



*Personal Computer
Personal Series*

SNA 3270 Emulation and RJE Support

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SNA 3270 Emulation and RJE Support

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Preface

This book explains how to use the IBM Personal Computer Systems Network Architecture (SNA) support programs for 3270 Emulation and Remote Job Entry (RJE) Support. It provides you with the following information about the programs:

- Equipment and program requirements
- How to set up a configuration file for your communication environment
- How to operate your IBM Personal Computer like a 3270 interactive terminal
- How to operate your IBM Personal Computer for remote job entry operations
- How to troubleshoot communication problems

Assumptions

This book assumes that you are already familiar with the communications and terminal operations for the particular host computer that you are connecting to. You should refer to your host manuals to understand how to use that computer. SNA 3270 Emulation and RJE Support use some of the features of the IBM Personal Computer DOS and Disk BASIC. At times we refer you to different sections of the DOS and BASIC books for more information.

Prerequisite Publications

- IBM Personal Computer *Guide to Operations*
- IBM Personal Computer *Disk Operating System*

Related Publication

The IBM Personal Computer *BASIC* book

Organization of This Book

This book consists of two separate parts:

Part 1. Chapters 1 through 4 describe 3270 Emulation.

Part 2. Chapters 5 through 8 describe Remote Job Entry (RJE) Support.

In addition, there are three appendixes to guide you through messages for both 3270 Emulation and RJE Support, help you troubleshoot communication problems, and tell you the differences between an IBM 3270 terminal and IBM Personal Computer 3270 Emulation.

Part 1. 3270 Emulation

Chapter 1 introduces 3270 Emulation.

Chapter 2 talks about getting ready to use 3270 Emulation.

Chapter 3 tells you how to set up a configuration file that matches your 3270 communication environment. It also tells you how to modify an existing configuration file.

Chapter 4 tells you how to start and end 3270 Emulation. It also describes how you use the keyboard and display for 3270-like functions.

Part 2. RJE Support

Chapter 5 introduces RJE Support.

Chapter 6 talks about getting ready to use RJE Support.

Chapter 7 tells you how to set up a configuration file that matches your RJE communication environment. It also tells you how to modify an existing configuration file.

Chapter 8 tells you how to start and end RJE Operation. It also tells you how to use RJE command statements to submit jobs to a host computer and receive output.

Appendixes

Appendix A lists unnumbered messages that you may encounter only during the start of 3270 Emulation or RJE Operation. The unnumbered messages are listed in alphabetical order for easy reference. It also lists numbered messages that you may encounter during 3270 Emulation and RJE Support. The numbered messages are listed in numerical order for easy reference.

Appendix B gives a general set of guidelines for performing problem determination for IBM Personal Computer/host communications. It also discusses the formatted communication trace for SNA and SDLC protocol. This appendix is to be used by experienced host system programmers.

Appendix C discusses differences between an IBM 3270 terminal and IBM Personal Computer 3270 Emulation.

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CHAPTER 1. INTRODUCTION TO 3270 EMULATION

What It Is

3270 Emulation is a group of programs and files that makes your IBM Personal Computer with a Synchronous Data Link Control (SDLC) Communications Adapter appear to be an IBM 3274 Model 51C Control Unit with one 3278-2 Display Station that can communicate with a variety of computer systems.

The computer that you will communicate with, called a *host* computer, must support IBM 3270 Systems Network Architecture (SNA). 3270 Emulation permits access to operating systems equipped with appropriate host interface equipment and programs. Access to these systems is over remote common carrier lines (switched) or local dedicated lines (nonswitched).

This means your IBM Personal Computer can perform and operate with the same set of host-supplied screens as an IBM 3270 terminal.

Be aware that this product emulates an IBM 3270 in most respects. However, differences between an IBM 3270 and the IBM Personal Computer emulation of an IBM 3270 do exist. You should carefully consider these differences prior to installing the 3270 Emulation Program. These differences could result in operational changes and/or required changes at the host computer. See Appendix C, "Differences Between an IBM 3270 and 3270 Emulation."

3270 Emulation consists of:

1. Configuration
2. Emulation

Configuration

Configuration sets up a configuration file for your unique communication environment. Even though most of your work is concerned with emulation, described next, you need a configuration file to start emulation. You need to set up a configuration file only once, but you can modify your configuration file if your communication environment changes.

Emulation

Emulation establishes a communication link with your host computer. Once this link is established, the data you enter from the keyboard is sent to your host computer. Alternately, messages are received from your host computer and displayed on the screen of your IBM Personal Computer. Thus, you interact with your host computer by sending messages, replying to messages, receiving information, and sending information.

What You Need

You need the following equipment, programs, and files to operate 3270 Emulation:

Equipment

- An IBM Personal Computer with at least 128K bytes of memory and at least one 160K byte diskette drive.
- A Synchronous Data Link Control (SDLC) Communications Adapter (1502090). See the IBM Personal Computer *Guide to Operations* for installation procedures.
- A Communications Adapter Cable (1502067).
- A modulator/demodulator (modem) for up to 4800 bps and a switched or nonswitched telephone line to match your host computer configuration.
- An IBM 80 CPS Matrix Printer if diagnostic or print operations will be used. Some host data streams may contain data that will not print correctly on a printer that supports only ASCII characters.
- An IBM Monochrome Display or other 80-column black and white monitor, or an 80-column color monitor and the Color/Graphics Monitor Adapter.

Programs and Files

- IBM Personal Computer Disk Operating System (DOS) diskette with Disk BASIC language (for 3270 configuration phase only)
- The SNA 3270 Emulation and RJE Support diskette containing the following programs and files:
 - For installation
 - 3270COPY.BAT – Batch command file for copying 3270 files
 - For configuration
 - C3270.BAT – Batch command file for configuration
 - SNACNFG.BAS – The 3270 Configuration Program
 - For emulation
 - 3270.BAT – Batch command file for emulation
 - 3270U.COM – The 3270 Communications Emulation Program
 - SNACAM.COM – The Communications Access Method
 - SDLC.DIA – The Communications SDLC Adapter Checkout Program

CHAPTER 2. GETTING READY TO USE EMULATION

Before you use emulation, you should read the information in the following sections:

- Organizing your 3270 programs and files
- Before you set up your configuration file

The information provided in these sections will help you to use 3270 Emulation successfully the first time through.

Organizing Your 3270 Programs and Files

The SNA 3270 Emulation and RJE Support diskette contains programs and batch command files for both 3270 Emulation and RJE Support. These programs require the IBM Personal Computer DOS and Disk BASIC. However, there is insufficient space on this diskette to include the IBM Personal Computer DOS and Disk BASIC. Thus, before you start emulation, you must organize your programs and files to fit on one diskette.

One approach is to create a diskette that contains only the DOS and Disk BASIC programs and the 3270 programs and files you need (see Chapter 6 if you want to use RJE programs and files instead).

You will need:

- **Your DOS diskette**
- **Your SNA 3270 Emulation and RJE Support diskette**
- **Two blank diskettes**
- **A felt-tip pen**
- **A supply of gummed labels**

Read through the instructions before you start. There are two sets of instructions: the first for a one-drive system, the second for a two-drive system.

For a One-Drive System

The procedure you are about to follow assumes you are starting with your system turned off.

1. Insert your DOS diskette into the drive.
2. Turn on the system.
3. After a few seconds, you will see a message on the screen asking you to enter today's date.

Type the date and then press the Enter key. For example, if today were July 6, 1982, you would enter **7-6-82**.

Your version of DOS may also ask for the time by responding:

Current time is 00:xx:xx.xx
Enter new time

Enter the time in the form *hh:mm:ss.xx* where *hh* is the hours, *mm* is the minutes, *ss* is the seconds, and *xx* is hundredths of a second. (You can omit the *:ss.xx* if you wish.)

For example, if the time were 10:45, you would enter **10:45**.

You should see a message like this on your screen:

The IBM Personal Computer DOS Version 1.10
(C)Copyright IBM Corp 1981,1982
A >

4. First, you should format two blank diskettes. To do this, insert your DOS diskette into the drive if it is not already there and type:

format b:

When the message **Insert new diskette for drive B: and strike any key when ready** appears, remove your DOS diskette and insert your first blank diskette into the drive.

When the message **Formatting . . . Format complete Format another (Y/N)?** appears, type **n** and remove your blank diskette. Label this diskette "SNA 3270 Emulation and RJE Support working diskette." Insert your DOS diskette into the drive and type:

format b:/s

When the message **Insert new diskette for drive B: and strike any key when ready** appears, remove your DOS diskette and insert your second blank diskette into the drive.

When the message **Formatting . . . Format complete Format another (Y/N)?** appears, type **n** and remove your blank diskette. Label this diskette "SNA 3270 program master diskette."

5. You are ready to make a working copy of your original SNA 3270 Emulation and RJE Support diskette. To do this, insert your original SNA 3270 Emulation and RJE Support diskette into the drive and type:

copy a:*. * b:

When the message **Insert diskette for drive B: and strike any key when ready** appears, remove your original SNA 3270 Emulation and RJE Support diskette. Insert your diskette labeled "SNA 3270 Emulation and RJE Support working diskette" into the drive and strike any key.

When the message **Insert diskette for drive A: and strike any key when ready** appears, remove your SNA 3270 Emulation and RJE Support working diskette. Insert your original SNA 3270 Emulation and RJE Support diskette into the drive and strike any key. Keep inserting your original SNA 3270 Emulation and RJE Support diskette (for drive A) and your SNA 3270 Emulation and RJE Support working diskette (for drive B) until the message **File(s) copied** appears.

Store your original SNA 3270 Emulation and RJE Support diskette as a backup and use your diskette labeled "SNA 3270 Emulation and RJE Support working diskette."

6. Copy BASIC.COM from your DOS diskette to your diskette labeled "SNA 3270 program master diskette." To do this, insert your DOS diskette into the drive and type:

copy basic.com b:

When the message **Insert diskette for drive B: and strike any key when ready** appears, remove your DOS diskette. Insert your diskette labeled "SNA 3270 program master diskette" into the drive and strike any key.

When the message **File(s) copied** appears, remove your SNA 3270 program master diskette.

7. Copy the 3270 programs from your SNA 3270 Emulation and RJE Support working diskette to your SNA 3270 program master diskette. To do this, insert your SNA 3270 Emulation and RJE Support working diskette into the drive and type:

3270copy

When the message **Insert diskette for drive A: and strike any key when ready** appears, just strike a key.

The system responds:

**The 3270 programs will now be copied to drive B
Strike any key when ready . . .**

When the message **Insert diskette for drive B:
and strike any key when ready** appears,
remove your SNA 3270 Emulation and RJE
Support working diskette. Insert your diskette
labeled “SNA 3270 program master diskette” into
the drive and strike any key.

When the message **Insert diskette for drive A:
and strike any key when ready** appears,
remove your SNA program master diskette. Insert
your diskette labeled “SNA 3270 Emulation and
RJE Support working diskette” into the drive and
strike any key. Keep inserting your SNA 3270
Emulation and RJE Support working diskette (for
drive A) and your SNA 3270 program master
diskette (for drive B) until the following message
appears:

**Your program diskette should now contain the following
3270 programs:**

C3270.BAT	SNACNFG.BAS	3270.BAT
3270U.COM	SNACAM.COM	SDLC.DIA

If you see an error message you do not understand or
if you need more information on the DOS commands,
see the IBM Personal Computer *Disk Operating System*
book.

You may now go on to “Before Setting Up Your
Configuration File” in this chapter.

For a Two-Drive System

The procedure you are about to follow assumes you are starting with your system turned off.

1. Insert your DOS diskette into drive A.
2. Turn on the system.
3. After a few seconds, you will see a message on the screen asking you to enter today's date.

Type the date and then press the Enter key. For example, if today were July 6, 1982, you would enter **7-6-82**.

Your version of DOS may also ask for the time by responding:

Current time is 00:xx:xx.xx
Enter new time

Enter the time in the form *hh:mm:ss.xx* where *hh* is the hours, *mm* is the minutes, *ss* is the seconds, and *xx* is hundredths of a second. (You can omit the *:ss.xx* if you wish.)

For example, if the time were 10:45, you would enter **10:45**.

You should see a message like this on your screen:

The IBM Personal Computer DOS Version 1.10
(C)Copyright IBM Corp 1981,1982
A >

4. first, you should format two blank diskettes. Note that if you have an IBM Personal Computer with a 160K byte diskette as drive A and a 320K byte diskette as drive B, you must use **format b:/1** to format a diskette that you can use in either drive. To do this, leave your DOS diskette in drive A. Insert your first blank diskette into drive B and type:

format b: or format b:/1

When the message **Insert new diskette for drive B: and strike any key when ready** appears, just strike a key.

When the message **Formatting . . . Format complete Format another (Y/N)?** appears, type **n** and remove your first diskette. Label this diskette "SNA 3270 Emulation and RJE Support working diskette." Insert your second blank diskette into drive B and type:

format b:/s or format b:/s/1

When the message **Insert new diskette for drive B: and strike any key when ready** appears, just strike a key.

When the message **Formatting . . . Format complete Format another (Y/N)?** appears, type **n** and remove your second diskette. Label this diskette "SNA 3270 program master diskette."

5. You are ready to make a working copy of your original SNA 3270 Emulation and RJE Support diskette. To do this, remove your DOS diskette. Insert your original SNA 3270 Emulation and RJE Support diskette into drive A, insert your diskette labeled "SNA 3270 Emulation and RJE Support working diskette" into drive B and type:

copy a:.* b:

When the copy is completed, the message **File(s) copied** appears.

Store your original SNA 3270 Emulation and RJE Support diskette as a backup and use your SNA 3270 Emulation and RJE Support working diskette.

6. Copy BASIC.COM from your DOS diskette to your diskette labeled "SNA 3270 program master diskette." To do this, insert your DOS diskette into drive A. Insert your diskette labeled "SNA 3270 program master diskette" into drive B and type:

copy basic.com b:

When the copy is completed, the message **File(s) copied** appears.

