— Data  Set  Name ————————————— VOLSER——————— Date——————— Time—
  T1D0BASE │ SYS1.FONTLIB                      │ USER86      │ 09-16-94  │ 10:50
  C0D0GT20 │ SYS1.FONTLIB                      │ USER86      │ 09-16-94  │ 10:50

↑ ↓  PgUp  PgDn  Del Space
```

ID   Identification number assigned to the font by Barr software.

Type   Type of resource. Barr software supports only FONT fonts.

Member   Name of the mainframe member from which the font originated.

Font Type

Type of font. This column is subdivided into five columns (ooooo). Marks in the columns indicate the font type.

① Indicates a base font.

② Font index for a 0-degree rotated font.

③ Font index for a 90-degree rotated font.

④ Font index for a 180-degree rotated font.

⑤ Font index for a 270-degree rotated font.

Use

Total times the resource was used.

Last Used

Last date the font was used.

Copied   Date resource was originally copied to the resource directory.

Member/Data Set Name

Mainframe library or partitioned data set (PDS) from which the font originated.

Volser   Mainframe volume serial number from which the font originated.

Date   Last date the mainframe font was modified.

Time   Time at which the mainframe font was last modified.

Delete Stored Resources

To delete fonts on the AFP Resource List screen, use the keys described below.

Del   Delete the highlighted or tagged fonts. The cursor rests on the highlighted font. Tagged fonts have a checkmark.

Spacebar   Tag or mark fonts to delete.

A sample screen follows.

```
                       BARR PRINT370 AFP RESOURCE UTILITY

  — ID —Type— Member ——————————— oooo  Use— Last Used———————  — Copied ———————
   0001 FONT  T1D0BASE   C0D0GT20  ◆  ◆   015  07-16-1995  08:26  02-16-1995  14:35
   0000 FONT  T1D0BASE   C0D0GT12  ◆  ◆   007  07-17-1995  08:24  02-16-1995  14:34
   0002 FONT  T1DABASE   C0S0BRTR  ◆  ◆   005  07-16-1995  08:12  02-16-1995  15:19
   0003 FONT  T1DABASE   C0S0BRTR  ◆  ◆   005  07-16-1995  08:12  02-16-1995  15:20
   0004 FONT  T1V10275   C0S0GT15  ◆  ◆   005  07-16-1995  08:12  02-16-1995  15:20
   0005 FONT  T1V10274   C0S0GT12  ◆  ◆   003  07-16-1995  08:12  02-16-1995  15:21
   0008 FONT  T1D0BASE   C0D0GT1┌──────────────────────────────┐ 07-15-1995  17:10
 ✓ 0009 FONT  T1V10284   C0D0GT1│ Tagged or Highlighted  (T/H)  │ 07-15-1995  17:10
   0006 FONT  T1V10273   C0S0GT10└──────────────────────────────┘ 07-16-1995  08:24
   0007 FONT  T1V10277   C0S0GT10  ◆  ◆   001  07-16-1995  08:24  07-16-1995  08:24
 ✓ 0011 FONT  T1DFBASE   C0S0SI10  ◆  ◆   001  07-16-1995  08:15  07-16-1995  08:15
 ✓ 0012 FONT  T1V10274   C0S0ST12  ◆  ◆   001  07-16-1995  08:15  07-16-1995  08:15

                                                               1/12    0 ——————

  — Member ——— Data  Set  Name ——————————————— VOLSER—————— Date——— Time—
   T1V10274   UF.H0001236.FONTLIB2            USER86      09-16-94   10:50
   C0D0ST20   UF.H0001236.FONTLIB             USER86      11-24-92   11:13

   ↑ ↓   PgUp  PgDn  Del Space
```

In this example, assume you tagged **FONT 0009**, **FONT 0011**, and **FONT 0012**.
When you press Del, the prompt **Tagged or Highlighted(T/H)** displays.
Choose whether to delete the tagged or highlighted fonts. Use the keys listed
below.

T   Delete all tagged (checked) fonts.

H   Delete only the font where the cursor rests.

Esc   Close the delete box without deleting any fonts.

8 Operating the PRINT370 Software

This section describes PRINT370 operation features.

During software operation, you can monitor the status of the channel printers, vary the channel online and offline, and reset the printers (see sections 8.1 and 8.2). When you start the software for the first time, you should send a test file to verify that you have set up the software correctly (see section 8.3).

If you encounter problems during software operation, you can view messages on the console (see section 8.4) and capture a command trace (see section 8.5).

You can start the software from the Exit and Save Changes screen of the Installation Description or from the DOS prompt by typing the software startup command. For example, for BARR/RJE, the startup command is **barrsnar**. See the Software Startup chapter of your *BARR/RJE* or *BARR/SPOOL* manual for more information about starting the software.

8.1 View Printer Status

You can monitor the status of the S/390 channel printers from the Status Line, the second line on the Operation screen.

```
CENTRAL HOST NAME    COMMUNICATION SCOPE:
    0    0 |LPT1      0 busy  |PR0E      0 idle  |                        9:47:29
```

For each channel printer, the Status Line shows the printer address, the number of lines or pages printed, and the printer's physical status.

This section describes the most common status messages.

Note: When you switch from local (host-attached) printing to remote (PC-attached) printing, these status messages display only on the Barr console. Messages display at the host only if host action is required, such as when a paper jam occurs and the host must backspace and re-send a portion of the file.

No device

No printer can be found at the address entered in the software. Verify that the printer address is correct, the cables are firmly connected, and the printer is online.

If this status displays for a Xerox laser printer that has been idle, check if the printer has entered Power Saver mode. Follow the instructions in your printer manual to reactivate the printer.

If this status displays for an Océ 2200 printer, verify that the printer's Select Bypass Switch is disabled. You must disable the Select Bypass Switch when you use an Océ 2200 printer with the PRINT370 software.

Tag error

The software detected a Tag error. If the software has been operating correctly, this error usually indicates a hardware failure. If you just installed the software, check that you configured the printer correctly. See section 1.5 for printer configuration requirements. A common cause for this error is a bent or faulty pin on a cable. To isolate the problem, run the PRINT370 loopback test described in section 4.3.

Active

The printer is actively accepting data from the software.

Idle

The software is not sending data to the printer and the printer is not busy processing a previous command. This is the normal state when no jobs are printing. Occasionally, you might also see this state when a job is printing.

Wait

The printer is busy completing a command, and the software is waiting for the device end signal from the printer. During normal printer operations, the printer alternates between the **Active**, **Idle**, and **Wait** states. The software updates this status display once per second. If the **Wait** state seems to display for longer periods, it might indicate that the printer is taking an unusual amount of time to complete a command.

Not Ready

> The printer is online but cannot accept data, usually due to a condition that requires operator intervention. For example, the printer might have a paper jam or be out of paper.
>
> If an error occurs, the status display for the printer alternates between these three message types:
>
> ■ Sense codes returned by the printer
> ■ Text interpretation of the error
> ■ Address/Lines printed/Status
>
> For example, if a file is sent to printer **PR0E** after you press the printer's STOP button, the status display alternates between these messages:
>
> ```
> ???P10.5SENSE 40000000
> Not Ready
> PR0E    0 Active
> ```
>
> Sense codes are defined by the printer manufacturer. If different messages display, see your printer documentation for more information.

8.2 Vary the Channel and Reset the Printer

During software operation, you can suspend printing to all S/390 channel attached printers by setting the channel offline. You also can reset and initialize printers from the software. You access these functions from the Advanced screen.

1. From the Operation screen, select **Advanced**.

```
                            Advanced

            Assign Devices          Diagnostics
            Sessions                Escape
            PRINT370
                                                Selection ↑↓→←
```
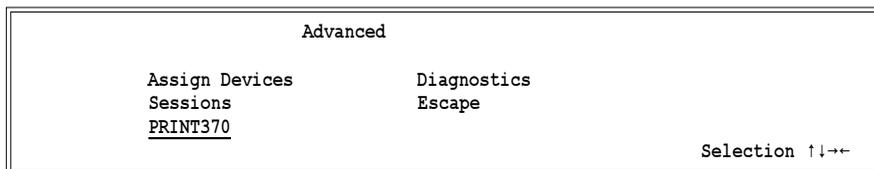
2. Select **PRINT370**.

The PRINT370 screen displays.

```
                              PRINT370
         Channel is        Vary channel on       PR0E           Command Trace
          ON LINE          Vary channel off      PR1E
                           Escape


                                                               Selection ↑↓→←
```

Vary the Channel

The left portion of this screen shows the current status of the channel supplied by the Barr PRINT370 software and hardware. By default the channel is online. From this screen, you can use the vary commands to vary the channel online or offline. If the channel is online, you can only select **Vary channel off**. If the channel is offline, you can only select **Vary channel on**. Use the arrow keys to select the desired option.

Vary channel on

Enable the channel. Data can flow from the PC to the printer.

Vary channel off

Disable the channel. This selection pauses or interrupts the data flow to all printers in the chain so you can perform printer maintenance without having to exit the Barr software.

Reset a Printer

You also can reset or initialize printer information in the Barr software. Usually you need to reset the printer information after you turn the printer off and then back on while the software is operating. When you issue a reset printer command, the software resets printer status information and flushes data buffers that have not yet been sent to the printer.

The device names for the printers you attached display on the right side of the screen.