7. Copy the 3270 programs from your SNA 3270 Emulation and RJE Support working diskette to your diskette labeled "SNA 3270 program master diskette." To do this, remove your DOS diskette. Insert your diskette labeled "SNA 3270 Emulation and RJE Support working diskette" into drive A. Leave your SNA 3270 program master diskette in drive B and type:

3270copy

The system responds:

**The 3270 programs will now be copied to drive B:
Strike any key when ready . . .**

When completed, the system responds:

**Your program diskette should now contain the following
3270 programs:**

C3270.BAT	SNACNFG.BAS	3270.BAT
3270U.COM	SNACAM.COM	SDLC.DIA

If you see an error message you do not understand or if you need more information on the DOS commands, see the IBM Personal Computer *Disk Operating System* book.

Before Setting Up Your Configuration File

Before setting up your configuration file, you should contact your host system programmer for information about your communication environment, such as information about:

- Line type
- Line mode
- SDLC station address
- NRZI mode
- Local address
- Station ID

You need all of this and other information that describes your communication environment to communicate successfully with your host computer. By supplying this information, you set up a *configuration file* that matches your communication environment.

Questions You Must Answer

Each of the following questions is discussed in detail in the section, “Answering the Configuration File Questions” in Chapter 3. If you do not know the answers for the questions, you should contact your host system programmer for the answers before you start configuration. When you contact your host system representative, tell them that the unique block number for your IBM Personal Computer is hex 03D. The block number is different for other SNA devices. The program already contains *supplied answers* for the questions. These supplied answers were included because they represent the most common communication environment.

Line Type

What type of communication line do you have? On a *switched* line, you have to dial the host computer to make the line connection. On a *nonswitched* line, the line is always connected so you do not have to dial the host computer. *Switched is the supplied answer.*

Line Mode

Does your communication line need turnaround or constant request to send? You must determine if you have a full-or half-duplex modem and if your modem supports constant request to send. Your choice here must match the line mode at your host computer. *Line turnaround required is the supplied answer.*

SDLC Station Address

What is the SDLC station address assigned to the IBM Personal Computer in your network? You must enter two hexadecimal digits for the station address.

Hex C1 is the supplied answer. Hex 00 is reserved as the null (no station) address and hex FF is reserved as the broadcast address; these are not valid entries. The valid range is hex 01 to hex FE.

NRZI Mode

Will you use NRZI (non-return-to-zero inverted)? Your choice here must match the NRZI setting at your host computer. *Use NRZI is the supplied answer.*

Local Address

What is the local address assigned to your IBM Personal Computer. The local address is the Destination Address Field (DAF) number in your transmission header. You must enter two hexadecimal digits for this field. *Hex 02 is the supplied answer.* The valid range is hex 01 to hex FF.

Station ID

What is the station identification of your IBM Personal Computer? You must enter five hexadecimal digits for the station ID. *Hex 00000 is the supplied answer.* The valid range is hex 00000 to hex FFFFF.

Key Assignment

Do you want your keys assigned the functions shown on the 3270 template or do you want to reassign the function of some of the keys. The key assignment functions shown on the 3270 template are the supplied template assignments.

CHAPTER 3. SETTING UP YOUR 3270 CONFIGURATION FILE

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Notes:

CHAPTER 3. SETTING UP YOUR 3270 CONFIGURATION FILE

To set up your configuration file, you simply start configuration and supply the answers to a few questions. After you answer all of the questions, the information about your communication environment is saved in a file that you name. You will specify this filename when you start emulation.

If any part of your communications environment changes, you have to modify your configuration file or set up a new file. See “Modifying Your Configuration File” in this chapter for more information.

CONFIGURATION

Before Setting Up Your Configuration File

Before setting up your configuration file, we suggest that you read Chapter 2, “Getting Ready to Use Emulation.” The information in Chapter 2 will help you to set up your configuration file successfully the first time through.

Starting Configuration

Configuration is a separate program that does not perform any communications. Thus, you do not need to worry about such things as connecting your communication adapter to your modem or dialing the phone.

Configuration operates under DOS and requires Disk BASIC. The batch command file (C3270.BAT), which is supplied on your SNA 3270 Emulation and RJE Support diskette, assumes that Disk BASIC and the 3270 Configuration Program (SNACNFG.BAS) are on the diskette loaded on the DOS default drive.

If you have not yet copied these programs and files onto one diskette, see “Organizing Your 3270 Programs and Files” in Chapter 2.

Note: There are two ways to start DOS, depending on whether your computer is powered on or off. We are assuming that your computer is powered on.

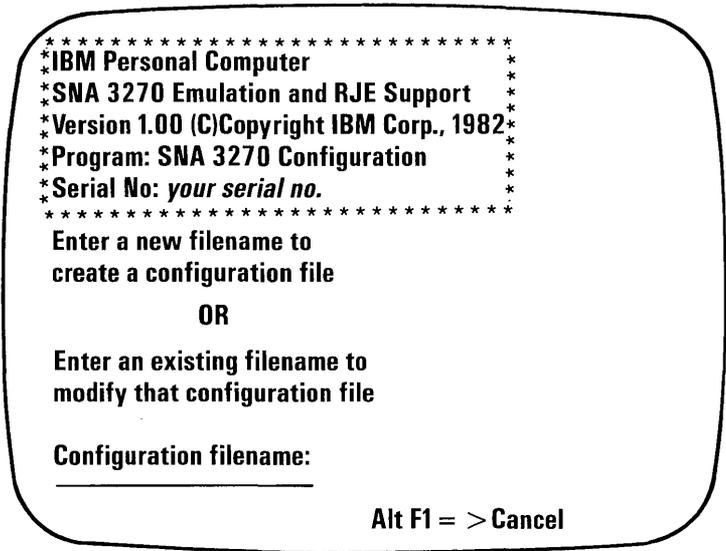
To start configuration, follow these steps:

1. Insert your 3270 program working diskette into the DOS default drive.
2. Press and hold both the Ctrl and Alt keys; then press the Del key. Release the three keys. This procedure is known as *System Reset*. Enter the date when prompted. (Your version of DOS may also prompt for the time.)
3. In response to the DOS prompt **A >** , type:

C3270

This loads the 3270 Configuration Program (SNACNFG.BAS) into your computer’s memory.

You then see the following screen:



At this point, you either create a new configuration file or specify the name of a file you previously created, which you can then modify.

CONFIGURATION

The format for the configuration filename is:

[*d*:] *filename*

where

d: is the drive. If *d* is not specified, the DOS default drive is assumed.

filename any alphanumeric name containing 1 to 8 characters.

You cannot specify an extension here since **.cfg** is automatically appended as the filename extension. Thus, only filenames with the extension **.cfg** can be created or modified.

You enter the filename by pressing the Enter key after typing the name.

Note: You can cancel configuration and return to DOS at any point by pressing and holding the Alt key and then pressing the F1 key. If you were creating a configuration file, no file is created. If you were modifying a configuration file, the file is not changed.

The next screen is different depending on whether you are creating a new configuration file or modifying an existing one. If the filename you enter is new (that is, it does not exist on the file), you are creating a new configuration file. In this case, just go on to the next section, "Creating a Configuration File."

If the filename you enter already exists, you can modify the existing file. In this case, see "Modifying Your Configuration File" later in the chapter.

Creating Your Configuration File

The Summary Screen

After you have entered a new configuration filename, you see the following screen:

CONFIGURATION FILE *yourfile* BEING CREATED

1 – Line type	Switched
2 – Line mode	Line turnaround required
3 – SDLC station address	C1
4 – NRZI mode	Use NRZI
5 – Local address	02
6 – Numeric lock	Disabled
7 – Audible alarm	Enabled
8 – Station ID	00000
9 – Key assignments	Standard

Press Enter to continue ___
or F4 to save the file.

Alt F1 = > Cancel

CONFIGURATION

This screen, called the *summary screen*, shows all of the questions and the supplied answers. For example, the first question on the summary screen is **Line type** for which the supplied answer of **Switched** is given.

From the summary screen you can:

- Select to be prompted for each question
- Print the summary screen with the supplied answers or your own answers
- Save the file with the supplied answers or your own answers
- Cancel without creating a configuration file

Selecting to be Prompted for Each Question

Press Enter to be prompted for each question. Now, you have the choice of typing your answers or taking the supplied answers. You see all of the options available to you or the valid limit range for each answer. You are prompted to answer all of the questions before you see the summary screen again.

Printing the Summary Screen

If you have a printer, press and hold the Shift key and then press the PrtSc key to print the summary screen with the supplied answers. You do this to get a printed copy of your configuration file. Normally, you would do this just before you save the file.

Saving the File

Press the F4 key to save the file with the supplied answers shown. By doing this, you save your configuration information in the file that you named. You return to DOS.

Cancelling Without Creating a File

Press and hold the Alt key and then press the F1 key to cancel configuration without creating a file. You return to DOS.

Answering the Configuration File Questions

This section describes each of the configuration file questions that you are asked on the screen. The cursor is positioned under the supplied answer for each question. To answer a question, just type your answer and press the Enter key. The screen then displays the next question. If you want the supplied answer, just press the Enter key.

If you make a typing error, an error message appears on the bottom of the screen. Press the Enter key to continue. See Appendix A for information on error messages.

When you press Enter from the summary screen, you see the following question screens.

Line Type

CONFIGURATION FILE *yourfile* BEING CREATED

Line type

- 1. Switched**
- 2. Nonswitched**

1

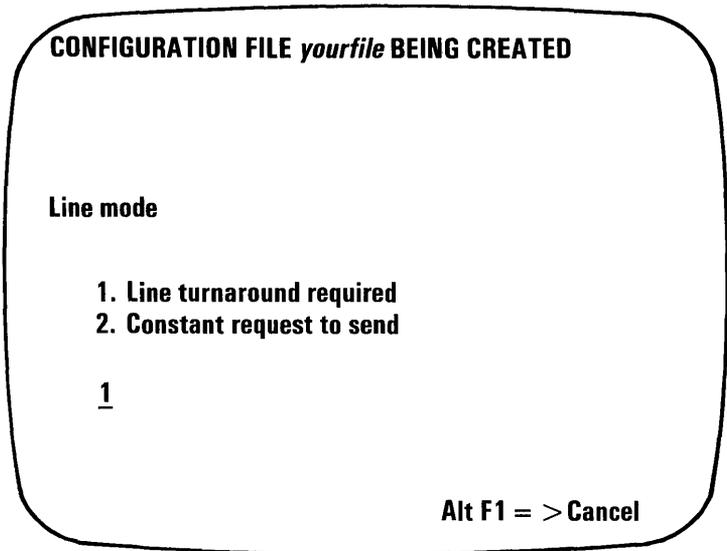
Alt F1 = > Cancel

- Select option **1** if your communication line is a switched (dialed) line. *This is the supplied answer.*
- Select option **2** if your communication line is a nonswitched (leased) line.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

Line Mode



CONFIGURATION

- Select option **1** if your modem is not capable of full-duplex operation. *This is the supplied answer.* Option 1 may also be selected for any modem that is capable of full-duplex operation. Though the IBM Personal Computer cannot use full-duplex operation with SNA communications, you can use a full-duplex modem.
- Select option **2** only if your modem is capable of full-duplex operation and supports constant request to send. Selecting option 2 can improve performance by decreasing line turnaround time.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

SDLC Station Address

CONFIGURATION FILE *yourfile* BEING CREATED

SDLC station address	Valid input: 2 hexadecimal digits
<u>C1</u>	Limit range: 01 to FE

Alt F1 = > Cancel

On this screen, you enter two hexadecimal digits for the SDLC station address assigned to the IBM Personal Computer. *Hex C1 is the supplied answer.* The valid range is hex 01 to hex FE. You should contact your host system programmer for the SDLC address.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

NRZI Mode

CONFIGURATION FILE *yourfile* BEING CREATED

NRZI mode

- 1. Use NRZI**
- 2. Do not use NRZI**

1

Alt F1 = > Cancel

CONFIGURATION

- Select option **1** if non-return-to-zero inverted (NRZI) is to be used. *This is the supplied answer.*
- Select option **2** if NRZI is not to be used.

You should contact your host system programmer for the NRZI mode.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

Local Address

CONFIGURATION FILE *yourfile* BEING CREATED

Local address	Valid input: 2 hexadecimal digits
<u>02</u>	Limit range: 01 to FF

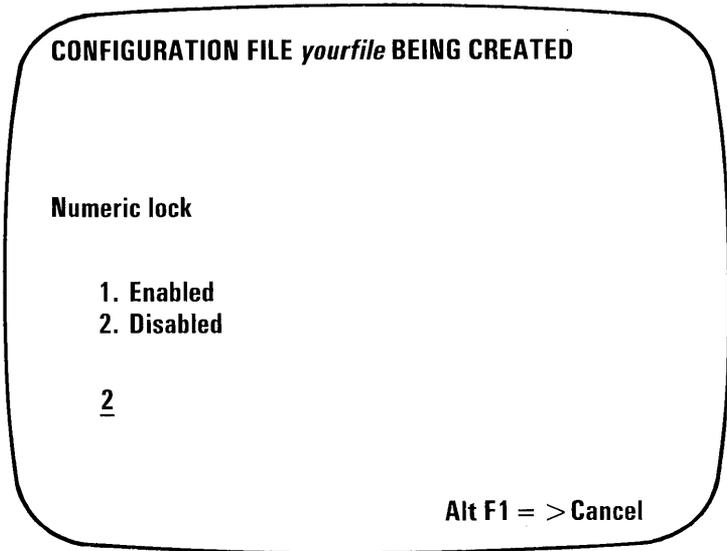
Alt F1 = > Cancel

On this screen, you enter two hexadecimal digits for the local address assigned to your IBM Personal Computer. The local address is the Destination Address Field (DAF) number in your transmission header. *Hex 02 is the supplied answer.* The valid range is hex 01 to hex FF. You should contact your host system programmer for your local address.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

Numeric Lock



The numeric lock feature allows certain fields on the screen (defined by the program as numeric fields) to accept only the characters: decimal 0 to 9, period (.), plus sign (+), minus sign (-), and DUP.

- Select option 1 if you would like the numeric fields on the screen to accept only the characters described above.
- Select option 2 if you would like the numeric fields to accept any character. *This is the supplied answer.*

Press Enter to complete your answer or press and hold the Alt key and then press F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

Audible Alarm

CONFIGURATION FILE *yourfile* BEING CREATED

Audible alarm

- 1. Enabled**
- 2. Disabled**

1

Alt F1 = > Cancel

During emulation, your IBM Personal Computer's audible alarm can be sounded by a host command. The audible alarm can also be sounded by command from the keyboard whenever you enter a character in the next-to-last position of the screen.

- Select option **1** if you want the host and the 3270 keyboard to sound the alarm. *This is the supplied answer.*
- Select option **2** if you do not want the host and the 3270 keyboard to sound the alarm.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

Station ID

CONFIGURATION FILE *yourfile* BEING CREATED

Station ID	Valid input: 5 hexadecimal digits
<u>00000</u>	Limit range: 00000 to FFFFF

Alt F1 = > Cancel

CONFIGURATION

On this screen, you enter five hexadecimal digits for your IBM Personal Computer's station identification. *Hex 00000 is the supplied answer.* The valid range is hex 00000 to hex FFFFF.

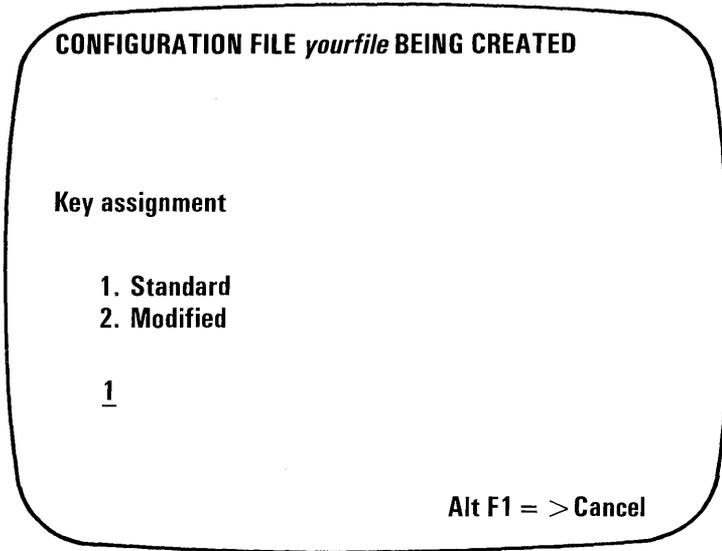
You should contact your host system programmer for your station identification.

Note: On a leased line, if your host does not use station IDs, then set this field to hex 00000.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

Key Assignment



On this screen, you either select the values shown on the 3270 template or choose to reassign the values of some of the keys. The keyboard and the 3270 template are explained in detail in the section “Keyboard Layout and Usage” in Chapter 4.

If you select option **1**, the keys are assigned the values shown on the 3270 template. *This is the supplied answer.*

Note: all previously reassigned key values will be returned to the values shown on the 3270 template.

If you select option **2**, you will see two more screens that will allow you to reassign the values of certain keys.

The keys on the first screen are:

- F1 through F10
- Alt-F1 through Alt-F10

The keys on the second screen are:

- Ctrl-F1 through Ctrl-F10
- The numeric key pad 0 through 9 and the period (.)

Note: If you reassign a key value, the new summary screen will show *modified* rather than *standard* for your key assignment value.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

Key Definition Values

CONFIGURATION FILE *yourfile* BEING CREATED

Key definition values are:

00 = Undefined	09 = PF9	18 = PF18	27 = PA3	36 = Print trace
01 = PF1	10 = PF10	19 = PF19	28 = Dup	37 = Cursor up
02 = PF2	11 = PF11	20 = PF20	29 = Field mark	38 = Cursor down
03 = PF3	12 = PF12	21 = PF21	30 = Clear	39 = Cursor left
04 = PF4	13 = PF13	22 = PF22	31 = Erase input	40 = Cursor right
05 = PF5	14 = PF14	23 = PF23	32 = Erase EOF	41 = Home
06 = PF6	15 = PF15	24 = PF24	33 = Color	42 = Reset
07 = PF7	16 = PF16	25 = PA1	34 = Attn	43 = Insert
08 = PF8	17 = PF17	26 = PA2	35 = Sys req	44 = Delete

Enter your key assignments:

F1 thru F10
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10

25 30 26 00 27 32 28 34 29 00

Alt F1 thru F10
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10

00 00 00 31 00 33 00 35 00 36

Alt F1 = > Cancel

On this screen, you enter two numeric digits for each reassigned value for the F1 through F10 keys and the Alt-F1 through Alt-F10 keys. *The key assignment values shown on this screen are the standard template assignments.*

For example, if you want to reassign the function of the F3 key from PA2 (value 26) to Print trace (value 36), do the following:

1. Using your Cursor Right key, position your cursor at the 2 below the F in F3.
2. Type in 36.
3. Press Enter.

Note: if you reassign a key function, you should mark the change on your template.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

Key Definition Values

CONFIGURATION FILE *yourfile* BEING CREATED

Key definition values are:

00 = Undefined	09 = PF9	18 = PF18	27 = PA3	36 = Print trace
01 = PF1	10 = PF10	19 = PF19	28 = Dup	37 = Cursor up
02 = PF2	11 = PF11	20 = PF20	29 = Field mark	38 = Cursor down
03 = PF3	12 = PF12	21 = PF21	30 = Clear	39 = Cursor left
04 = PF4	13 = PF13	22 = PF22	31 = Erase input	40 = Cursor right
05 = PF5	14 = PF14	23 = PF23	32 = Erase EOF	41 = Home
06 = PF6	15 = PF15	24 = PF24	33 = Color	42 = Reset
07 = PF7	16 = PF16	25 = PA1	34 = Attn	43 = Insert
08 = PF8	17 = PF17	26 = PA2	35 = Sys req	44 = Delete

Enter your key assignments:

Ctrl F1 thru F10	Numeric Keypad
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10	1 2 3 4 5 6 7 8 9 0 .
00 00 00 00 00 00 00 00 00	42 38 00 39 00 40 41 37 00 43 44
_	

Alt F1 = > Cancel

On this screen, you enter two numeric digits for each reassigned value for the Ctrl-F1 through Ctrl-F10 keys, the numeric keypad 0 through 9 keys, and the period (.) key. *The key assignment values shown on this screen are the standard template assignments.*

For example, if you want to reassign the function of the 3 key from undefined (value 00) to PA1 (value 25), do the following:

1. Using your Cursor Right key, position your cursor at the first 0 below numeric 3.
2. Type 25.
3. Press Enter.

Note: You should always have a Reset key assigned. If you reassign a key function, you should mark the change on your template.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

The New Summary Screen

At the end of the sequence of question screens, you see a new summary screen with all of your specific answers. (The following screen shows all of the questions with the supplied answers.)

CONFIGURATION FILE *yourfile* BEING CREATED

1 – Line type	Switched
2 – Line mode	Line turnaround required
3 – SDLC station address	C1
4 – NRZ1 mode	Use NRZI
5 – Local address	02
6 – Numeric lock	Disabled
7 – Audible alarm	Enabled
8 – Station ID	00000
9 – Key assignment	Standard

Enter number of item to change ____
or press F4 to save the file.

Alt F1 = > Cancel

Saving Your Configuration File

The configuration file you are creating is not yet saved. To save your file, do the following:

1. Press Shift-PrtSc if you want to print the screen first.
2. Press the F4 key to save the answers shown on your summary screen as your configuration file. The following message appears on the screen:

File *yourfile* created

After you save your configuration file, you can go back and change any of your answers. To do this, see the next section, “Modifying Your Configuration File.”

If you do not want to save the file, you can cancel without creating a file by pressing the Alt-F1 keys.

Modifying Your Configuration File

You can modify your configuration file anytime. You merely follow the steps under “Starting Configuration” earlier in this chapter and when you see the DOS prompt **A >**, type **c3270**. Then enter your filename on the first configuration screen. You see the following screen:

CONFIGURATION FILE *yourfile* BEING CREATED

1 – Line type	Switched
2 – Line mode	Line turnaround required
3 – SDLC station address	C1
4 – NRZ1 mode	Use NRZI
5 – Local address	02
6 – Numeric lock	Disabled
7 – Audible alarm	Enabled
8 – Station ID	00000
9 – Key assignment	Standard

Enter number of item to change ___
or press **F4** to save the file.

Alt F1= > Cancel

All of the questions and your current answers appear on the summary screen. (This screen just shows the supplied answers.) From this screen you:

1. Type the number of the item that you want to change. Press the Enter key.

The next screen you see is the particular question you selected. The question screen is the same one shown when you were creating your configuration file. This screen shows all of the options available or the limit ranges and your current answer. If you are still satisfied with your current answer, just press the Enter key. To change your answer, just type your new choice and press the Enter key.

The summary screen is then reshown with the new, current answer. Each time the summary screen is shown, you may select another question to change.

2. Print the summary screen if you want by pressing Shift-PrtSc. This provides you with a printed copy of your new configuration file answers. Normally, you would do this just before you save the file.
3. Press the F4 key to save the file with the answers as shown. When you do this, you are replacing your old file with a new file containing your changes. The following message appears on the screen:

File *yourfile* modified

You return to DOS.

4. Press and hold the Alt key and then press the F1 key to cancel without modifying your configuration file. Your configuration file will remain the same. You return to DOS.

Notes:

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Notes:

CHAPTER 4. 3270 EMULATION

What It Does

Emulation allows you to perform interactive operations at your keyboard/display with a host computer as if you were using an IBM 3278 keyboard/display.

The following items are characteristics of emulation:

Control Unit

The IBM Personal Computer appears to the host as an IBM 3274 Model 51C, logical unit type 2, Control Unit. Because emulation provides data stream translation, host application programs generally require few or no changes to support the IBM Personal Computer as an IBM 3270.

Data transmitted from the host is supported in an IBM 3270 data stream compatible format. Operation can be on switched or nonswitched communications lines.

Display/Keyboard

The IBM Personal Computer display and keyboard appear to the host computer as an IBM 3278 Model 2 Display Station. The following selected items are supported:

- Twenty-four 3270 program function keys
- Three PA keys
- Local print key
- Audible alarm

- 3270 keyboard numeric lock
- Status displayed on 25th line
- 41 definable function keys
- Monochrome and color modes

Note: Emulation operates only like the display and control unit models described above. Not all IBM 3270 features are supported. See Appendix C, “Differences Between an IBM 3270 and 3270 Emulation.”

Some of the functions that emulation performs are:

- Communicating with you in IBM Personal Computer mode, such as handling keystrokes, displaying data on the screen, and allowing you to print data with the print keys (Shift-PrtSc).
- Sending screen images to the host by building IBM 3270 data streams.
- Processing IBM 3270 commands from the host, that is, writing to the screen, reading from the screen, and sending screen images to the printer.
- Resolving contention between keystrokes and IBM 3270 data streams from the host. Emulation wins contention.

Keyboard Layout and Usage

This section describes the use of the keys on the IBM Personal Computer during 3270 emulation.

An emulation keyboard template is provided in one of the plastic pockets in the back of the book. You should have it available and place it on the ledge above your keyboard for quick and easy reference.

A copy of the emulation keyboard template is provided in the back of the book that you may reproduce.

The keyboard is divided into four areas:

1. The typewriter area in the middle
2. Twenty-four program function keys on the top row used in conjunction with Alt and Alt-Shift
3. Standard function keys on the left and right sides
4. 3270 emulation function keys on the left and right sides

Typewriter Keyboard

The typewriter area of the keyboard uses a standard typewriter layout for letters, numbers, and special characters. Capital letters and the special characters shown above the numbers on the row of number keys are typed by holding down either of the Shift keys, or pressing the Caps Lock key once, and then pressing the desired key. These characters are displayed on the screen at the current cursor position as they are typed.

Program Function Keys

Program Function (PF) keys may have special meaning to your host application program. You obtain your PF keys as follows:

PF keys	Press and hold this key	Then press
1 through 12	Alt	The top row of numeric keys 1 through =

PF keys	Press and hold these keys	Then press
13 through 24	Alt and shift (or Caps Lock)	The top row of numeric keys 1 through =

Characters corresponding to these keys are not displayed on the screen but are sent to your host application to perform their special programmed function.

You can reassign your PF keys to the function keys (F1 through F10 or the numeric key pad) by changing the standard assignments in your configuration file (see the Key Assignment configuration screen in Chapter 3). You might do this, for example, so that you could press only one key to perform a PF key function.

Standard Function Keys

During emulation, these keys perform the same function on your IBM Personal Computer keyboard. A few differences in function occurring during configuration or emulation are noted.



(Backspace) Moves the cursor one position to the left and removes one character for each keystroke. Note that during emulation, it does not remove a character for each keystroke.

Caps Lock Sets or releases the upshift function for all alphabetic keys. Note that during emulation, this key gives you the upshift function on all keys.

Ctrl-Break (Control Break) Ends emulation.

Ctrl-Alt-Del (System Reset) Reloads DOS.



(Backtab) Moves the cursor to the first character location of the current field. If the cursor is currently at the first character location of a field, it moves the cursor to the first character location of the previous unprotected field.



(Forward Tab) Moves the cursor to the first character location of the next unprotected data field.



(Delete) Deletes the character at the cursor position. Characters to the right of the cursor within the same field and on the same line are shifted to the left one character.



Moves the cursor to the first unprotected character location on the screen.



(Insert) Sets the keyboard to insert mode so that characters can be entered at the current cursor position and all data will move to the right starting from the cursor position to the end of the field. Press the Ins key again to release the keyboard from insert mode.



(Cursor Down) Moves the cursor down one line.



(Cursor Left) Moves the cursor one position to the left.



(Cursor Right) Moves the cursor one position to the right.



(Cursor Up) Moves the cursor up one line.



(Enter) Moves the cursor from the last character on one line to the first character of the next line. Note that during configuration, Enter is used to record your answer, move you to the next question screen, and reset error messages.



(Shift) Performs the upshift function for all keys. You must hold the key while you type a character.

PrtSc

Prints the screen image on the attached printer.

Emulation Function Keys

During emulation, these keys perform special functions on your IBM Personal Computer keyboard.