```
                              PRINT370
         Channel is        Vary channel on       PR0E
          ON LINE          Vary channel off      PR1E
                           Escape


                                                               Selection ↑↓→←
```

➤ Select the printer you want to reset or initialize.

8 Operate PRINT370

The Printer Commands menu displays.

```
                      Printer Commands
                      Reset PR0E
                      Initialize and Reset PR0E
                      Escape
 Last Sense:000000000000000000000000000000000000000000000000      Selection ↑↓→←
```

You can reset the printer or initialize and reset it.

> *Avoiding data loss:* If you need to reset printer information while the
> software is sending a file to the printer, you must first put the file on
> hold from the print spool to avoid losing data. When the software resets
> the internal PRINT370 state for a printer, it discards all data from the file
> that is currently printing until the start of the next print file. After the
> reset, you can use the spool reprint feature to resume printing.

Reset PRxx

Reset the selected printer.

Initialize and Reset PRxx

Reset the internal PRINT370 state for the printer and then send the
initialization file you specified on the Printer Options screen.

Last Sense

If you enable the **Log Printer Sense Errors** option on the
Advanced Printer Options screen, the software displays the last
sense code returned by the printer.

8.3 Print a Test File

From the Barr software, print a file to verify that you correctly configured
the software to drive the printer. The test file PRINTER.TST is included with
the Barr reference files. Use the Barr **Send Files** command or the print spool
to send the test file to the printer. Repeat the test for each printer.

The test file contains both lowercase and uppercase characters. If your
printer can print only uppercase characters, the printout of PRINTER.TST
will look strange. Alternatively, you can send a simple text file that contains
only uppercase characters.

Test from the Print Spool

If you have enabled the print spool feature, you can copy the test file to the print spool and print it from the Print Spool screen. Follow these steps to test the printer.

1. From the Operation screen, select **Assign Devices**.

```
                              Assign Devices


SEND1→LPT1  SEND2→SCREEN  KEYBOARD→COMMAND  CON→SCREEN  LOG→NUL  PR1→SPOOL*
PU1→SUSPEND   SPOOL1→PR0E*



                          Select SOURCE→DESTINATION.           Selection ↑↓→←
```

2. Make sure the spool source device is directed to the printer you want to test (for example, **SPOOL1→PR0E**).

3. Press Ctrl Alt P to reach the Print Spool screen.

```
Printer  File        State     Form    Class Prty Copies   Size   Units  Status
PR0E                 Ready
PR1E                 Ready

                                                          Date    Time
         CHECKS                CK501   1     0    1      1998  4/24/97  10:35
         PRICES      Hold      LABELS  2     3    2      4840  4/24/97  10:44
LPT1     TAX1040     Printing  1040    1     5    1      5180  4/24/97  10:35
         INVOICES              INV99   2     5    8      3262  4/24/97  10:36

         Printers    Sort                ↑PgUp       Help          Exit
         Files       Check Spool         ↓PgUp                     Restore
                                                                       ?
```

4. Make sure that the printer **State** is **Ready**, the **Class** is **Z**, and the **Priority** is blank.

5. Press Ctrl Alt D to go to the DOS session.

```
COPY C:\BARR\REF\PRINTER.TST C:\SPOOL
```

6. Use the DOS **copy** command to copy the file PRINTER.TST to the spool directory (usually C:\SPOOL). Files copied to the print spool from DOS are automatically assigned a **Class** of **Z**.

If you are testing more than one channel printer, you need to control which printer will print the file. Be sure the **Class** is set to **Z** for only one printer at a time.

Test with the Send Files Command

If you are not using the print spool feature, follow these steps to test the printer with the **Send Files** command.

1. From the Operation screen, select **Assign Devices**.

```
                              Assign Devices


SEND1→LPT1  SEND2→SCREEN  KEYBOARD→COMMAND  CON→SCREEN  LOG→NUL  PR1→SPOOL*
PU1→SUSPEND   SPOOL1→PR0E


                         Select SOURCE→DESTINATION.          Selection ↑↓→←
```

2. Select the source device **SEND2**.

```
                              Assign Devices


DESTINATION? (FILE) SCREEN NUL SUSPEND LPT1 COMMAND RD1 PR0E


                                                           Selection ↑↓→←
```

3. Select the printer, for example **PR0E**.

```
                              Assign Devices


SEND1→LPT1  SEND2→PR0E  KEYBOARD→COMMAND  CON→SCREEN  LOG→NUL  PR1→SPOOL*
PU1→SUSPEND   SPOOL1→PR0E


                         Select SOURCE→DESTINATION.        Selection ↑↓→←
```

The screen reflects the new assignment.

4. Press [Enter] to return to the Operation screen.

```
                              Operation
         Command to Host    Send Files to RD2      Advanced
         Quit               Send Files to PR0E     Mount Forms

                                                      Selection ↑↓→←
```

5. Select **Send Files to PR0E**

```
Enter file names. To combine files, separate by a plus (+).
To start a new file, leave a blank.
To cancel, press Esc.
Files: C:\BARR\REF\PRINTER.TST
```

6. Type the file name **C:\BARR\REF\PRINTER.TST**.

If the file prints, you correctly configured the printer. If the file does not
print, run the adapter test described in section 4.3.

8.4 View Error Messages

If a printer error occurs, the software displays an error message on the
console portion of the Operation screen. If you have enabled the console log
file by setting **LOG→(FILE)** on the Assign Devices screen, messages also are
written to the log file.

Error Message Format

Most PRINT370 error messages begin with the **P370:** prefix to help you
distinguish them from other messages. If you enable the console log file, you
can track printer problems by searching the log file for messages with this
prefix.

Example Messages

You might see some of these errors on the console and in the console log
file. Which messages you see depend on which adapter you purchased.

PRINT370 Adapter Messages

These messages are unique to the PRINT370 adapter. They do not display if
you purchased the CHANNEL-OUT (BT) adapter.

Selective Reset

```
P370: Selective Reset
P370: Expected low tag not present
```

Selective reset is a channel function that the mainframe performs to reset a channel device. For example, the mainframe might perform a selective reset in response to a device tag error. Usually a selective reset indicates a printer error.

TIO Errors

```
P370: TIO error, Expected/Actual=nn/nn OUT=nn Status=nn
P370: Data tran: missing initial in tag
P370: Selective Reset
```

Tag Input/Output (TIO) errors are usually followed by a selective reset. Repeated TIO errors for the same job might indicate a file error that you can correct by receiving another copy of the job from the host to the PC. TIO errors that occur for many jobs might indicate a hardware problem that you can diagnose by running adapter diagnostics.

CHANNEL-OUT (BT) Adapter Messages

These messages are unique to the CHANNEL-OUT (BT) adapter. They do not display if you purchased the PRINT370 adapter.

Interface Timeout

```
P370: PRINT370 PCI interface time-out occurred.
```

This message might display if a serious channel error occurs that prevents a command from completing. For example, a missing Channel End or an Interface Control Check can cause this message.

Maximum Channel Command Length

```
P370: CHANNEL OUT PCI maximum command length exceeded (BufUsed=512).
```

If PRINT370 encounters a print record that is too large to fit in the maximum channel command length, it displays this message.

Other Messages

These messages can display if you have either the PRINT370 or
CHANNEL-OUT (BT) adapter.

Printer Sense Codes

Printer sense codes might display on certain conditions. Sense code messages have this format:

```
PRxx sense error text CMD:nn  LEN:nn                                    20:04:57
Sense: 00000000 00000000 00000000 00000000                             20:04:57
|0000 0000 0000 0000|0000 0000 0000 0000|0000 0000 0000 0000|0000 0000 0000 0000
```

The first message line displays the following information:

- **PRxx** is the printer address (for example, PR0E).
- **sense error text** represents the sense error message text (for example, **Load Check**). This message also displays on the Status Line at the top of the screen.
- **CMD** is the channel command that produced the error.
- **LEN** is the length of the data record.

The second line displays the complete 24-byte sense code. The last sense code also displays on the Printer Commands menu.

The third line displays the first 64 bytes of the hexadecimal command data.

Data Check and Load Check

Data Check and Load Check error messages display in the sense code format. This is an example of a Data Check error message:

```
PR0C Data Check CMD:00  LEN:89                                          20:04:57
Sense: 04000000 00000000 00000000 00000000                             20:04:57
|0000 0000 0000 0000|0000 0000 0000 0000|0000 0000 0000 0000|0000 0000 0000 0000
```

Data Check errors occur on IBM 3203, IBM 3211, and compatible printers. They indicate that the printer cannot print a character, usually because the character is not on the print train or band. If your printer can print only uppercase characters, use the FOLD command file to fold lowercase characters to uppercase. For more information, look up the sense code in your printer manual.

This is an example of a Load Check error message:

```
PR0C Load Check CMD:63  LEN:89                                              20:05:15
Sense: 02000000 00000000 00000000 00000000                                 20:05:15
|0000 0000 0000 0000|0000 0000 0000 0000|0000 0000 0000 0000|0000 0000 0000 0000
```

Load Check errors occur on IBM 3203, IBM 3211, and compatible printers. They indicate that an error occurred with an FCB (**CMD:63**) or UCS (**CMD:FB**) file. For more information, look up the sense code in your printer manual.

Bad Length Count

```
S/370 FILE ABORTED: Bad Ending Length Count.
```

If the Barr software encounters an S/370 format error in a print file, it displays this message and discards the rest of the file.

8.5 Capture a Command Trace

If you encounter problems and contact Barr Technical Support, a support analyst might ask you to provide a command trace. Usually you only need to capture a trace if you are directed to do so.

By default, the PRINT370 comand trace writes to a file named DUMP. If you also enable the Barr RJE communications line trace or memory dump, all the diagnostics write to the same file.

Follow these steps.

1. From the Operation screen, select **Advanced** and then select **PRINT370**.

```
                        PRINT370
    Channel is        Vary channel on      PR0E           Command Trace
     ON LINE          Vary channel off     PR1E
                      Escape

                                                          Selection ↑↓→←
```

2. Select **Command Trace**.

```
        Enable S/370 Command Trace? No
        Trace Data During S/370 Command Trace? Yes
        Filename is DUMP
                                                          Choice? + -
```

3. Set **Enable S/370 Command Trace** to **Yes**.

4. Leave **Trace Data During S/370 Command Trace** at the default setting of **Yes** unless the support analyst asks you to change it.

5. You can change the trace **Filename** if you like.

6. Reproduce the condition that caused the error.

7. Send the trace file to the support analyst. See the *Contacting Barr Systems Electronically* booklet for instructions.

Chapter

9 Printing from DOS

You can use device drivers to print to S/390 channel attached printers from DOS when the BARR/RJE, BARR/AFP, or BARR/SPOOL software is not loaded. The device drivers come with the PRINT370 reference files. When you install the device drivers, they add new output devices to DOS. You can copy files to the output devices or you can modify application programs to write directly to the device drivers.

Note that the DOS device drivers do not support AFP printing. Because the mainframe controls AFP printing, you must load BARR/RJE or BARR/AFP software if you want to print to AFP printers.

To install the device drivers, you must add commands to the DOS configuration file CONFIG.SYS, as described in this chapter. For more information about the DOS CONFIG.SYS file, see your DOS manual. For more information about how to modify your application programs to write directly to the device drivers, see Appendix D.

9.1 Install the Device Drivers

You need to install two device driver files that come with PRINT370. The files you use depend on which adapter you have. The first device driver, P37MBASE.EXE (for the CHANNEL-OUT (BT) adapter) or P370BASE.EXE (for the PRINT370 adapter), is a base driver that controls all adapter and channel operations. You need to load only one base driver. The second driver, PRINT370.EXE, is the printer driver that controls all output to the printer. You need to load one printer driver for each printer you use. When you install the printer driver, a new name is added to the list of DOS devices. The PRINT370 device name is treated like other devices such as LPT1 and COM1.

Base Device Driver

The P37MBASE.EXE (for the CHANNEL-OUT (BT) adapter) or P370BASE.EXE (for the PRINT370 adapter) base device driver controls the adapter and channel. The printer device drivers use the base device driver to communicate with the printer. For example, after the printer drivers format the data the base device driver sends data to the printer.

Help

To display help and the version number for the base device driver, type the corresponding command at the DOS prompt. For the PRINT370 adapter, type this command:

```
p370base /h
```

For the CHANNEL-OUT (BT) adapter, type this command:

```
p37mbase /h
```

Install Command

To install the base device driver, you must enter a command in your CONFIG.SYS file. For the CHANNEL-OUT (BT) adapter, enter this command:

```
DEVICE=C:\BARR\P37MBASE.EXE
```

For the PRINT370 adapter, enter this command:

```
DEVICE=C:\BARR\P370BASE.EXE
```

Command Options for the PRINT370 Adapter

If you have the PRINT370 adapter, you can specify address and interrupt request options for the base device driver. Separate the options with a character space. Change the default settings only if you verify a conflict with other equipment in the PC. If a conflict exists, the software will not function correctly when you attempt to start or operate it.

❘ *Note:* These options do not apply to the CHANNEL-OUT (BT) adapter.

A=aaa

> Address of the PRINT370 adapter. This value must match the address jumper setting on the adapter. The default value is **298**. Other choices are **288**, **2A8**, or **2B8**.
>
> ❘ *PC AT Computers:* **IRQ7** is the only IRQ available for the eight-bit
> ❘ slot of a PC AT.

`I=ii`

> Interrupt Request (IRQ) used by the PRINT370 adapter. The default value is **15**. Other choices are **10**, **11**, **12**, or **7**.

Printer Device Driver

Load one copy of the printer device driver PRINT370.EXE for each channel printer you use from DOS. The printer driver formats the data for printing.

Help

To display help and the version number for the printer device driver, type the following command at your DOS prompt:

```
print370 /h
```

Install Command

To install the printer device driver, type the following command in your CONFIG.SYS file:

```
DEVICE=C:\BARR\PRINT370.EXE A=nn N=name
```

You must specify a printer address and device name. You also can specify other options. Separate the options with a character space.

`A=nn`

> Address of your printer. This option is required. The driver does not assume a default value.

`C` Specify the letter C to disable the printer option **Conditional new page at end of file**. Omit the letter C to enable the option.

`D=n` Display level for status and error messages.

- **0** Do not display messages.
- **1** Display only errors.
- **2** Default. Display all status messages.

`N=name`

> The DOS name that identifies the printer device. This option is required. The name can contain up to eight characters and must consist of only letters and numbers (for example, **PRINTER1**).

O Specify the letter **O** to enable the **Printer performance Optimized** option. Omit the letter **O** to disable the option.

P=n Printer type.

> **0** Default. IBM 3211 or equivalent printer.
> **1** IBM 3203 or equivalent printer.
> **2** IBM 6262 or equivalent printer.
> **4** Xerox laser printer.
> **5** Kodak Komstar computer output microfiche device.

S=x,y

Location where error messages and printer status messages display. Specify the display location with **x** and **y** coordinates, where **x** indicates the column position (0 to 60) and **y** indicates the line position (0 to 24). For example, set **s=0,0** to indicate the top left corner of the screen. The default setting is **s=60,1**, which displays messages on the first line of the screen starting at column 60.

The status information is 20 characters long. Do not specify a starting column greater than 60 on an 80-column display, and do not specify a starting column greater than 112 on a 132-column display.

Multiple printers: Assign each printer different display coordinates. Otherwise messages for different printers will overlap and the status of some printers will not be visible.

T=tt

The timeout value. After **t t** seconds of idle time, the driver assumes that the file received from DOS is complete and flushes the data to the printer. The default is **3** seconds.

X Specify the letter **X** to disable data translation. If you specify this option, the device driver does not translate ASCII PC files to EBCDIC before it sends them to the printer. The **X** option is useful when you print ASCII PC files that contain Xerox metacode to Xerox laser printers. Omit the letter **X** to enable data translation.

Example Driver Configuration

The following example shows CONFIG.SYS file commands to define two S/390 channel printers to DOS for the CHANNEL-OUT (BT) adapter.