3270 Emulation Key	IBM Personal Computer Key	Function
Attn	F8	Sends a signal command with a sense code of <i>request change direction</i> to request that the host allow you a chance to send data to it.
Color	Alt-F6	<p>Alternates between the color mode (red, white, blue, green) and the monochrome mode (white, green) each time you press the keys.</p> <p>Note: For color attributes, see Figure 1, "Colors, Derived from Field Attributes" below.</p>
Clear	F2	Clears the screen and sets the cursor to row 1, column 1.
Dup	F7	Inserts the dup character code (L) into the current field with a tab to the next field.
Erase EOF	F6	Clears the character at the current cursor position and all of the following positions in the current field.

3270 EMULATION

3270 Emulation Key	IBM Personal Computer Key	Function
Erase Input	Alt-F4	Clears all unprotected character locations to nulls, resets Modified Data Tags (MDTs), and repositions the cursor.
Field Mark	F9	Inserts a field mark character code (▲) into the current field.
New Line	+	Moves the cursor to the next line for input.
PA1	F1	Requests host program attention.
PA2	F3	Requests host program attention.
PA3	F5	Requests host program attention.
Print Trace	Alt-F10	Prints the formatted trace table. (See the section, "How to Print the Formatted Trace Table" in Appendix B.)
Reset	End	Clears input inhibited condition and insert mode and unlocks the keyboard.
Sys Req	Alt-F8	Swaps LU-LU and SSCP-LU modes.

Field Attribute

Color Switch
Monochrome **Color**

Unprotected, normal intensity	Green	Green
Unprotected, intensified	White	Red
Protected, normal intensity	Green	Blue
Protected, intensified	White	White

Figure 1. Colors Derived from Field Attributes

Display Screen

Status Line

During emulation, the status line presents terminal and session status to you on the 25th line of the display screen. The status information is displayed as follows:

SYS.AVAIL AA| INP .INH BB|MODE CC DD| |ERROR NNNN
--

Note: All keywords are highlighted.

where:

AA = LL - LU to LU session state
LS - LU to SSCP session state
?? - Session state not available

BB = SL - System lock
TM - System time
MC - Machine check
CC - Communications check
PC - Program check
NA - Not accepted
FN - Function not supported
PF - Protected field
EF - End of field
NF - Numeric field

CC = IN - Insert mode

DD = UC - Uppercase mode

NNNN = Error number

A detailed explanation of these information codes follows.

SYS.AVAIL AA

When the display screen is in the System Available state, *AA* indicates the reason.

Values of *AA*:

- LL** LU to LU — Your 3270 emulation session is connected to the display station.
- LS** LU to SSCP — The system operator (SSCP Control Program) session owns the display screen. Except for the Enter key, the Program Attention keys are not functional when this code is displayed.
- ??** Session state not available — The display station is connected to the host system but not to your 3270 emulation session nor to the system operator (SSCP control program). The Sys Req key has been pressed, but since the display is not connected to the LU-LU session, it cannot be switched to the LU-LU session.

INP.INH *BB*

When the display screen is in the Input Inhibited state, *BB* indicates the reason.

Values of *BB*:

- CC** Communication Check — An attempt was made to communicate with the host and a communication link error was detected. Data cannot be sent. Press the Reset key. This code is accompanied by the error code that defines the probable cause of the problem. The audible alarm is sounded. (See Appendix A for specific error information.)

- EF** End of Field — You have attempted to enter too much information into a field. The audible alarm is sounded. You should press the Reset key to unlock the keyboard and correct the entry.

- FN** Function not Supported — A currently unavailable function was requested (unsupported keystroke). You should press the Reset key to unlock the keyboard.

- MC** Machine Check — The display is not working properly or the emulation program contains bad data. The machine check code is accompanied by an error code that defines the probable cause of the problem. Recovery procedures depend upon the type of error. (Refer to Appendix A for additional information.)

- NA** Not Accepted — The last input was not accepted. This code appears when keystrokes are being queued and the capacity of the queue is exceeded. (The queue is not processed in this case.) Because of uncertainty about what was accepted, you should check the contents of the screen before repeating the operation. The audible alarm is sounded.

- NF** Numeric Field — This code appears when the numeric lock is enabled and you made a nonnumeric entry at a display screen location reserved for numeric information. The audible alarm is sounded. You should press the Reset key to unlock the keyboard. Retry the operation.
- PC** Program Check — A programming error was detected in the data received by the control unit. You should press the Reset key and retry the operation. This code is accompanied by an error code that indicates the probable cause of the problem. The audible alarm is sounded.
- PF** Protected Fields — The protected field code appears when an attempt is made to enter, insert, erase, or delete a character with the cursor in a protected field or at an attribute location. The audible alarm is sounded. You should press the Reset key and take the appropriate action, such as moving the cursor.
- SL** System Lock — The application program has disabled the keyboard following an entry. The system lock code appears when the application program has replied to the last message you sent and is requesting you to send the next message. At this time, however, the host has not unlocked the keyboard. When you see SL press Reset to restore the keyboard.
- TM** System Time — The Print Trace (Alt-F10) keys, the PrtSc key, or the Enter key was pressed.

MODE *CC DD*

When the display screen is a certain mode, *CC* and *DD* indicate the reason.

Value of *CC*:

IN Insert — The keyboard is in insert mode. A character may be inserted at the cursor location. Characters to the right of the cursor position move right to make room for the inserted character. You set **IN** by pressing the **Ins** key and reset **IN** by pressing either the **Reset** key, the **Ins** key again, or any key that is sent to the host application (**PF** keys, **PA** keys, **Clear**, **Sys Req**, **Attn**, and **Enter**).

Value of *DD*:

UC Uppercase — The keyboard is in upshift mode. You set **UC** by pressing the **Caps Lock** key and reset **UC** by pressing the **Caps Lock** key again.

ERROR *NNNN*

When an error occurs, an error number and message are shown on the screen. *NNNN* is a 4-digit number that indicates the reason.

If a machine check, communication check, or program check exists, then **Input Inhibited** is displayed. The error number displayed is the reason for the inhibited state. Appendix A explains the error codes.

Starting Emulation

Note: There are two ways to start DOS, depending on whether your computer is powered on or off. We assume that your computer is powered on.

To start emulation, you do these steps:

1. Make sure your SDLC adapter and cable are connected to your telephone modem.
2. Insert your 3270 program diskette that you created in the section, “Organizing Your 3270 Programs and Files,” in Chapter 2 into the DOS default drive.
3. Press and hold both the Ctrl and Alt keys; then press the Del key. Release the three keys. This procedure is known as *System Reset*. Enter the date when prompted. (Your version of DOS may also prompt you for the time.)
4. In response to the DOS prompt **A >** , type:

3270

Press Enter. This loads the 3270 programs (S3270U.COM, SNACAM.COM, and SDLC.DIA) into your computer’s memory.

You then see the message:

```
*****  
* IBM Personal Computer *  
* SNA 3270 Emulation and RJE Support *  
* Version 1.00 (C)Copyright IBM Corp., 1982 *  
* Program: SNA 3270 Emulation *  
* Serial No: your serial no. *  
*****
```

Enter configuration filename (drive optional)

—

5. You must now specify the name of your configuration file. The format for the configuration filename is:

[d:]filename

where:

d: is the drive. If *d* is not specified, the DOS default drive is assumed.

filename is the name of the file created during configuration. The system generates the extension **.cfg**. You do not need to specify the extension.

Type the filename and press Enter. The configuration file is then loaded into memory and your IBM Personal Computer is now ready to operate as a 3270.

Once you become familiar with 3270 emulation, you can try simpler ways to start emulation, for example:

- a. You can specify your configuration filename as a part of the 3270 command. Enter the command as follows:

3270 [*d:*] *your configuration filename*

If you enter your configuration filename this way, you are not prompted for the configuration filename.

- b. You can modify the batch command file (3270.BAT) to name your configuration file internally by replacing the DOS dummy parameter (%1) with your configuration filename. Then you will not be prompted for the configuration filename. Then you need to specify only **3270** to start emulation.
- c. You could rename the batch command file (3270.BAT) to AUTOEXEC.BAT. Then, your 3270 programs will be started every time you start DOS.

You then see the message:

Establish connection if necessary

6. If you are connected to your host computer by a switched modem, you must now dial the phone number of the host computer. When you hear the answer tone (a high-pitched sound) you must press the data button on your modem. You can then hang up the phone (the connection will be maintained). If you have any questions about this part of the connection, ask your host operator or telephone company representative.

When the connection has been made, the characters **SYS.AVAIL XX** appear on the status line. If **SYS.AVAIL LS** or **LL** does not appear on the display status line, refer to Appendix B, "Troubleshooting Communications Problems."

If you are connected to your host computer by a leased line and the **Establish connection if necessary** message remains on the screen, you should check with your host system representative or your telephone company representative to determine the cause of the problem.

Your computer is now emulating a 3270. You should respond to the information being presented to you from the host application. You need to know something about the host application you are connected to. For example, your first response may be to enter logon data and special access codes. The requirements of the host application are beyond the scope of this book. If you need information about the host application, contact your host system programmer.

Ending Emulation

To end emulation, do the following steps:

1. Enter the logoff command that conforms to your host requirements to end your session with your host computer. For the format of the appropriate command, see the applicable host manual.
2. Press Ctrl-Break to end emulation. You see:

3270 Emulation completed

The status line goes blank and then displays the DOS prompt **A >** (for switched lines, there is a delay of a few seconds before this occurs). You must reload the program and re-dial on a switched line if you want to restart emulation.

Note: If you were running the formatted trace program, you must press Ctrl-Break once to end the trace. Control returns to emulation. Then, you press Ctrl-Break again to end emulation.

Notes:

[Faint, illegible handwritten notes]

PART 2. RJE SUPPORT

NOTES:

CHAPTER 5. INTRODUCTION TO RJE SUPPORT

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CHAPTER 5. INTRODUCTION TO RJE SUPPORT

What It Is

Remote Job Entry (RJE) Support is a group of programs and files that make your IBM Personal Computer with a Synchronous Data Link Control (SDLC) Communications Adapter appear to be a 3770 terminal that can communicate with a variety of computer systems.

The computer that you will communicate with, called a *host* computer, must support remote job entry. RJE Support permits access to operating systems equipped with appropriate host interface equipment and programs. Access to these systems is over remote common carrier lines (switched) or local leased lines (nonswitched). The lines can be either point-to-point or multipoint.

RJE Support consists of:

1. Configuration
2. Operation

Configuration

Configuration sets up a configuration file for your unique communication environment. Even though most of your work is concerned with operation, you need a configuration file to start operation. You need to set up a configuration file only once. Also, you can modify your configuration file if your communication environment changes.

Operation

Operation establishes a communication link with your host computer. Once this link is established, you can send jobs to your host computer and receive job output from your host computer. Thus, you interact with your host computer. Operational information may be displayed and scrolled up on your screen. The *status line* presents terminal and session status to you on the 25th line of the display screen. Error information also appears on the status line. Special control keys allow you to stop the display from scrolling or end operation.

What You Need

You need the following equipment, programs, and files to operate RJE Support:

Equipment

- An IBM Personal Computer with at least 128K bytes of memory and at least one 160K byte diskette drive.
- A Synchronous Data Link Control (SDLC) Communications Adapter (1502090). See the IBM Personal Computer *Guide to Operations* for installation procedures.
- A Communications Adapter Cable (1502067).
- A modulator/demodulator (modem) and a switched or nonswitched telephone line to match your host computer configuration.
- An IBM 80 CPS Matrix Printer if diagnostic or print operations will be used. Some host data streams may contain data that will not print correctly on a printer that supports only ASCII characters.
- An IBM Monochrome Display or other 80-column black and white monitor, or an 80-column color monitor and a Color/Graphics Monitor Adapter.

Programs and Files

- An IBM Personal Computer Disk Operating System (DOS) diskette with Disk BASIC language (for RJE configuration only)
- The SNA 3270 Emulation and RJE Support diskette containing the following programs and files:
 - For installation
 - SRJECOPY.BAT – Batch command file for copying SRJE jobs
 - For configuration
 - CSRJE.BAT – Batch command file for RJE configuration
 - SNACNFG.BAS – The RJE Configuration Program
 - For operation
 - SRJE.BAT – Batch command file for RJE operation
 - SRJEU.COM – The RJE Communications Program
 - SNACAM.COM – The Communications Access Method
 - SDLC.DIA – The Communications SDLC Adapter Checkout Program

CHAPTER 6. GETTING READY TO USE RJE SUPPORT

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Notes:

CHAPTER 6. GETTING READY TO USE RJE SUPPORT

Before you use RJE Support, you should read the information in the following sections:

- Organizing your RJE programs and files
- Before you set up your configuration file

The information provided in these sections will help you to use RJE Support successfully the first time through.

Organizing Your RJE Programs and Files

The SNA 3270 Emulation and RJE Support diskette contains programs and batch command files for both 3270 Emulation and RJE Support. These programs require the IBM Personal Computer DOS. However, there is insufficient space on this diskette to include the IBM Personal Computer DOS. Thus, before you start to set up your configuration file, you must organize your programs and files to fit on one diskette.

One approach is to create a diskette that contains only the DOS programs and the RJE programs and files you need. (See Chapter 2 if you want to use 3270 programs and files instead.)

You will need:

- Your DOS diskette
- Your SNA 3270 Emulation and RJE Support diskette
- Two blank diskettes
- A felt-tip pen
- A supply of gummed labels

Read through the instructions before you start. There are two sets of instructions: the first for a one-drive system, the second for a two-drive system.

For a One-Drive System

The procedure you are about to follow assumes you are starting with your system turned off.

1. Insert your DOS diskette into the drive.
2. Turn on the system.
3. After a few seconds, you will see a message on the screen asking you to enter today's date.

Type the date and then press the Enter key. For example, if today were July 6, 1982, you would enter **7-6-82**.

Your version of DOS may also ask for the time by responding:

Current time is 00:xx:xx.xx
Enter new time

Enter the time in the form *hh:mm:ss.xx* where *hh* is the hours, *mm* is the minutes, *ss* is the seconds, and *xx* is hundredths of a second. (You can omit the *:ss.xx* if you wish.)

For example, if the time were 10:45, you would enter **10:45**.

You should see a message like this on your screen:

The IBM Personal Computer DOS Version 1.10
(C)Copyright IBM Corp 1981,1982
A >

4. First, you should format two blank diskettes. To do this, insert your DOS diskette into the drive if it is not already there and type:

format b:

When the message **Insert new diskette for drive B: and strike any key when ready** appears, remove your DOS diskette. Insert your first blank diskette into the drive and strike any key.

When the message **Formatting . . . Format complete Format another (Y/N)?** appears, type **n** and remove your blank diskette. Label this diskette "SNA 3270 Emulation and RJE Support working diskette." Insert your DOS diskette into the drive and type:

format b:/s

When the message **Insert new diskette for drive B: and strike any key when ready** appears, remove your DOS diskette. Insert your second blank diskette into the drive and strike any key.

When the message **Formatting . . . Format complete Format another (Y/N)?** appears, type **n** and remove your blank diskette. label this diskette "SNA RJE program master diskette."

5. You are ready to make a working copy of your original SNA 3270 Emulation and RJE Support diskette. To do this, insert your original SNA 3270 Emulation and RJE Support diskette into the drive and type:

copy a:*. * b:

When the message **Insert diskette for drive B: and strike any key when ready** appears, remove your original SNA 3270 Emulation and RJE Support diskette. Insert your diskette labeled "SNA 3270 Emulation and RJE Support working diskette" into the drive and strike any key.

When the message **Insert diskette for drive A: and strike any key when ready** appears, insert your original SNA 3270 Emulation and RJE Support diskette into the drive and strike any key. Keep inserting your original SNA 3270 Emulation and RJE Support diskette (for drive A) and your SNA 3270 Emulation and RJE Support working diskette (for drive B) until the message **File(s) copied** appears.

Store your original SNA 3270 Emulation and RJE Support diskette as a backup and use your diskette labeled "SNA 3270 Emulation and RJE Support working diskette."

6. Copy BASIC.COM from your DOS diskette to your diskette labeled "SNA RJE program master diskette." To do this, insert your DOS diskette into the drive and type:

copy basic.com b:

When the message **Insert diskette for drive B: and strike any key when ready** appears, remove your DOS diskette. Insert your diskette labeled "SNA RJE program master diskette" into the drive and strike any key.

When the message **File(s) copied** appears, remove your SNA RJE program master diskette.

7. Copy the RJE programs from your SNA 3270 Emulation and RJE Support working diskette to your SNA RJE program master diskette. To do this, insert your diskette labeled "SNA 3270 Emulation and RJE Support working diskette" into the drive and type:

srjecopy

When the message **Insert diskette for drive A: and strike any key when ready** appears, just strike a key.

The system responds:

**The SNA RJE programs will now be copied to drive B:
Strike any key when ready . . .**

When the message **Insert diskette for drive B and strike any key when ready** appears, remove your SNA 3270 Emulation and RJE Support working diskette. Insert your diskette labeled "SNA RJE program master diskette" into the drive and strike any key.

When the message **Insert diskette for drive A: and strike any key when ready** appears, remove your SNA 3270 Emulation and RJE Support working diskette. Insert your diskette labeled "SNA 3270 Emulation and RJE Support working diskette" into the drive and strike any key. Keep inserting your SNA 3270 Emulation and RJE Support working diskette (for drive A) and your SNA RJE program master diskette (for drive B) until the following message appears:

Your program diskette should now contain the following RJE programs:

CSRJE.BAT	SNACNFG.BAS	SRJE.BAT
SRJEU.COM	SNACAM.COM	SDLC.DIA

If you see an error message you do not understand or if you need more information on the DOS commands, see the IBM Personal Computer *Disk Operating System* book.

You may now go on to "Before Setting Up Your Configuration File" in this chapter.

For a Two-Drive System

The procedure you are about to follow assumes you are starting with your system turned off.

1. Insert your DOS diskette into drive A.
2. Turn on the system.
3. After a few seconds, you will see a message on the screen asking you to enter today's date.

Type the date and then press the Enter key. For example, if today were July 6, 1982, you would enter **7-6-82**.

Your version of DOS may also ask for the time by responding:

**Current time is 00:xx:xx.xx
Enter new time**

Enter the time in the form *bb:mm:ss.xx* where *bb* is the hours, *mm* is the minutes, *ss* is the seconds, and *xx* is hundredths of a second. (You can omit the *:ss.xx* if you wish.)

For example, if the time were 10:45, you would enter **10:45**.

You should see a message like this on your screen:

**The IBM Personal Computer DOS Version 1.10
(C)Copyright IBM Corp 1981,1982
A >**

4. First, you should format two blank diskettes. Note that if you have an IBM Personal Computer with a 160K byte diskette as drive A and a 320K byte diskette as drive B, you must use **format b:/1** to format a diskette that you can use in either drive. To do this, leave your DOS diskette in drive A. Insert your first blank diskette into drive B and type:

format b: or **format b:/1**

When the message **Insert new diskette for drive B: and strike any key when ready** appears, just strike a key.

When the message **Formatting . . . Format complete Format another (Y/N)?** appears, type **n** and remove your first diskette. Label this diskette "SNA 3270 Emulation and RJE Support working diskette." Insert your second diskette into drive B and type:

format b:/s or **format b:/s/1**

When the message **Insert new diskette for drive B: and strike any key when ready** appears, just strike a key.

When the message **Formatting . . . Format complete Format another (Y/N)?** appears, type **n** and remove your second diskette. Label this diskette "SNA RJE program master diskette."

5. You are ready to make a working copy of your original SNA 3270 Emulation and RJE Support diskette. To do this, remove your DOS diskette. Insert your original SNA 3270 Emulation and RJE Support diskette into drive A. Insert your diskette labeled "SNA 3270 Emulation and RJE Support working diskette" into drive B and type:

copy a:*. * b:

When the copy is completed, the message **File(s) copied** appears.

Store your original SNA 3270 Emulation and RJE Support diskette as a backup in a safe place and use your SNA 3270 Emulation and RJE Support working diskette.

6. Copy BASIC.COM from your DOS diskette to your diskette labeled "SNA RJE program master diskette." To do this, insert your DOS diskette in drive A. Insert your diskette labeled "SNA RJE program master diskette" in drive B and type:

copy basic.com b:

When the copy is completed, the message **File(s) copied** appears.

7. Copy the RJE programs from your SNA 3270 Emulation and RJE Support working diskette to your diskette labeled "SNA RJE program master diskette." To do this, insert your diskette labeled "SNA 3270 Emulation and RJE Support working diskette" in drive A. Leave your SNA RJE program master diskette in drive B and type:

srjcopy

The system responds:

**The SNA RJE programs will now be copied to drive B:
Strike any key when ready . . .**

Strike any key. When completed, the system responds:

**Your program diskette should now contain the following
SNA RJE programs:**

**CSRJE.BAT
SRJEU.COM**

**SNACNFG.BAS
SNACAM.COM**

**SRJE.BAT
SDLC.DIA**

If you see an error message you do not understand or if you need more information on the DOS commands, see the IBM Personal Computer *Disk Operating System* book.

Before Setting Up Your Configuration File

Before setting up your configuration file, you should contact your host system programmer for information about your communication environment, such as information about:

- Line type
- Line mode
- SDLC station address
- NRZI mode
- Auto readfile
- Local address
- Station ID
- Logon data

You need all this and other information that describes your communication environment to communicate successfully with your host computer. By supplying this information, you set up a *configuration file* that matches your communication environment.

Questions You Must Answer

The following questions are discussed in detail in the section, “Answering the Configuration File Questions,” in Chapter 7. If you do not know the answers for these questions, you should contact your host system programmer for the answers before you start configuration. When you contact your host system programmer, tell them that the unique block number of your IBM Personal Computer is hex 03D. The block number is different for other SNA devices. The program already contains *supplied answers* for the questions. These supplied answers were included because they represent the most common communication environment.

Line Type

What type of communication line do you have? On a *switched* line, you have to dial the host computer to make the line connection. On a *nonswitched* line, the line is always connected so you do not have to dial the host computer. *Switched is the supplied answer.*

Line Mode

Does your communication line need turnaround or constant request to send? You must determine if you have a full- or half-duplex modem and if your modem supports constant request to send. Your choice here must match the line mode at your host computer. *Line turnaround required is the supplied answer.*

SDLC Station Address

What is the SDLC station address assigned to your IBM Personal Computer? You must enter two hexadecimal digits for the SDLC station address.

Hex C1 is the supplied answer. Hex 00 is reserved as the null (no station) address and hex FF is reserved as the broadcast address; these are not valid entries. The valid range is hex 01 to hex FE.

NRZI Mode

Will you use NRZI (non-return-to-zero inverted)? Your choice here must match the NRZI setting at your host computer. *Use NRZI is the supplied answer.*

AUTO READFILE

Do you want to enter an automatic readfile name? You create a readfile using the DOS EDLIN program. A readfile contains host commands and/or RJE command statements. These commands are processed as soon as your logon has been accepted by the host. If you include your readfile name in your configuration file, your readfile will be automatically processed whenever you start RJE operations. An example of a readfile is:

```
.. m pul = d  
  
.. m prl = p  
  
XXXXX  
  
XXXXX  
  
.. eof
```

where:

.. m is an RJE command statement that assigns and changes the devices you can use to transmit and receive data. See the "MODIFY Command Statement" in Chapter 8 for more information.

XXXXX could be host commands to start a punch, a host job, or to change forms for the printer. The **XXXXX** commands would be sent to the host as a card input stream.

.. eof must be the last record in the input file if you do not want to send any more readfiles with the initial one.

If you do not want to set up a readfile now, you can add a readfile name to your configuration file later.

Local Address

What is the local address assigned to your IBM Personal Computer? The local address is the Destination Address Field (DAF) number in your transmission header. You must enter two hexadecimal digits for this field. The valid range is hex 01 to hex FF. *Hex 01 is the supplied answer.*

Station ID

What is the station identification assigned to your IBM Personal Computer? You must enter five hexadecimal digits for the station ID. The valid range is hex 00000 to hex FFFFF. *Hex 00000 is the supplied answer.*

Logon Data

Do you want an automatic logon? *Logon* is a procedure required by most host computers to establish a communication session between the host and a terminal. The logon data can be up to 80 characters in length. If you include your logon data in your configuration file, your logon will be automatically entered whenever you start RJE operations.

For the format of the appropriate logon, see the applicable host manual.

Notes:

CHAPTER 7. SETTING UP YOUR RJE CONFIGURATION FILE

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Notes:

CHAPTER 7. SETTING UP YOUR RJE CONFIGURATION FILE

To set up your configuration file, you simply start configuration and supply the answers to a few questions. After you answer all of the questions, the information about your communication environment is saved in a file that you name. You will specify this filename later when you start RJE operation.

If any part of your communication environment changes, you either modify your configuration file or set up a new file. See “Modifying Your Configuration File” in this chapter for more information.

Before Setting Up Your Configuration File

Before starting RJE configuration, we suggest that you read Chapter 6, “Getting Ready to Use RJE Support.” The information in Chapter 6 will help you to set up your RJE configuration file successfully the first time through.

Starting RJE Configuration

Configuration is a separate program that does not perform any communications. Thus, you do not need to worry about such things as connecting your communication adapter to your modem or dialing the phone.

Configuration operates under DOS and requires Disk BASIC. The batch command file (CSRJE.BAT), which is supplied on the SNA RJE Emulation and RJE Support diskette, assumes that Disk BASIC and your RJE Configuration Program (SNACNFG.BAS) are on the diskette loaded on the DOS default drive.

If you have not yet copied these programs and files onto one diskette, see "Organizing Your RJE Programs and Files" in Chapter 6.

Note: There are two ways to start DOS, depending on whether your computer is powered on or off. We are assuming that your computer is powered on.

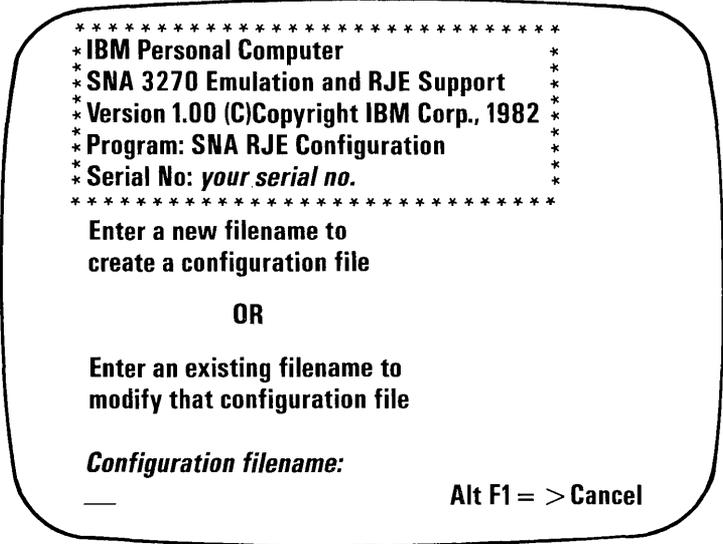
To start RJE configuration, follow these steps:

1. Insert your RJE program working diskette in the DOS default drive.
2. Press and hold both the Ctrl and the Alt keys; then press the Del key. Release the three keys. This procedure is known as *System Reset*. Enter the date when prompted. (Your version of DOS may also prompt you for the time.)
3. In response to the DOS prompt **A >**, type:

```
csrje
```

This loads the RJE Configuration Program (SNACNFG.BAS) into your computer's memory.

You then see the following screen:



At this point, you either create a new configuration file or specify the name of a file you previously created, which you can then modify.

The format for the configuration filename is:

[*d*:]*filename*

where:

d: is the drive. If *d* is not specified, the DOS default drive is assumed.

filename is any alphanumeric name containing 1 to 8 characters.

You cannot specify an extension here since **.cfg** is automatically appended as the filename extension. Thus, only filenames with the extension **.cfg** can be created or modified.

You enter the filename by pressing the Enter key after typing the name.

Note: You can cancel configuration and return to DOS at any point by pressing and holding the Alt key and then pressing the F1 key.