```
DEVICE=C:\BARR\P37MBASE.EXE
DEVICE=C:\BARR\PRINT370.EXE A=0E N=PRINTER1 S=60,1 D=1
DEVICE=C:\BARR\PRINT370.EXE A=0F N=PRINTER2 S=60,2 D=1 P=4 X
```

If you have the PRINT370 adapter, replace **P37MBASE** with **P370BASE** in the first command.

In this example, the adapter is set at the default settings. The first printer, **PRINTER1**, is a 3211 printer (default) at channel address **0E**. The second printer, **PRINTER2**, is a Xerox printer at channel address **0F**, and ASCII to EBCDIC data translation is disabled (**X**). For both printers, status messages will display only when errors occur. Messages for the first printer will display on line 1 beginning in column 60, and messages for the second printer will display on line 2 beginning in column 60.

9.2 Print Files from DOS

You can print files with the ASCII or S/370 formats by copying the files to the channel-attached printer driver with the DOS **copy** command.

The format of the **C**opy command is as follows:

> **copy /b filename printer**

Substitute the name of your file and your printer.

The **/b** option tells DOS to determine when it reaches the end of the file by reading the number of bytes specified by the file size. With this method, DOS sends all characters to the printer as data. The default option (if **/b** is omitted) tells DOS to look for the ASCII **Ctrl-Z** (**1A**) end of file character. As a result, characters that have a special meaning for DOS are not sent to the printer.

For example, if you specify

> **copy /b weekly.rpt printer1**

DOS copies the entire file to PRINTER1 as data.

CAUTION: Do *not* attempt to print from DOS when BARR/RJE, BARR/AFP, or BARR/SPOOL software controls the channel. When you load a base Barr product with PRINT370 support, the software automatically disables the device drivers. Because DOS does not know that the device drivers are disabled, DOS might get stuck while it waits for the device drivers to enable. As a result you might not be able to exit the base Barr product and might have to restart your PC. Also, if you use the device drivers to send a file to the printer, be sure the data finishes printing before you attempt to load the base software. It is best not to load the device drivers if you plan to print from BARR/RJE, BARR/AFP, or BARR/SPOOL.

9.3 Use Translation Tables for Device Drivers

A default translation table is built into the DOS device drivers, but you can modify this table. When you use the BARR/RJE, BARR/AFP, or BARR/SPOOL software, you can directly edit an ASCII-to-EBCDIC translation table to control data translation from the software Installation Description. When you use the DOS device drivers, you must use separate utility files to change the translation table.

Standard Translations

You can control the translation of control codes with the P370XLAT.EXE file as follows:

■ If you do not use P370XLAT.EXE, the device drivers translate ASCII control codes to EBCDIC control codes.

■ If you use P370XLAT.EXE, the default table in the device drivers translate ASCII control codes to question marks.

For more information about the default translations, see the Tuning and Global Options, Edit EBCDIC and ASCII Translation Tables section in your *BARR/RJE* or *BARR/SPOOL* manual.

Custom Translations

You can modify, P370XLAT.EXE to perform custom translations. Custom translations require three files: a program file, a source file, and a make file.

If you are not familiar with editing, assembling, and linking programs, you might need help from a programmer. You must have a Microsoft equivalent assembler (MASM) and a linker (LINK) to create an execu- table file (.EXE).

Follow these steps to create a custom translation table.

1. Use a program editor to modify the assembler source file P370XLAT.ASM to reflect the desired translations.

2. Run the make file MAKE.BAT to build the executable table.

3. Run the modified DOS program P370XLAT.EXE to load the table into the P370BASE device driver.

If you prefer, a programmer can write a C program to obtain the same results by following the DOS calls in the assembler source.

To load the modified translation table, type **p370xlat** at the DOS prompt. The modified translation table remains in effect until you load another translation table or restart the PC. If you always need to use the modified translation table, you can add the command **p370xlat** to your PC's AUTOEXEC.BAT file.

9.4 Run Adapter Diagnostics

The PRINT370 option of your BARR/RJE, BARR/AFP, or BARR/SPOOL software includes diagnostic tests that you can run from the Installation Description. When you use the PRINT370 device drivers, you can perform diagnostics from DOS with the 370DIAG.EXE file.

Do not attempt to use this diagnostic utility when the BARR/RJE, BARR/AFP, or BARR/SPOOL software is loaded.

Before you use the diagnostic utility, be sure to unload the PRINT370 device drivers. Follow these steps to unload the drivers and run the utility.

1. Edit the CONFIG.SYS file to comment out the PRINT370 device drivers.

2. Restart your PC.

3. At the DOS prompt, type the command **370diag**.

   Note: If you run the diagnostics without first unloading the device drivers, the diagnostic results will be unreliable and the PC might perform unpredictably.

For more information about adapter diagnostics, see section 4.3.

Notes:

A Barr S/370 File Format

Barr S/370 file format is the internal data format Barr software uses for routing data to channel printers. The software converts files to this format, or you can generate files in this format on the PC.

When you select **S/370 Channel** receive mode on the Assign Devices screen, the software converts files received from mainframe or midrange systems to S/370 format. When you send PC-generated ASCII files to the printer, the software also converts them to S/370 format. However, plain ASCII files cannot take advantage of the printer's channel command capabilities.

If you want PC-generated files to use channel commands, you can modify your programs to generate data in S/370 file format with channel commands.

A.1 When to Use S/370 File Format

You might want to generate PC files in the S/370 file format for these situations:

■ You do not want data translation to occur. For example, if you print files in the Xerox metacode format to Xerox laser printers, data should not be translated. The software does not translate files that are already in the S/370 format.

■ You need complete control of channel commands. (For plain ASCII files, Barr software performs only the Skip to Channel 1 and Space 1 Line commands.)

■ You create printer resource files on the PC. Printer resources must be in S/370 file format. (Typically, you put resource files with the S/370 format in the forms overlay directory.)

If you only need to control channel skips for an ASCII file and you print to a Xerox printer with built-in forms, you do not need to use Barr S/370 format. Instead, you can use the channel skip sequences for Xerox printers described in Appendix C.

A.2 Record Formats

Two S/370 record formats are available: S/370 Byte-Length Record format and S/370 Word-Length Record format. The two formats support different maximum record lengths. With S/370 Byte-Length format, records can contain a maximum of 254 characters. With S/370 Word-Length format, records can be longer than 254 characters. (Realia COBOL uses the same formats.)

The software automatically uses S/370 Word-Length Record format for files received with S/370 Channel receive mode because some host systems allow records longer than 254 bytes. The software also uses Word-Length format for simple PC ASCII files. When you generate PC files in the S/370 format, you can create files in either Word-Length or Byte-Length format, but Byte-Length format usually is sufficient.

Files in S/370 format must have a four-byte format header at the begin- ning of the file. The format header bytes must have specific hexadecimal values. Because the format header indicates the maximum length of the data records within the file, format headers for the Word-Length and Byte-Length formats are slightly different.

Data records follow the file format header and are usually in EBCDIC because most channel printers require EBCDIC data. Records must contain count bytes indicating the record length and channel command characters. Additionally, most records contain print data. Follow the guidelines below when you create data records.

■ Include a record length count at the beginning and end of the record. Both length counts must have the same value and must include the number of data bytes plus one byte for carriage control.

■ Include only one channel command byte per record. For a list of channel commands, see section A.3.

S/370 Byte-Length Record Format

Use the Byte-Length Record format for records that contain no more than 254 bytes of data.

Format header	76 1A FF 00	
Records	Beginning length byte	1 byte (01-FF)
	Channel command	1 byte
	Print data	0 - 254 bytes
	Ending length byte	1 byte*

*The Beginning and Ending length bytes have the same value.

In this example, the file contains a header and three records. Two of the records contain print text.

```
76 1A FF 00 01 8B 01 04 09 C8 C9 5A 04 05 89 C4 D6 D5 C5 05
```

Header   **76 1A FF 00**

Record 1   **01**   Beginning length byte (record contains one byte)
           8B   Channel command (Skip to Channel 1)
           01   Ending length byte

Record 2   **04**   Beginning length byte (record contains four bytes)
           09   Channel command (Write and Space 1 Line)
           C8 C9 5A   EBCDIC data (HI!)
           04   Ending length bytes

Record 3   **05**   Beginning length byte (record contains five bytes)
           89   Channel command (Write and Skip to Channel 1)
           C4 D6 D5 C5 EBCDIC data (DONE)
           05   Ending length byte

S/370 Word-Length Record Format

Use the S/370 Word-Length Record format for records that contain more than 254 bytes. Note the different format headers for S/370 Word-Length Record format and S/370 Byte-Length Record format. Also, the record length counts for Word-length Record format have two bytes.

Format header	76 1A FF FF	
Records	Beginning length byte	2 bytes (01 - FF, LSB MSB)
	Channel command	1 byte
	Print data	0 - n bytes
	Ending length byte	2 bytes*

*The Beginning and Ending length bytes have the same values.

For S/370 Word-Length Record format, you must give the record length counts in INTEL format, where the most significant byte (MSB) follows the least significant byte (LSB). For example, you would represent the length value 0150 as 50 01.

This example contains the same carriage control commands and print text as the Byte-Length example, but the information is in Word-Length format.

```
76 1A FF FF 00 8B 01 00 00 09 C8 C9 5A 04 00 00 89 C4 D6 D5 C5 05 00
```

Header   **76 1A FF FF**

Record 1 **01 00**   Beginning length bytes (record contains one byte)
          8B   Channel command (Skip to Channel 1)
          01 00   Ending length bytes

Record 2 **04 00**   Beginning length bytes (record contains four bytes)
          09   Channel command (Write and Space 1 Line)
          C8 C9 5A   Data (HI!)
          04 00   Ending length bytes

Record 3 **05 00**   Beginning length bytes (five bytes of information)
          89   Channel command (Write and Skip to Channel 1)
          C4 D6 D5 C5 Data (DONE)
          05 00   Ending length bytes

A.3 S/370 Channel Commands

When you code or decode files with the S/370 format, refer to the channel commands described in this section. The three types of channel command types are as follows:

- Commands that perform carriage control functions
- Commands that perform other functions
- Commands reserved for the Barr software

Carriage Control Commands

Carriage control is the ability to control the position of text on an output device. You can use carriage control commands to move the printer carriage from one line on the page to another or move to a new page.

For some systems, such as PC's, data is a stream of characters being sent to an output device. Some of these characters are carriage control characters such as CR (carriage return), LF (line feed), and FF (form feed). SCS (SNA Character Stream) works in the same fashion: a stream of characters, some of which are control characters.

While mainframes store data records, each record of printer output has both carriage control and data associated with it. The carriage control is usually the first position of the record and the data follows. The data field may be empty. When the file is referenced, there is a record format parameter that tells the system if carriage control exists and what type of carriage control is being used. When these records are being directed to the printer, the channel software converts the carriage control (if necessary) into the appropriate channel command. The software then passes this command and any data in the record to the printer.

Table A-1.   Channel Commands without Data

Carriage Control	Machine (without data)	Machine (with data)	ASA (ANSI)	SCS	ASCII
Do Not Space	03 (No Op)	01	+	0D	0D
Space one line	0B	09	Space	15	0D 0A
Space two lines	13	11	0	15 15	
Space three lines	1B	19	-	15 15 15	
Skip to Channel 1	8B	89	1	0C or 04 81	0C
Skip to Channel 2	93	91	2	04 82	
Skip to Channel 3	9B	99	3	04 83	
Skip to Channel 4	A3	A1	4	04 84	
Skip to Channel 5	AB	A9	5	04 85	
Skip to Channel 6	B3	B1	6	04 86	
Skip to Channel 7	BB	B9	7	04 87	
Skip to Channel 8	C3	C1	8	04 88	
Skip to Channel 9	CB	C9	9	04 89	
Skip to Channel 10	D3	D1	A	04 7A	
Skip to Channel 11	DB	D9	B	04 7B	
Skip to Channel 12	E3	E1	C	04 7C	

There are differences between carriage control commands. ASA and Machine carriage control are both based on records, however, they perform their skip at different times. ASA carriage control is executed before the line of data is written. Machine carriage control is executed after the data is written. These two techniques will be referred to as Skip Before and Skip After. It is not correct to refer to ASCII or SCS as Skip Before or Skip After, they are character streams and the carriage control has a relationship to the data based on its position in the character stream.

PRINT370 uses machine carriage control commands. These commands are grouped into two categories: commands you can include in records without data (see Table A-2) and commands you can include in records with data (Table A-3).

For example, use the **0 B** command in Table A-2 to advance the printer one line, but use the **0 9** command in Table A-3 to print a data record and then advance one line.

Table A-2. Channel Commands without Data

Command Description	Command
No Operation	03
Space 1 Line Immediate	0B
Space 2 Lines Immediate	13
Space 3 Lines Immediate	1B
Skip to Channel 1 Immediate	8B
Skip to Channel 2 Immediate	93
Skip to Channel 3 Immediate	9B
Skip to Channel 4 Immediate	A3
Skip to Channel 5 Immediate	AB
Skip to Channel 6 Immediate	B3
Skip to Channel 7 Immediate	BB
Skip to Channel 8 Immediate	C3
Skip to Channel 9 Immediate	CB
Skip to Channel 10 Immediate	D3
Skip to Channel 11 Immediate	DB
Skip to Channel 12 Immediate	E3

Table A-3. Channel Commands with Data

Command Description	Command
Write without Spacing	01
Write and Space 1 Line	09
Write and Space 2 Lines	11
Write and Space 3 Lines	19
Write and Skip to Channel 1	89
Write and Skip to Channel 2	91
Write and Skip to Channel 3	99
Write and Skip to Channel 4	A1
Write and Skip to Channel 5	A9
Write and Skip to Channel 6	B1
Write and Skip to Channel 7	B9
Write and Skip to Channel 8	C1
Write and Skip to Channel 9	C9
Write and Skip to Channel 10	D1
Write and Skip to Channel 11	D9
Write and Skip to Channel 12	E1

Other Commands

Some channel commands perform functions other than carriage control (see Table A-4). For example, they cause the printer to disable printer Data Check errors, fold lowercase characters to uppercase, load a Forms Control Buffer (FCB), or load a Universal Character Set Buffer (UCSB).

Table A-4. Other Channel Commands

Command Description	Command
Block Data Check	73
Allow Data Check	7B
Fold	43
Unfold	23
Load FCB	63
Load UCSB	FB

Reserved Commands

A few commands are reserved by the Barr software (see Table A-5). The
C 6 and **F F** commands are used in the Barr spool header. The software
processes records beginning with these commands, but does not neces-
sarily send the records to the printer. Be careful not to code these two
commands when you generate PC files in the S/370 format. Instead, you
can use the special **F D** command described in this section.

Table A-5. Commands Reserved by Barr Software

Command Description	Command
3211 FCB	C6
Translate Next Command	FD
Start of Spool Header Record	FF

The FD command causes the software to translate a channel command to
another command before the software sends the command to the printer. You
can use this command when you receive data from a mainframe and the data
contains a printer command character that is not defined to the SNA charac-
ter set. Normally, the mainframe discards undefined command characters, so
the non-standard command character is not sent to the PC.

At the mainframe, you can substitute a valid channel command that you are
not using in your print jobs. When the PC receives the job, the substitute
command is intact. When the job is sent to the printer, the Barr software
replaces the substitute command with the desired printer command.

When you use the **F D** command, you must code it as a record in the Barr
S/370 format. The record must have four bytes of command information
and two count bytes. The command bytes are the **F D** command, the command
to translate from, the command to translate to, and the command type. The
translation remains in effect until another translate request is issued using
the same substitute command.

For example, assume that you have an IBM 3800 or equivalent printer
that uses the Mark Form command (**1 7**). This command marks the page
perforation to make job separation easier. Although Mark Form is a valid
command for printing to a mainframe-attached channel printer, it is not
valid for remote printing. Pick a valid channel command that you do not use,
such as Skip to Channel 10 (**D 1**), and substitute it for all instances of the 17
character in the mainframe data. Then code the **F D** command in a printer
initialization file, a form overlay file, or a printer control data string as
follows:

```
04 FD D1 17 00 04
```

04   Beginning count byte (four bytes of data).

FD   Translate command.

D1   Command to translate from (Skip to Channel 10).

17   Command to translate to (Mark Form).

00   Type of the command you are translating to. Use 00 for commands without data (control commands) or 03 for commands with print data (write commands).

04   Ending count byte (matches beginning count byte).

When the Barr software sends the data to the printer, it performs the translation according to the **FD** command sequence and converts all instances of **D1** to **17**. The software continues to translate the command, until it encounters another translate request for the unused command (Skip to Channel 10) in the file.

B ASCII Format with Channel Skips

This appendix describes how to add channel skip commands to simple ASCII files without converting the files to the Barr S/370 file format. Channel commands help your data print faster on channel printers.

B.1 Standard Channel Skip Processing

Normally, S/390 channel printers do not support ASCII carriage control characters. Therefore, ASCII carriage control commands must be converted to channel commands before they can be sent to a channel printer. When it prints standard ASCII files, the Barr software automatically converts the most common ASCII carriage control characters to the corresponding channel commands.

When the software encounters an ASCII form feed (**0 C**) character, it automatically sends a Skip to Channel 1 command to the printer. This is the only channel skip PRINT370 automatically performs for ASCII files.

When the software encounters ASCII carriage return (**0 D**) and line feed (**0 A**) characters, it sends the correct channel command to the printer to advance one line. Advancing one line at a time instead of jumping directly to a line slows down channel printing.

B.2 Enhanced Channel Skip Processing

If you want to use your printer's channel skip feature for ASCII files, and your printer stores form definitions internally, you can code the commands Skip to Channel 1 through Skip to Channel 12 with a special command sequence. When the Barr software sends the file to the channel printer, it converts the command sequence to the correct channel skip command.

The sequence consists of two bytes in the format **1F nn**, where **1F** signals the software to send a channel skip command to the printer and **n**n indicates which skip command to send. You must code the hexadecimal value of the skip that you want to perform. For example, specify **1F 02** for a Skip to Channel 2 and **1F 0C** for a Skip to Channel 12.

Barr software uses machine carriage control format, so it writes the data and then sends the channel skip.

The channel skip command sequence works best for channel skips 2 through 12. The Barr software automatically converts ASCII form feed characters to Skip to Channel 1 commands, and it is more efficient to let the software convert them than to code them yourself as the ASCII sequence `1F 01`.

You can add the channel skip sequences to your files by using a program editor or you can generate the sequences by changing the application programs that generate the files.

If you need to perform channel commands other than channel skips, you must use the Barr S/370 file format.

If you are printing to a Xerox laser printer, you can use the information in this appendix to help resolve printing problems. This appendix describes how PRINT370 handles files with these three Xerox file formats:

- LPS
- Interpress
- Metacode

Files with these formats usually are created on a PC and sent to Xerox laser printers from the PRINT370 software. Printer resource files from the mainframe also can be in these formats at the host. However, print files from the mainframe are received with **S/370 Channel** receive mode and thus are in the Barr S/370 file format.

When PRINT370 sends these files to the printer, it performs special processing, depending on the file type. Files in LPS or Interpress format are considered binary files. PRINT370 sends DJDE strings to the printer at the beginning of the file and then sends the file in 128-byte blocks. You specify the format of the DJDE strings for Xerox laser printers on the Advanced Printer Options screen. (The DJDE options display only when you select **Xerox Laser** as the printer type.) When the software sends files with the metacode format to the printer, it does not translate channel commands or data.

PRINT370 uses the file format to determine the file type, so be careful not to accidentally generate ASCII files that contain these characteristics. The software looks for certain characters at specific byte positions in the file. All byte offsets begin with offset zero, the first byte of the file.

C.1 LPS Files

LPS files are used as form overlays, fonts, or logos. Normally, these resource files are created on the PC and then stored on the Xerox printer's hard disk. When a file is sent to the printer, DJDEs in the print data tell the printer which resources to use.

You can use PRINT370 to move these resource files to the printer. Usually you only need to send the files to the printer when you create or modify them.

LPS File Format

LPS files are distinguished by a 128-byte file format header that contains the file name and file type. The number of bytes in the file is typically an integer multiple of 128. See Table C-1 for a description of the file header.

Table C-1. LPS Format Header

Offset	Field	Comments
0	File name (RAD 50 format)	Zero if not used.
4	File type (RAD 50 format)	Zero if not used. Font = **C4 27**, Form = **5D 28**, Logo = **27 4C**
6	File size	File size in 512 byte blocks
8	First free byte	
10	Date (DOS format)	Not used.
12	Record size in bytes	
16	Reserved	
18	ASCII file name	Only six of the nine bytes are used. The unused bytes must be zero.
27	ASCII file type	Font = **FNT**, Form = **FRM**, Logo = **LGO**
30	Reserved	
34	00	
126	00	
127	2A	ASCII asterisk (*****)

LPS File Processing

PRINT370 tests for the two byte values **0 0 2 A** starting at offset 126. That is, it checks byte 127 for a value of **0 0** and byte 128 for a value of **2 A** or an asterisk (*****).

When PRINT370 sends an LPS file to the printer, it first sends this DJDE string:

    $DJDE$ FILE=(), END;

The printer gets the file name and type from the first record of the LPS file. PRINT370 sends the remainder of the file as 128-byte records. At the end of each record, the software adds an asterisk (byte 129) and sends a Write and Space command. If the last record does not contain 128 bytes, PRINT370 pads the record with **0 0** bytes up to byte 128, and then adds the asterisk.

C.2 Interpress Files

You can produce graphics files on the PC in the Interpress format and then use PRINT370 to send these files to the printer.

Interpress File Format

The Interpress file is a binary file with a header record that contains the words:

    INTERPRESS XEROX IMG

The number of character spaces between these words can vary. The number of bytes in the file is typically an integer multiple of 128.

Interpress File Processing

Interpress file processing is similar to LPS file processing. To determine whether a file is in Interpress format, PRINT370 searches for the words INTERPRESS, XEROX, and IMG in the first 128 bytes of the file. The words can be uppercase or lowercase.

When PRINT370 sends this type of file to the printer, it first sends two DJDE strings.

```
        $DJDE$ BEGIN=, END;
        $DJDE$ GRAPHIC, END;
```

PRINT370 sends the remainder of the file as 128-byte records. At the end of each record, the software adds an asterisk (byte 129) and sends a Write and Space command. If the last record does not contain 128 bytes, PRINT370 pads the record with **0 0** bytes up to byte 128, and then adds the asterisk.

C.3 Metacode Files

Metacode files are print files generated on the PC. Because the print data contains special metacode formatting that would conflict with ASCII control characters, PRINT370 must distinguish metacode files from ASCII files.

Metacode File Format

Metacode is a block variable format similar to the mainframe format RECFM=VBM. The blocks and records must adhere to a specific structure.

Block Structure

A data block can contain one or more records. The block begins with a two-byte count of the bytes in the block, with the most significant byte (MSB) value listed first followed by the least significant byte (LSB). Two null bytes follow the count bytes. The block size includes the block length bytes, null bytes, and sum of all the record lengths.

Block length byte (MSB)	Block length byte (LSB)	00	00	Records

Record Structure

Each record begins with a two-byte count of the bytes in the record and two null bytes. The record size includes five bytes of format information (the length bytes, null bytes, and carriage control byte) and all the data bytes. Carriage control bytes must be expressed as machine carriage control.

Record length byte (MSB)	Record length byte (LSB)	00	00	Machine carriage control byte	Data bytes

Metacode File Processing

To determine whether a file is in metacode format, PRINT370 tests for a pair of null bytes (**0 0 0 0**) starting at offsets two and six. In other words, PRINT370 looks for this sequence at the beginning of the file:

    xx xx 00 00 **xx xx** 00 00

PRINT370 does not check the values of the bytes represented by **x x**.

The software assumes that the first byte in each record is the channel command. Carriage control commands must be machine carriage control, because the channel and the Xerox online printer interface do not support any other carriage control type. The software performs no other special processing. The software sends the carriage control and data to the printer without validating or translating it.

C Xerox File Formats

Notes:

D PRINT370 Device Driver Interface

If you are a PC programmer, you can change your programs to use the PRINT370 device drivers to send print data to S/390 channel printers. Chapter 9 describes the PRINT370 device drivers. This appendix describes how to develop the device driver interface.

Because you cannot load the Barr base software and device drivers at the same time, this works best when you do not use software such as BARR/RJE, BARR/SPOOL, or BARR/AFP.

D.1 Interface Methods

When you install the PRINT370 device drivers, they create a new DOSdevice that your programs can access like any standard DOS device, suchas LPT1. There are two ways your program can access the device drivers:

- **IOCTL method** - The PRINT370 device drivers can accept standard IOCTL calls from applications you write in Assembler or any other language that can access DOS functions. These calls include Open Device/File, Close, Write Status, and Write.

- **High-Level Language method** - You can use high-level programming languages such as C to open, write to, and close the device driver.

The IOCTL method or a combination of both methods is preferred. If you use only the high-level language functions, you might not be able to perform some operations.

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D.2 Interface Guidelines

When you develop the interface to the PRINT370 device drivers, follow these guidelines.

Open the Device Driver

Your program must open the device driver with binary or raw mode. When applications pass data to the device, binary mode prevents DOS from examining each character and removing non-printable characters as it does with ASCII mode. This dramatically improves performance.

If you are using IOCTL calls, perform the IOCTL call after the open call by issuing *IOCTL: Set Device Information*, DOS Function 4401 with Device Information Bit 5 ON (binary mode).

If you are programming in C, pass **W B** as the mode of the **f open** call.

Perform Write Status

Your program should perform a Write Status call before writing data to the device driver. If the call returns the Busy status, the application should wait before writing the data. If the program attempts to write while the device is in a Busy state, the device driver waits until enough internal data space is freed to hold the data from the write operation, and then the driver returns to the application. The wait can last several minutes if the output device is in an error state, such as out of paper.

The ability to check the write status is helpful if your application program is CPU-intensive or if you cannot allow the write call to wait before returning. When your program receives a Not Busy reply to the WriteStatus call, it can pass up to 500 bytes of data to the device driver.

C programmers might need to code a new function to perform the IOCTL call. There is no generic C call to retrieve the write status. An example C call to perform the IOCTL Write Status call is shown below.