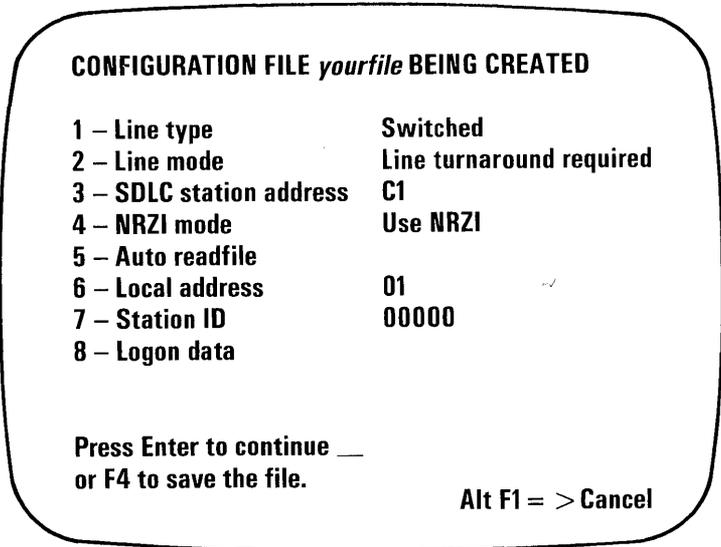
The next screen is different depending on whether you are creating a new configuration file or modifying an existing one. If the filename you enter is new (that is, it does not exist on the file), you are creating a new configuration file. In this case, just go on to the next section, "Creating Your Configuration File."

If the filename you enter already exists, you can modify this existing configuration file. In this case, see "Modifying Your Configuration File" later in this chapter.

Creating Your Configuration File

The Summary Screen

After you have entered a new configuration filename, you see the following screen:



This screen, called the *summary screen*, shows all of the configuration questions and their supplied answers. For example, the first question on the summary screen is **Line type** for which a supplied answer of **Switched** is given.

From the summary screen, you can do the following:

- Select to be prompted for each question
- Print the summary screen with the supplied answers or your own answers
- Save the file with the supplied answers or your own answers
- Cancel without creating a file

Selecting to be Prompted for Each Question

Press Enter to be prompted for each question. Now, you have the choice of typing your answers or taking the supplied answers. You see all of the options available to you or the valid limit range for each answer. You are prompted to answer all of the questions before you see the summary screen again.

Printing the Summary Screen

If you have a printer, press and hold the Shift key and then press the PrtSc key to print the summary screen. You do this to get a printed copy of your configuration file. Normally, you would do this just before you save the file.

Saving the File

Press the F4 key to save the file with the answers shown. By doing this, you save your configuration information in the file that you named. You return to DOS.

Cancelling without Creating a File

Press and hold the Alt key and then press the F1 key to cancel configuration without creating a file. You return to DOS.

Answering the Configuration File Questions

This section describes each of the configuration file questions that you are asked on the screen. The cursor is positioned under the supplied answer for each question. To answer a question, just type your answer and press the Enter key. The screen then displays the next question. If you want the supplied answer, just press the Enter key.

If you make a typing error, an error message appears on the bottom of the screen. Press the Enter key to continue. See Appendix A for information on error messages.

When you press Enter from the summary screen you see all of the following question screens.

Line Type

CONFIGURATION FILE *yourfile* BEING CREATED

Line type

- 1. Switched**
- 2. Nonswitched**

1

Alt F1 = > Cancel

- Select option **1** if your communication line is a switched (dialed) line. *This is the supplied answer.*
- Select option **2** if your communication line is a nonswitched (leased) line.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

Line Mode

CONFIGURATION FILE *yourfile* BEING CREATED

Line mode

1. Line turnaround required
2. Constant request to send

1

Alt F1 = > Cancel

- Select option **1** if your modem is not capable of full-duplex operation. *This is the supplied answer.* Option 1 may also be selected for any modem that is capable of full-duplex operation. Although the IBM Personal Computer cannot use full-duplex operation with SNA communications, you can use a full-duplex modem.
- Select option **2** only if your modem is capable of full-duplex operation and supports constant request to send. Selecting option 2 improves performance by decreasing line turnaround time.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

SDLC Station Address

CONFIGURATION FILE *yourfile* BEING CREATED

SDLC station address	Valid input: 2 hexadecimal digits
<u>C1</u>	Limit range: 01 to FE

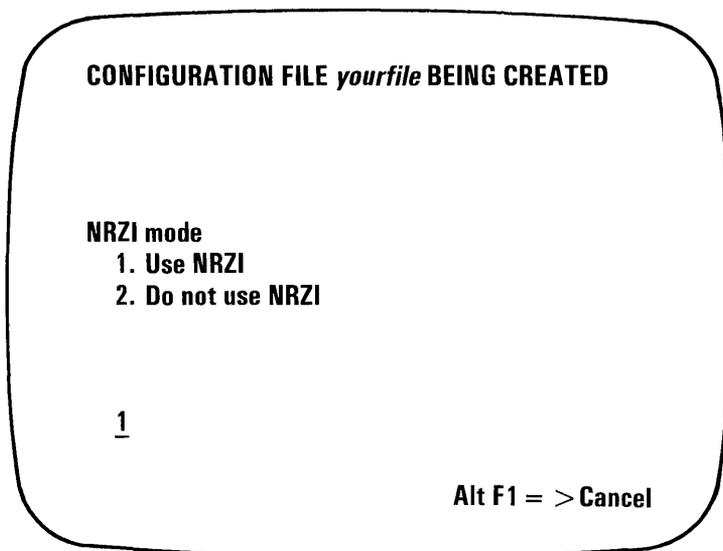
Alt F1 = > Cancel

On this screen, you enter two hexadecimal digits for the station address assigned to your IBM Personal Computer. *Hex C1 is the supplied answer.* The valid range is hex 01 to hex FE. You should contact your host system programmer for your SDLC station address.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

NRZI Mode

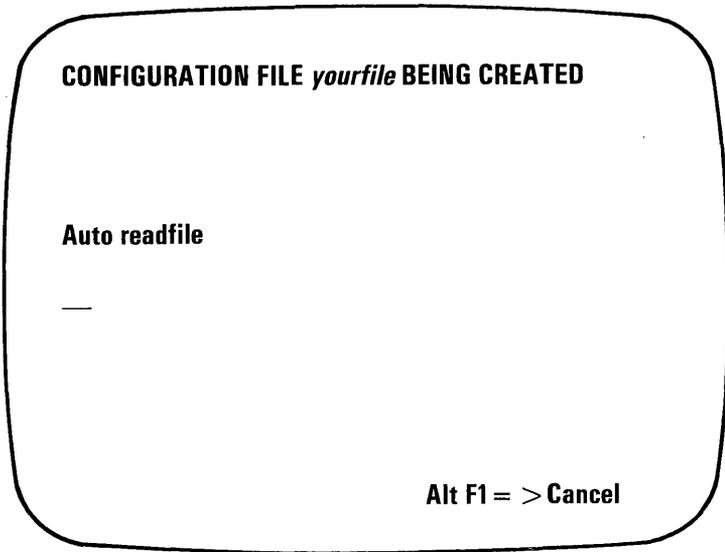


- Select **1** if non-return-to-zero inverted (NRZI) is to be used. *This is the supplied answer.*
- Select **2** if NRZI is not to be used.

You should contact your host system programmer for the NRZI mode.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.



On this screen, you can enter your automatic readfile name. The readfile name can consist of an optional drive designation, an alphanumeric name containing 1 to 8 characters, and an optional filename extension, for example, [*d:*]*filename*[.ext]. You are not required to enter an automatic readfile name.

If you specify an automatic readfile here, RJE will process your readfile as an initial command. See the section “Command Processing” in Chapter 8 for further information.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

Local Address

CONFIGURATION FILE *yourfile* BEING CREATED

Local address	Valid input: 2 hexadecimal digits
<u>01</u>	Limit range: 01 to FF

Alt F1 = > Cancel

On this screen, you enter two hexadecimal digits for the local address assigned to your IBM Personal Computer. The local address is the Destination Address Field (DAF) number in your transmission header. *Hex 01 is the supplied answer.* The valid range is hex 01 to hex FF. You should contact your host system programmer for the local address.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

Station ID

CONFIGURATION FILE *yourfile* BEING CREATED

Station ID	Valid input: 5 hexadecimal digits
<u>00000</u>	Limit range: 00000 to FFFFF

Alt F1 = > Cancel

On this screen, you enter your IBM Personal Computer's station ID. *Hex 00000 is the supplied answer.* The valid range is hex 00000 to hex FFFFF. Enter five hexadecimal digits for the station ID.

You should contact your host system programmer for the station ID.

Note: If your host does not use station IDs on a leased line, set this field to hex 00000.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

Logon Data

CONFIGURATION FILE *yourfile* BEING CREATED

Logon data **Optional: 1 to 80 characters**

Alt F1 = > Cancel

On this screen, you enter the logon information. It can be up to 80 characters in length. A logon entry is not required, but if you enter this information here, it will always be provided automatically when you start RJE operation.

Press Enter to complete your answer or press and hold the Alt key and then press the F1 key to cancel configuration without creating a configuration file.

If you make an error, press the Enter key to continue.

The New Summary Screen

At the end of the sequence of question screens, you see the new summary screen with all of your specific answers. (This screen shows all of the questions with the supplied answers.)

CONFIGURATION FILE *yourfile* BEING CREATED

1 - Line type	Switched
2 - Line mode	Line turnaround required
3 - SDLC station address	C1
4 - NRZI mode	Use NRZI
5 - Auto readfile	
6 - Local address	01
7 - Station ID	00000
8 - Logon data	

Enter number of item to change ____
or press F4 to save the file.

Alt F1 = > Cancel

Saving Your Configuration File

The configuration file you are creating is not yet saved. To save your file, do the following:

1. Press Shift-PrtSc if you want to print the screen first.
2. Press the F4 key to save the answers shown on your summary screen as your configuration file. The following message appears on the screen:

File *yourfile* created

After you save your configuration file, you can go back and change any of your answers. To do this, see the next section, “Modifying Your Configuration File.”

If you do not want to save the file, you can cancel without creating a file by pressing the Alt-F1 keys.

MODIFYING YOUR CONFIGURATION FILE

You can modify your configuration file anytime. You merely follow the steps under “Starting RJE Configuration” earlier in this chapter and when you see the DOS prompt **A >** type **csrje**. Then enter your filename on the first configuration screen. You see the following screen:

CONFIGURATION FILE *yourfile* BEING MODIFIED

1 – Line type	Switched
2 – Line mode	Line turnaround required
3 – SDLC station address	C1
4 – NRZI mode	Use NRZI
5 – Auto readfile	
6 – Local address	01
7 – Station ID	00000
8 – Logon data	

Enter number of item to change ____
or press F4 to save the file.

Alt F1 = > Cancel

All of the questions and your current answers appear on the summary screen. (This screen just shows the supplied answers.) From this screen you:

1. Type the number of the item you want to change. Press the Enter Key.

The next screen you see is the particular question you selected. The question screen is the same one shown when you were creating your configuration file. This screen shows all of the options available or the limit ranges and your current answer. If you are still satisfied with your current answer, just press the Enter key. To change your answer, just type your new choice and press the Enter key.

The summary screen is then reshown with the new, current answer. Each time the summary screen is shown, you may select another question to change.

2. If you have a printer, print the screen by pressing and holding Shift and then pressing the PrtSc key. This provides you with a printed copy of your new configuration file answers. Normally, you would do this just before you save the file.
3. Press the F4 key to save the file with the answers as shown. When you do this, you are replacing your old file with a new file containing your changes. The following message appears on the screen:

File *yourfile* modified

You return to DOS.

4. Press and hold the Alt key and then press the F1 key to cancel without modifying your configuration file. Your configuration file will remain the same. You return to DOS.

Notes:

CHAPTER 8. RJE OPERATION

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CHAPTER 8. RJE OPERATION

What It Does

RJE operation enables your IBM Personal Computer to submit jobs to an IBM host computer using SDLC link protocol. Your IBM Personal Computer serves as a Remote Job Entry (RJE) work station in your network. Your jobs are processed by the host computer. Your job output can be directed back to your IBM Personal Computer, another RJE terminal in your communication network, or other host computer input/output devices.

You can run RJE operation on the same line that you use for your SNA 3270 work. This reduces your line requirements.

RJE operation communicates with your host computer using ASCII or EBCDIC code and supports text transparency. *Text transparency* lets you send and receive data that contains all of the 256 characters in the EBCDIC code.

RJE operation transmits and receives data streams. A *data stream* consists of data sent between your IBM Personal Computer and the host. A data stream can be:

- A stream sent to the host
 - Console stream
 - Reader stream
- A stream received from the host
 - Print stream
 - Punch or exchange stream
 - Console stream

RJE operation processes command statements. *Command statements* control RJE execution. They are not part of the console or reader streams transmitted to the host. These statements allow you to:

- Assign input/output devices on the IBM Personal Computer
- Identify files to be transmitted
- Control some printer operations
- Specify the end of a job stream

RJE operation provides statistics at the end of each session that contain the number of records sent to the host in the reader stream and the number of records received from the host in the print, punch, and exchange streams.

Special Key Functions

Special key functions consist of the following:

- Keys that perform standard functions on your IBM Personal Computer during RJE operation
- Keys that perform special functions on your IBM Personal Computer during RJE operation

Standard Function Keys

During RJE operation, these keys perform their normal functions on your IBM Personal Computer.

Key(s)	Function
	(Enter) Enters a line of data from the keyboard to RJE.
Ctrl-Alt-Del	Restarts DOS. This is also called <i>System Reset</i> .
Ctrl-Break	Ends RJE operation.
Ctrl-Num Lock	Stops scrolling on the display screen. Press any key to restart scrolling.
Shift-PrtSc	Prints a copy of the display screen on the printer.

RJE Operation Function Keys

During RJE operation, these keys perform special functions on your IBM Personal Computer.

Key(s)	Function
Alt-F10	(Print Trace) Prints the formatted trace table (see “Formatted Communications Trace” in Appendix B).
End	Stops an error code from blinking and continues execution.

Sending Data Streams to the Host

You can send data streams to the host from either of the following devices:

- Keyboard
- Diskette

Keyboard Input

You can enter data streams and command statements from the keyboard for RJE processing. To do this, just type the data and press Enter. Each time you press Enter, you are entering a line of data or a record for RJE processing. You can enter as many as eighty characters. If you press Enter without typing any characters, you have entered zero characters, that is, entered a blank line. All characters over eighty are ignored.