```
/********************************************
    ioctl_write_status (file_handle)
     return: 0 - not ready 0xff - ready
********************************************/
int ioctl_write_status (handle)
int handle;
{
  union REGS regs;

  regs.h.ah = 0x44;                      /* IOCTL function           */
  regs.h.al = 0x07;                      /* Write status sub function */
  regs.x.bx = handle;
  intdos (&regs,&regs);
  return (regs.h.al);
}
```

Write Data

Your program should write data to the device driver in 500-byte pieces or less. If your program attempts write operations with more than 500 bytes of data, the Write call is not guaranteed to return immediately. The program should issue a Write Status call before writing data. If the Write Status returns a Not Busy status, the device driver guarantees that a write of 500 bytes will return immediately.

Because the device driver uses internal buffering, the last block of data written to the device driver cannot be printed until the device driver is closed. Then all data is flushed to the printer.

File Formats

The PRINT370 device drivers accept the following file formats: ASCII, Barr S/370, Xerox LPS, Xerox Interpress, and Xerox metacode. S/370 format is preferred because it is the most efficient.

D.3 Device Driver Status Call

Applications can use the printer address to obtain the printer's current status. Because none of the functions within the DOS IOCTL function set allow character devices to obtain this information, the device driver implements a back door. Only those applications that can call DOS interrupts can use this feature.

To obtain the Printer Status information, use the DOS multiplex interrupt (**2 F**), which allows applications to communicate with each other.

Use the registers and values in Table D-1 to program the Printer Status call. The Printer Status call returns information to two register pairs, as shown in Table D-2, and returns status bits to the DX register, as shownin Table D-3.

Table D-1. Calling Conventions

Register	Value	Description
AH	**EE**	Multiplex Number (ID of listening program). Barr software uses hexadecimal EE.
AL	**0F**	Obtain Printer Status function
CL	**nn**	Address of printer

Table D-2. Register Pair Returns

Register Pair	Description
DS:SI	Pointer to Error Text Description (15 bytes long); only valid during an error condition.
ES:DI	Pointer to Sense Bytes (24 bytes of sense data last received); only valid during a sense error.

Table D-3. Register Status Bits

Register	Status Bits (hexadecimal)*	Description
DX	**0080**	Sense Error, sense bytes are valid
	0008	Other Error review text description only
	0020	Device is currently active

*All other bits are reserved and might or might not be ON.

CAUTION: Do not modify any of the data pointed to by **DS:SI** or **ES:DI**. If this data is modified, the device drivers could fail. The active bit (**0020** in the DX register) is reset once a second, making it possible for active to be indicated with other error conditions. During any error condition, the Text Description is the driver interpretation of the error and the sense bytes are the last sense bytes received from the device. The sense bytes reflect the current state of the device when the sense error bit is indicated.

Notes:

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Glossary

adapter

Add-on piece of equipment you can plug into a PC to allow the PC to connect to another device.

AFP

Advanced Function Printing. A type of printing where only files from PSF can be sent to the printer and the printer communicates directly with the host.

application program

Software that performs a specific application or task, such as word processing, accounting, or financial planning. (Contrasts with a utility or system program that is used to carry out file management and housekeeping functions.)

APPLID

In SNA, VTAM communicates with many applications. The APPLID is the identifying name of a VTAM application.

ASCII

American Standard Code for Information Interchange, which specifies a set of 128 graphic and control symbols and their seven-bit codes. Extended ASCII supports 255 symbols. ASCII is used by PCs and PC peripheral devices, such as printers.

base software

A Barr software product to which options can be added. For example, BARR/RJE is a base software product to which options such as PRINT370 can be added.

binary

A base two number system used in computer programming. The binary digits, or bits, are 0 and 1.

bit

Binary digit. The name of an elementary unit of information that has two states. Usually the two states are called 0 and 1.

block

A contiguous vector of bits that is read or written as a unit. A block can include one or more records. Blocks usually have a fixed size.

boot

To prepare a computer for use by loading the operating system. Usually the operating system loads automatically when you power on the computer.

bps

Bits-per-second. A unit of measure for the data transfer rate.

buffer

An area of computer memory used for performing input or output operations. The software reads data into a buffer or writes data from a buffer.

bus and tag cables

Cables used to connect devices to a mainframe channel. The bus cable transmits data and the tag cable controls the information on the bus.

---

byte

A string of bits that, treated as a unit, represent a character. Usually eight adjacent bits represent one EBCDIC character.

carriage control

Characters used to control vertical spacing of print lines.

channel

Functional unit that directs the flow of information between control units and main storage.

channel attach

Direct way to connect printers to S/390 mainframes.

character

A single letter, digit, symbol, space, or punctuation mark.

COM1, COM2, COM3, COM4

Asynchronous serial ports 1, 2, 3, and 4 on the PC.

command

Something you instruct the computer to do, such as run a program.

communication controller

A communication control unit that manages line control and data transfer through a network. Operations are controlled by one or more programs stored and executed in the unit. Examples are the IBM 3705, 3725, and 3745 Communication Controllers.

communication control unit

A communications device that controls the transmission of data over lines in a network, such as transmission control units and communication controllers.

communication link

The physical connection and link protocol between the remote workstation and the host computer.

communications protocol

A specification of data and control message formats and their meanings. This specification is followed by both the sender and receiver in a communication link.

compaction

In SNA communications, the sender sends two bytes as one byte to increase data transmission throughput. The receiver decompacts the data to the original two bytes.

compiler

Programs that convert instructions written in high-level languages to the machine language that the computer can interpret.

compression

To increase throughput in data transmission, the sender substitutes one character for a sequence of duplicate blanks and two characters for a sequence of non-blank characters. The receiver decompresses the data to their original state.

computer output microfiche

Microfiche that contains data recorded by computer.

configuration

(1) A specific combination of hardware that forms a system. For PCs, the term configuration describes characteristics such as the type of video adapter, the number and description of printers, the amount of memory, and a description of

serial ports. (2) A specific combination of software options used to set up an application program.

console
The device used to control the operation of a computer, including a keyboard and display or printers.

control codes
Any character used to facilitate transmission of data between the PC and the host.

control unit
See communication control unit.

daisy chain
A method of interconnecting a series of devices such as printers.

data
A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by human or automatic means.

Data Link Control (DLC) protocol
Communication rules for the orderly exchange of information between two nodes on a data link. The lowest level protocol of SNA and BSC.

data rate
The speed of data transfer on the channel for a channel data transfer command.

DCI
Direct-Coupled Interlock. A type of channel data transfer that uses one signal pair (Service In, Service Out).

DEC
Digital Equipment Corporation, the manufacturer of VAX mainframes.

device
An input and output unit connected to the computer such as a printer, plotter, or monitor.

device address
A number that uniquely identifies a device.

device driver
A software program that controls a specific device, such as a printer or a network connection. Drivers load into memory and stay active while the computer does other work.

disconnect
Terminate a physical connection.

disk
A flexible magnetic-coated mylar disk used to record information. Synonymous with flexible disk or floppy disk.

display
A TV-like device used to display information.

DJDE
Dynamic job descriptor entry. A set of instructions within the data stream that tells the Xerox printer what forms, fonts, and graphics to print for Xerox centralized printers.

DOS
Disk operating system. An operating system for computers that uses disks to store programs and data.

EBCDIC
Extended Binary-Coded Decimal Interchange Code, which specifies a set of 256 graphic symbols and their eight-bit

codes. EBCDIC is used by mainframes and mainframe peripheral devices, such as printers. It was first used with the IBM System/360.

EISA
Extended Industry Standard Architecture. A 32-bit extension of the 8- and 16-bit internal bus structure developed by IBM. Developed by Compaq Computer Corp. and other PC manufacturers.

emulator
Program that acts like another device in every way.

extension
In a file name, one to three characters that follow the period (for example, STUDY5.JOB).

FCB
Forms control buffer. In the IBM 3800 printing subsystem, a buffer for controlling the vertical format of printed output.

FCBLOAD
Forms Control Buffer Load. A record sent from a host to a remote to specify vertical forms control.

FCC
Federal Communications Commission.

file transfer
Transfer of files between two computer systems.

full duplex
A communication link that allows simultaneous transmission of data in both directions (in contrast to half duplex).

graphic symbols
Symbols represented by a picture (in contrast to ones with an alphabetic name such as carriage return).

half duplex
A communication link that allows for transmission of data in only one direction at a time (in contrast to full duplex).

hardware
The physical or hard components in a computer system, such as a processor, memory, display, and printer. (Contrasts with the soft information components that include programs and data processed by the computer.)

header
Data at the start of a file that describes the file and how the file is to be printed.

hexadecimal
A base 16 number system that uses the digits 0 to 9 and letters A to F.

HIP
Host Interface Processor. Software used with the Xerox 871 Communications Module.

host computer
A computer that controls the communications network, stores databases, and has a large computing and memory capacity. Other computers can connect to the host to share its resources.

HST
High-Speed Transfer. A type of channel data transfer that uses two signal pairs (Service In, Service Out and Data In, Data Out).

IBM

International Business Machines Corporation.

IBM PC

International Business Machines Personal Computer.

input

Information that is read into a computer.

Installation Description

Installation program for entering BARR/RJE configuration options.

interface

The connection between any two components in a system. The term is used for the connection between both software and hardware components.

interrupt

Mechanism used to stop a program for an event needing immediate attention.

IPDS

Intelligent printer data stream. An all-points-addressable data stream that allows you to position text and graphics at any point on a printed page.