What happens to this line of data you have entered? It is either transmitted directly to the host or, if it is a command statement, it is processed by RJE and not transmitted to the host.

Data streams are transmitted directly to the host as:

- Console streams
- Reader streams

Console Stream

A *console stream* is used to send host commands and operator messages to the host.

Reader Streams

A *reader stream* is composed of JCL statements and data. (Some hosts also accept and process host commands contained in reader streams.) Lines of data that you enter from the keyboard can form a reader stream. You specify the keyboard as the reader by using the MODIFY command statement. See the “MODIFY Command Statement” later in this chapter for more information.

To end a reader stream, use the EOF command statement. See the “EOF Command Statement” later in this chapter for more information.

Diskette Input

You can enter reader streams and RJE command statements from a diskette file for RJE processing. To do this, you enter a READFILE command statement from the keyboard. You enter parameters on the READFILE command statement that specify the *filespec* and how RJE is to process each record in that file. See the “READFILE Command Statement” later in this chapter for more information.

Transparent Processing

Transparent processing means that the data is transmitted to the host exactly as it is in the file. Data is sent as 80-byte records. The last record is padded with zeros. All RJE command statements are treated as data.

Non-Transparent Processing

Non-transparent processing means that the file is processed as if it were created by the DOS Line Editor (EDLIN) program, that is, as if it contained variable length records. See the DOS manual for details on how to use the EDLIN program. Records of less than 80 bytes are padded with blanks and sent to the host as 80-byte records. Eighty-byte records are sent to the host as 80-byte records. Records greater than 80 bytes are separated and sent as 80-byte records.

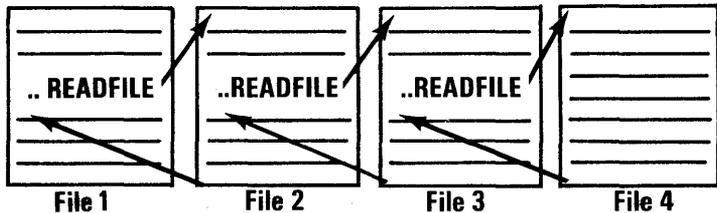
RJE Command Processing

RJE command processing means that each record in the file is checked to see if it is a RJE command statement. A *command file* can contain the following:

- JCL statements
- Data
- Host commands, which are sent to the host in the reader stream
- RJE command statements, which are processed by RJE and not transmitted to the host.

Command files created by EDLIN that contain RJE command statements may be nested.

When RJE encounters a nested READFILE command statement, for example, it stops reading the current READFILE, closes it, and begins reading the nested READFILE. After the nested READFILE is read and closed, the original READFILE is opened, read, and closed. An example of a nested READFILE is shown below.



RJE reads records in the above four files in the following sequence: the beginning of file 1, the beginning of file 2, the beginning of file 3, all of file 4, the rest of file 3, the rest of file 2, and the rest of file 1.

Non-Command Processing

Non-command processing means that each record in the file is treated as a data record and sent to the host in the reader stream.

Receiving Data Streams from the Host

RJE receives the following data streams from the host:

- Console streams
- Print streams
- Punch or exchange streams

Note: If you have a large data stream from the host directed to a diskette, you should use a blank formatted diskette. If your first diskette cannot hold all of your data stream, you will probably want to rerun this job, starting with a blank formatted diskette that can hold contain the entire stream.

If you choose not to rerun your job, then you may be able to restart the data stream with a host command. Another file will be opened. You will have to determine the contents of each file and, if necessary, merge them. Some of the data may be repeated on the new file.

Console Streams

Console streams received from the host are scrolled on the display screen.

Print Streams

You can direct print streams to a diskette or to the printer. *The default for a print stream is the printer;* you can change it to a diskette or “not assigned” using the MODIFY command statement.

A print stream directed to the printer or a diskette is written in the subset of Standard Character String (SCS) controls used by the IBM Personal Computer system printer. Printer control characters in the print stream are automatically converted as they are received from the line. When a print stream that was stored on a diskette is printed, the data is already in SCS form.

All EBCDIC characters are translated to ASCII. You can set up the print stream at a page size that matches the paper size on your IBM Personal Computer. *The default page size that RJE sets is 132 characters wide and 66 lines long.* The standard paper on an IBM Personal Computer is 11 inches long set at 6 lines per inch, which yields 66 lines per page. If you have a host that supports 8 lines per inch, and not 6 lines per inch, it may be better to use a DOS MODE command to set your printer to 8 lines per inch and have the host send 88 lines per page.

Punch or Exchange Streams

Punch or exchange streams can be directed to a file or can be specified as “not assigned.” *The default is “not assigned.”* You can change the device assignment to a diskette using the MODIFY command statement. A punch or exchange stream directed to a file is written in decompressed form, that is blanks are expanded. Punch data is written as 80-byte logical records. Exchange data is written in 128-byte records if the host specifies a 128-byte record; a 80-byte record is written for all other host-specified record lengths. The data that is written depends upon the data received and any SCS control characters.

You can use the punch stream to download data in either source or object format by entering a MODIFY command statement to convert the data to ASCII (source) or leave it in EBCDIC (object) format.

Note: The separator cards sent by some hosts in a punch data stream are included in the output data set. The separator cards from some hosts can be eliminated with the appropriate host commands.

Messages

All messages at the IBM Personal Computer, whether from the host computer or RJE, are scrolled on the screen. Optionally, they can be logged in a file or on the printer. Use the MODIFY command statement to specify where the terminal session will be logged.

Command Statements

Command statements control RJE operation. You can enter command statements from the keyboard or from a diskette.

You use the following four command statements during RJE operation:

Command Statement	Purpose
CARRIAGE	Sets the forms length for the printer and correlates channel control characters with form line numbers. It also displays the current values of the carriage settings.
EOF	Means the end of the reader stream and signals the end of the data set to the host.
MODIFY	Assigns and changes the devices you use to transmit and receive data. It also displays current device assignments.
READFILE	Names a file and describes how RJE will process it prior to transmitting it to the host.

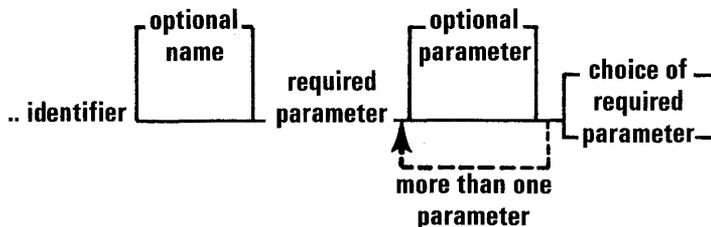
RJE Command Statement Format

Each command statement must begin with two periods, one blank, and then the identifier (for example, `.. m`). Enter one or more blanks between the identifier and the first parameter (for example, `.. m pr1 =`).

The *parameters* are values you supply to RJE. When you start operations each parameter has an initial value or a default value. You can enter parameters in any order. A comma (no blanks) must separate one parameter from another (for example, `.. m pr1 = p,pu1 = n`).

You can include comments in any statement that contains parameters. Use one or more blanks between the last parameter and the comment.

To read the format of a RJE command statement, read from left to right along the main line. When you reach an optional parameter, you can either include that parameter or continue along the main line. When you reach a choice of required parameters, you must include one of the parameters with your command statement. Each RJE command statement has the following format:



where:

identifier is an RJE command statement or its abbreviation (C for CARRIAGE, E for EOF, M for MODIFY, or R for READFILE).

optional parameter is an item that may be included if desired, such as **pr1 =** in a MODIFY command statement.

more than one parameter means that more than one parameter can be included, such as **.. m pr1 = ,log =** in a MODIFY command statement.

choice of required parameters means that one of the parameters must be included, such as the choice between “not assigned” and “keyboard” in **.. m rdr =** in a MODIFY command statement.

The individual commands are described in detail on the next few pages.

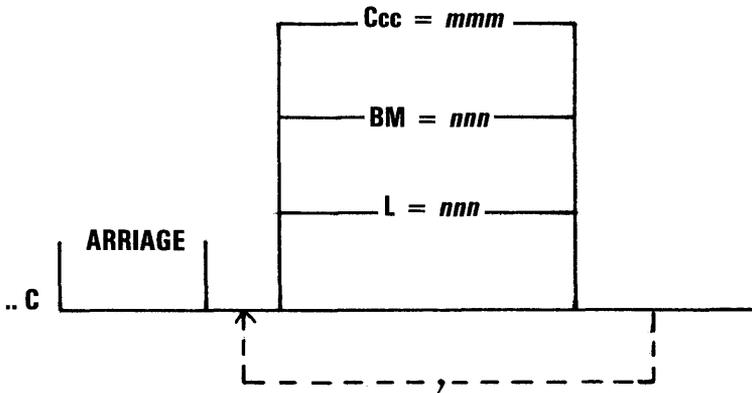
CARRIAGE Command Statement

Purpose:

The *CARRIAGE* statement does the following things:

- Sets the forms length for the printer and correlates channel control characters with form line numbers.
- Displays the current values of the carriage settings. To use the CARRIAGE statement for this purpose, do not enter any parameters.

Format:



CARRIAGE Command Statement

where:

L = nnn: Specifies the length of the form, that is, the number of print lines per page. The maximum length is 112; *the initial value is 66*.

BM = nnn: Specifies the line number of the bottom margin. Valid values are less than or equal to the number of lines per page (L). *The initial value is 66*.

Ccc = mmm: Equates a channel control character with a form line number. The **cc** is a channel control character between 1 and 12. The **mmm** is a form line number between 1 and the number of lines per page (L). Each **cc = mmm** must be preceded by a capital C (**Ccc = mmm**).

A *channel control character* causes the printer to skip to line **mmm**. A **Ccc = mmm** combination can be specified for all 12 channel control characters. If values are not entered for all 12 characters, the unspecified channel control characters remain unchanged. A channel control character set to zero causes the printer to space to a new line. If no **Ccc = mmm** combinations are entered, previously entered or initial values are used.

The line number specified for channel 1 sets the top margin; *the initial value is 1. The initial value for channels 2 through 12 is zero.*

CARRIAGE Command Statement

Example:

You want to display the current values of your carriage settings. You enter:

```
.. c
```

The following information is displayed:

```
Carriage L = 066 BM = 066 TM = 001 C1 = 001  
C2 = 000 C3 = 000 C4 = 000 C5 = 000 C6 = 000  
C7 = 000 C8 = 000 C9 = 000 C10 = 000 C11 = 000  
C12 = 000
```

The values shown above are the current values for each of the parameters. This example shows the initial values.

where:

L = 066 is the number of print lines per page.

BM = 066 is the line number of the bottom margin.

TM = 001 sets the line number of the top margin and is the same number specified for channel 1.

C1 through C12 are the channel control characters.

CARRIAGE Command Statement

Notes:

1. When you start RJE operation, each CARRIAGE parameter has an initial value. The initial value of each parameter will remain the same until you or the host change it. When the initial value of a parameter is changed, the change becomes the new value for that parameter. Some hosts may send carriage information. The latest information, whether received from the host or entered in a CARRIAGE command statement, will be used.
2. If you end an RJE session and begin a new session, the parameters do not change from the last values assigned to them.
3. Leading zeros are not required on any CARRIAGE parameter.
4. Check the host (using host commands) for the status of the output queues before entering a CARRIAGE statement. See the appropriate host manual for the host commands to use.

EOF Command Statement

Purpose:

The *EOF* (End-of-File) statement means the end of the reader stream. EOF causes end of data set to be sent to the host. The host will queue jobs for execution as they are received.

Format:

```
.. E [OF]
```

Remarks:

There are no parameters on the EOF statement.

You should always end your reader stream with an EOF for a single job or multiple jobs in your stream. EOF always resets the reader stream (RDR =) to N.

Although the EOF statement causes the host to queue the job for execution, RJE remains active and can receive additional input.

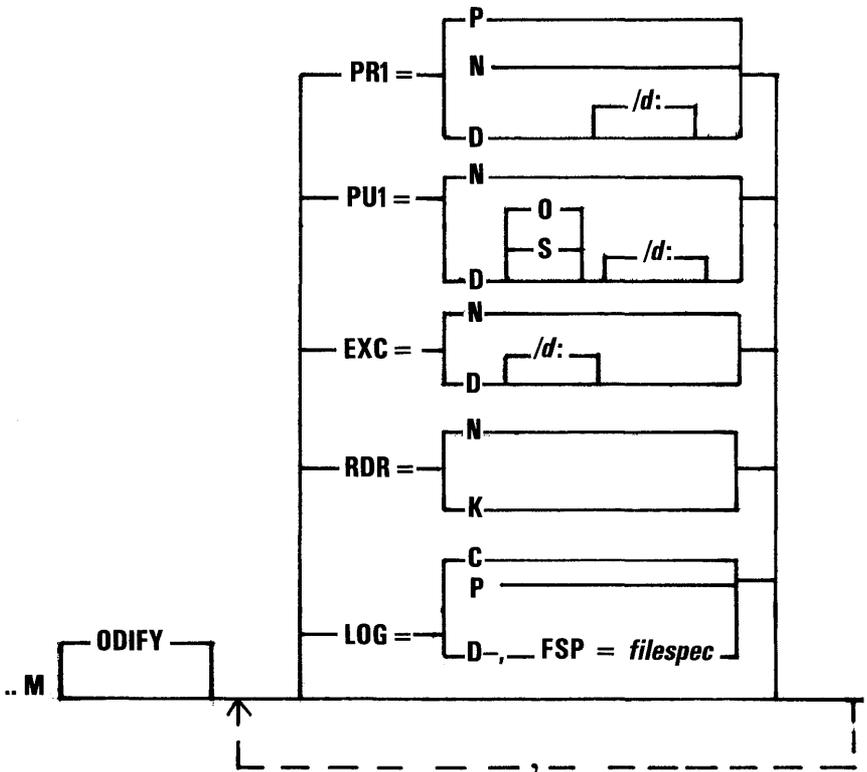
MODIFY Command Statement

Purpose:

The *MODIFY* statement does the following things:

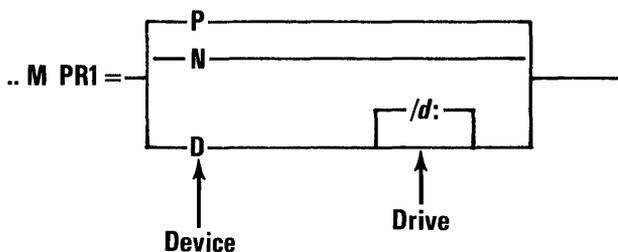
- Assigns and changes the devices you use to transmit and receive data. If multiple changes are required, you can enter them using one *MODIFY* statement.
- Displays current device assignments. To use the *MODIFY* statement for this purpose, do not enter any parameters.