IRQ

Interrupt request. A request for processing on a particular priority level.

ISA

Industry Standard Architecture, a standard for the PC's expansion bus (where you plug in add-on adapters). The IBM AT bus became a 16-bit ISA bus.

I/O

Input/Output, which represents data transfer between a mainframe and peripheral equipment.

JCL

Job Control Language. A language interpreted by the operating system.

JDE

Job Descriptor Entry.

JDL

Job Descriptor Library. A library that the Xerox printer references at receive and print time.

JES2 and JES3

Job entry subsystems of the IBM MVS Operating System. These subsystems are used for entering jobs into the MVS Operating System and dispensing the output from the jobs. JES2 and JES3 are replacements for the earlier HASP II program that was used for this same purpose.

job

An independent unit of work that is processed by the host computer operating system. A job consists of JCL statements, programming language statements, and data to be processed. The output from a job includes printed output and updates to files on disk or tape.

JSL

Job Source Library. A library for the Xerox printer containing text source statements that describe how the printer will input print data and output the image on paper.

kilobyte (KB)

A unit of computer memory that is 1024 bytes. Each byte is eight bits long. 1024 in decimal notation is the same as 10000000000 in binary notation. In computer literature, the kilo prefix means times 1024.

LAN

See Local Area Network.

language

A language consists of a set of symbols, the rules that define which sequences of symbols are syntactically correct, and the meanings attached to various parts of the language. Examples of computer languages include FORTRAN, C, COBOL, and ALGOL.

LAT

Local Area Transport, an early networking protocol used by DEC. (DECNET is the newer protocol.)

line

Connection between computing units, such as a central host computer and a remote terminal. In this manual, line usually refers to a line coming out of a communication controller that is connected to a modem by an RS232 cable.

line speed

The number of binary digits that can be sent over a communication line in one second. Line speed is expressed as bits per second (bps).

line trace

A recording of the frames sent and received on a communication line that is useful for diagnosing communications problems.

local area network (LAN)

A high-speed communications network within a limited geographic area. Typically, several PCs are linked together within a single building or campus. (In contrast, a wide area network may span hundreds or thousands of miles.)

local connection

Direct attachment to the mainframe without use of a telecommunication line.

logical unit (LU)

In SNA communications, an independent stream of data that is multiplexed with other streams within a physical unit.

LOGMODE

In SNA communications, a list of parameters specifying the type of session to establish between a mainframe application and a remote workstation. VTAM uses the LOGMODE during the Bind operation.

logoff

In SNA communications, to terminate a session.

logon

In SNA communications, to initiate a session or to initiate a session between an application program and an LU.

logon data

In SNA communications, an LU sends a message in response to logon. This entire logon sequence or message is the logon data.

loopback

A testing procedure in which transmitted data are returned as received data.

lpm

Lines per minute, a measure for printing speed.

LPT1, LPT2, LPT3

PC parallel printer ports 1, 2, and 3.

LSB

Least significant byte.

mainframe

A large central computer that offers a full set of computing services. The term originated in the days when the central processor, memory, and input/output channels were located in one central housing called the mainframe. Synonymous with host computer.

message

The longest unit of information, transmitted as a consecutive series of bits. In asynchronous communication, a message is a single character. In synchronous communication, a message is a block of characters preceded by some sync characters and terminated by an end-of-block marker.

metacode

A Xerox-generated data stream that provides all-points-addressability on Xerox centralized printers.

microfiche

A sheet of microfilm that can contain microimages in a grid pattern.

microfilm

A high resolution film for recording microimages.

MODEENT

In SNA communications, the macro that defines the logmode table entry.

MODETAB

In SNA communications, the table of logmode definitions.

MSB

Most significant byte.

multiplex

To concentrate multiple streams of data on one medium.

MVS

Multiple Virtual Storage operating system. A large IBM Operating System that operates on System/370, 3081, and 3091 processors.

NCP

Network Control Program. In SNA communications, a program that controls the operation of a communication controller. It is generated by the user from a library of IBM-supplied modules.

NUL

Device that deletes output.

offline

Disconnected from the system. Processing that is performed in isolation.

online

Connected to the system. Processing that is performed during direct communications between a workstation and a host computer.

operating system

A master program that manages the resources of the computer. The operating system provides a set of services to all programs for input/output, data management, program loading, memory allocation, and communication facilities for job entry and output dispatching.

operator commands

Commands sent to the host computer.

OS

Operating system.

output
  Data produced by a computer program.

pacing
  In SNA communications, a method to control the flow of data from VTAM to the remote.

parallel interface port
  A device interface to the computer that reads and writes groups of bits at the same time. A common way to connect printers to the PC.

parameter
  A variable that is given a constant value for a specified application.

PC
  Personal computer.

PDL
  Print Description Language. Xerox compiler that converts a JSL into a JDL.

peripheral devices
  Equipment attached to the computer that is controlled by the computer or serves as memory or a source of information. Examples of peripheral devices include disk drives, printers, and communications devices such as modems.

physical unit (PU)
  In SNA communications, an independent unit attached to an SDLC line.

PPM
  Pages per minute for printing speed.

PR1
  RJE printer 1.

print queue
  A list of items waiting to print.

print spooling
  Managing a queue of files to be printed on one or more printers.

printer control data
  Data used to specify the operating mode of the printer.

printer forms commands
  Commands sent to the host to manage printing of special forms.

program
  A set of instructions that provide step-by-step details for performing a task. Instructions for a computer can be written in a high-level language like FORTRAN, BASIC, or PASCAL. Instructions that are in a form directly usable by the computer are called machine language instructions.

protocol
  See communications protocol.

PSF
  IBM Print Services Facility.

PU1
  RJE punch device 1.

punch
  Output from the host computer that consists of a file of lines up to 80 characters long. Typically this type of data is processed rather than printed.

queue
  A list of items waiting for service in a system.

RD1

RJE reader device 1.

reader

A logical device that reads jobs from the RJE workstation and sends them to the host system. At the host, jobs are put in a job queue for processing.

receive

To obtain data from a communications line (in contrast to send).

receive mode

Options that control the format of files that are received.

remote

A terminal attached via a communication link to a mainframe computer.

remote connection

Connect equipment to the mainframe via a telecommunication line.

RJE

Remote Job Entry. A computing environment in which you can create programs and data on the PC, transmit them to the mainframe, receive the printouts at high speed on disk or printers, and control the status of jobs by using remote operator commands.

S/370

IBM mainframe machine architecture. See also channel attached.

SCS

SNA character set.

SDLC

Synchronous Data Link Control. A low-level communications protocol for synchronous communications. It is defined for both full-duplex and half-duplex operation. SNA uses SDLC as its low-level communications protocol.

sense code

Data describing an I/O error.

session

(1) SNA communications between two LUs that start with a logon and end with a logoff. (2) A BARR/RJE screen dedicated to a particular activity.

SNA

Systems Network Architecture. A description of the IBM communications network, a multilayered communications environment that usually uses SDLC as its lowest level communications protocol. The description includes the logical structure, formats, protocols, and operation sequences for transmitting units through and controlling the configuration and operation of networks.

SNPFORM

An Océ printer utility used to create forms from a list of resources.

SNPIMAGE

An Océ printer utility used to create resources from a list of commands.

software

The programmable instructions for operating the physical machinery of a computer system, such as programs, databases, and files. (Contrasts with the hardware components such as the processor, printer, and disk drive).

software disk

See disk.

spool directory

Installation Description option which specifies the location of files to be printed by the Barr print spool.

spooling

Simultaneous Peripheral Operations Online. Spooling denotes a system that allows several independent flows of data to proceed concurrently. For example, files can be sent from disk to the host computer while other files are being printed. See also print spooling.

tab character

A character that causes the printer to advance to a tab stop.

TCP/IP

Transmission Control Protocol/Internet Protocol. A suite of protocols designed to allow communication between networks regardless of the technologies implemented in each network.

throughput rate

In printing applications, the rate of data transfer from the application, through the printer, onto paper.

timeout

An elapsed time period without a transmission or other expected event occurring.

token ring network

High-speed communication network that consists of physical equipment and architecture. This is the IBM architecture for LANs. The network is characterized by a ring structure with a single token continuously circling the ring.

translation

Process of converting from one coding convention to another.

transmit

To send data from one place to another.

transparent transmission

A variation of binary synchronous communication that allows transmission of all 256 characters.

UCS

Universal Character Set. Some printers (such as the IBM 3203 and IBM 3211) require loading a UCS Buffer to match the print train or band installed.

UNIX

An operating system for workstations developed by Bell Laboratories that features multiprogramming in a multi-user environment. It was originally developed for minicomputers but can now be used on mainframes and microcomputers.

VAX

A super-minicomputer made by Digital Equipment Corporation.

virtual route pacing (VPacing)

In SNA communications, pacing used to control data flow between the application and VTAM.

VM

IBM's Virtual Machine Operating System. A popular operating system for interactive computing. It creates a computing environment in which every user appears to have his own IBM 370 computer.

VSE/POWER

An S/390 operating systems program that simultaneously operates many readers, printers, and remote communications devices.

VTAM

Virtual Telecommunications Access Method. An IBM operating systems program that resides on the mainframe controlling SNA communications between the mainframe applications software and the remote terminals.

XPAF

Xerox Printer Access Facility.

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