Format:



MODIFY Command Statement

Format:



where:

PR1

Specifies the destination of print data streams sent to the IBM Personal Computer by the host computer.

Device

P = Printer: Assigns the printer to receive the print data streams. *This is the initial value.*

RJE supports only one printer. It can be used either to receive print data streams from the host (PR1 = P) or as a syslog (system log) device (LOG = P). Therefore, if you specify **pr1 = p**, then you cannot specify **log = p**.

N = Not Assigned: No device is assigned to receive print streams from the host. Setting **pr1 = n** causes your IBM Personal Computer to reject print streams from the host. The host will be notified that you are unable to accept print streams at this time.

D = Diskette: Assigns the diskette to receive print data streams.

MODIFY Command Statement

Drive

/d: Assigns the diskette drive. If you do not assign a drive, the current drive assignment is used.

Remarks:

RJE allocates files to receive your print data streams as they are needed during operations. RJE names the file(s) PRINTXXX, where XXX is set to 001 for the first print data stream received and incremented by one for each new print data stream.

Warning: If the file already exists on the diskette in the drive you specified, then that file is overwritten.

If you enter a MODIFY statement with the PR1, PU1 or EXC parameter while the IBM Personal Computer is receiving a print, punch, or exchange data stream, the device assignment is not changed until the data stream being received is completed.

Note: After RJE operation ends, you could use the DOS COPY command to print your print stream from your diskette. To do this, you enter:

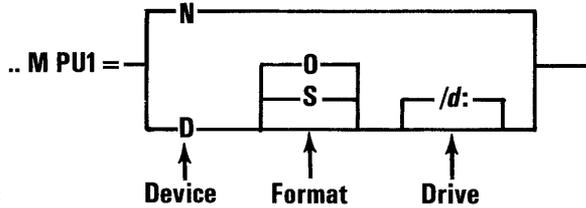
`copy printxxx 1pt1:`

Examples:

Command Statement	Device Assigned
<code>.. m pr1 = p</code>	Printer
<code>.. m pr1 = n</code>	No device assigned
<code>.. m pr1 = d</code>	Diskette, current drive assigned
<code>.. m pr1 = d/b:</code>	Diskette, drive B

MODIFY Command Statement

Format:



where:

PU1

Specifies the destination of punch data streams sent to the IBM Personal Computer by the host computer. It also specifies whether the data stream will be written to the file in object or source format.

Device

N = Not Assigned: No device is assigned to receive punch streams from the host. Setting `pu1 = n` causes your IBM Personal Computer to reject punch streams from the host. The host will be notified that you are unable to accept punch streams at this time.

D = Diskette: Assigns the diskette to receive punch data streams and assigns the format for the punch data streams.

If you specify only `pu1 = d` and this is the first time you entered this parameter, then `pu1 = do` is assumed.

If you specify only `pu1 = d` and you have previously specified `pu1 = ds`, then `pu1 = ds` is assumed.

Format

O = Object: Your punch data streams are written to the diskette in object format. The data is not translated.

MODIFY Command Statement

It is written to the diskette exactly as it is received from the host. *This is the initial value.*

S = Source: Your punch data streams are written to the diskette in source format. The data received from the host is translated to ASCII format before being written to the diskette.

Drive

/d: Assigns the diskette drive. If you do not assign a drive, the current drive assignment is used.

Remarks:

Punch data streams directed to a diskette are written in *decompressed* form, that is, blanks are expanded. RJE allocates files to receive punch data streams as they are needed during execution. Punch files are named PUNCHXXX, where XXX is set to 001 for the first punch data stream received and incremented by one for each new punch data stream.

Warning: If the file already exists on the diskette in the drive you specified, then that file is overwritten.

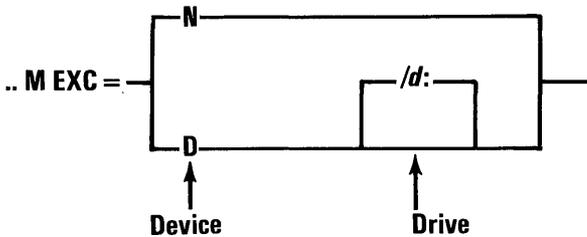
If you enter a MODIFY statement with the PRI, PU1, or EXC parameter while the IBM Personal Computer is receiving a print, punch, or exchange data stream, the device assignment is not changed until the data stream being received is completed.

Examples:

Command Statement	Device Assigned
.. m pu1 = n	No device assigned Diskette, source format, current drive assigned.
.. m pu1 = ds	
.. m pu1 = do/b:	Diskette, object format, drive B

MODIFY Command Statement

Format:



where:

EXC

Specifies the destination of an exchange data stream sent to the IBM Personal Computer by the host.

Device

N = Not Assigned: No device is assigned to receive exchange streams from the host. Setting **exc = n** causes your IBM Personal Computer to reject exchange streams from the host. The host will be notified that you are unable to accept exchange streams at this time. *This is the initial value.*

D = Diskette: Assigns the diskette to receive exchange data streams.

Drive

/d: Assigns the diskette drive. If you do not assign a drive, the current drive assignment is used.

MODIFY Command Statement

Remarks:

RJE allocates data files as they are needed during operations. RJE names the file(s) EXCHAXXX, where XXX is set to 001 for the first exchange data stream received and incremented by one for each new exchange data stream.

Warning: If the file already exists on the diskette in the drive you specified, then that file is overwritten.

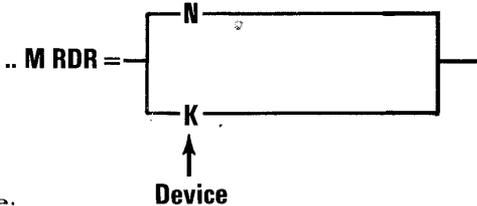
If you enter a MODIFY statement with the PR1, PU1, or EXC parameter while the IBM Personal Computer is receiving a print, punch, or exchange data stream, the device assignment is not changed until the data stream being received is completed.

Examples:

Command Statement	Device Assigned
<code>.. m exc = n</code>	No device assigned
<code>.. m exc = d</code>	Diskette, current drive assigned
<code>.. m exc = d/b:</code>	Diskette, drive B

MODIFY Command Statement

Format:



where:

RDR

Specifies the origin of the reader stream to be transmitted to the host.

Device

N = Not Assigned: No device is assigned to send reader streams to the host *and* the keyboard is assigned as the console device. This means that the next and the following lines entered from the keyboard form a console stream that is sent to the host. This is the *initial value*.

K = Keyboard: Assigns the keyboard as the reader stream device. This means that the next and the following lines entered from the keyboard form a reader stream that is sent to the host.

Remarks:

The reader stream is also set to “not assigned” by two other means:

- The completion of a READFILE statement from diskette
- An EOF statement encountered from either the keyboard or the diskette reader stream

MODIFY Command Statement

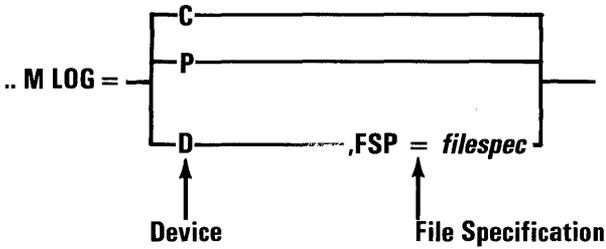
The reader stream can also originate from diskette, but you cannot use the **rdr =** parameter to set the diskette as the reader stream device. Use the READFILE command statement to do this.

Examples:

Entered from Keyboard	Explanation
.. m rdr = k	Specifies the keyboard as the reader stream device
record 1	First reader stream record
record 2	Second reader stream record
.. m rdr = n	Specifies the keyboard as the console stream device
\$dn	Console stream record (use the appropriate host commands)
.. m rdr = k	Specifies the keyboard as the reader stream device
record 3	Third reader stream record
record 4	Fourth reader stream record
.. eof	Specifies end of file. Sets the keyboard as the console device and sends an end of data set message to the host.

MODIFY Command Statement

Format:



where:

LOG

Specifies the output device for all lines that are scrolled on the display screen. Thus, it creates a log of your terminal session.

Device

C = Display (CRT): All lines are to be displayed; *this is the initial value.*

P = Printer and Display: All lines are to be printed and also to be displayed. If you specify `log = p`, you cannot specify `pr1 = p`.

D = Diskette and Display: All lines are to be written on a diskette file and also to be displayed. When `log = d` is specified, it must be accompanied by the `fsp = filespec` parameter.

MODIFY Command Statement

File Specification

FSP = *filespec*: The file specification consists of [*d*:]*filename*[*.ext*] as follows:

d: Assigns the diskette drive. If you do not assign a drive, the DOS default drive is used.

filename: Any alphanumeric name containing 1 to 8 characters. The filename can be immediately followed by a filename extension. An illegal character is assumed to be a delimiter; in this case, anything after the illegal character is ignored.

.ext: The optional filename extension consists of a period and 1 to 3 alphanumeric characters.

When referring to a file that has a filename extension, remember to include the extension; otherwise, the file may not be found.

Examples:

Command Statement	Device Assigned
<code>.. m log = c</code>	Display (CRT)
<code>.. m log = p</code>	Printer and display
<code>.. m log = d, fsp = b:mylog.log</code>	Diskette and display, drive B, filename mylog.log
<code>.. m log = d, fsp = syslog</code>	Diskette and display, DOS default drive, filename syslog

MODIFY Command Statement

Notes:

1. When you start RJE operation, each MODIFY parameter has an initial value. The initial value of each parameter will remain the same until you change it.
2. When the initial value of a parameter is changed, this becomes the new value for that parameter.
3. If you end an RJE session and begin a new session, the parameters do not change from the last values assigned to them.

MODIFY Command Statement

Examples:

You want to receive an exchange data stream from your host computer to your diskette and log all screen lines to the printer. Your diskette is in drive B. You also want to know your current device assignments. First, you enter:

```
.. m
```

The following information is displayed:

Device assignments

To host

Console stream

Default Keyboard

Reader stream

RDR = N Not assigned

From host

Print stream

PR1 = D/X: Diskette

Punch stream

PU1 = DO/B: Diskette object

Exchange stream

EXC = N Not assigned

Syslog

Log = C CRT

End device assignments

Next, you enter:

```
.. m exc = d/b:,log = p
```

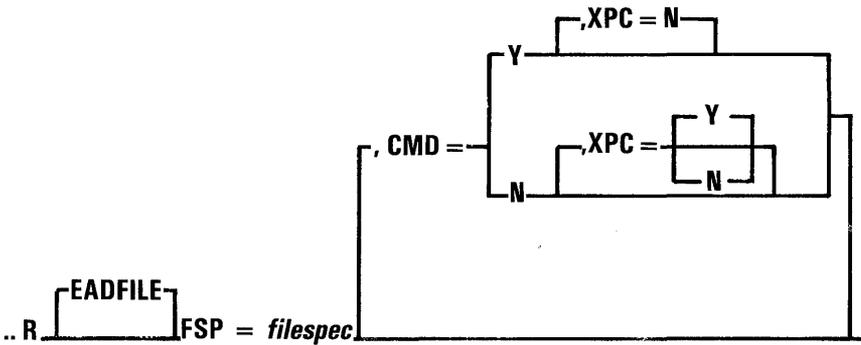
READFILE Command Statement

Purpose:

The *READFILE* statement names a file and describes how RJE will process it before transmitting it to the host on the reader stream. A file retrieved by a *READFILE* statement is inserted into the reader stream at the point where the *READFILE* occurs. After RJE reads all records in the file, that is, after an end of file is reached, RJE continues reading input from the file that contained the *READFILE* or from the keyboard.

A *READFILE* statement may be *nested*; that is, a file identified by a *READFILE* statement may itself contain *READFILE* statements that direct RJE to retrieve and insert other files in the job stream. RJE supports seven levels of nesting.

Format:



READFILE Command Statement

where:

File Specification

FSP = *filespec*: The file specification consists of [*d:*]*filename*[*.ext*] as follows:

d: Assigns the diskette drive. If you do not assign a drive, the DOS default drive is assumed.

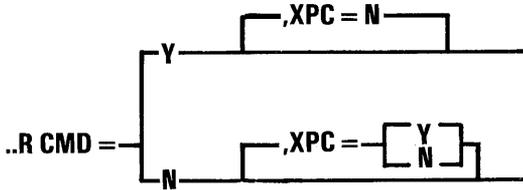
filename: Any alphanumeric name containing 1 to 8 characters. The filename can be immediately followed by a filename extension. An illegal character is assumed to be a delimiter; in this case, anything after the illegal character is ignored.

.ext: The optional filename extension consists of a period and 1 to 3 alphanumeric characters.

When referring to a file that has a filename extension, remember to include the extension; otherwise, the file may not be found.

READFILE Command Statement

Format:



where:

CMD

Specifies whether RJE is to process command statements found in the file.

Command Statement

Y = Process: RJE is to process all command statements found in the file. RJE sends all other records to the host.

N = Not Process: RJE does not process command statements found in the file. RJE sends all records, including records beginning with the two periods and a blank space (..) to the host.

The *default* supplied for `CMD =` depends on the following value entered for `XPC =`:

- If `xpc = y`, then the `CMD` default is `N` and `CMD = Y` is not supported.
- If `xpc = n` or is not entered, then the `CMD` default is `Y`.

READFILE Command Statement

where:

XPC

Specifies whether RJE is to process the data in the file as transparent or non-transparent data.

Transparent or Non-Transparent

N = Non Transparent: RJE processes the data in the file before it is transmitted to the host. *This is the default.* The data is processed as follows:

- Each data character is translated from its internal format (ASCII) to EBCDIC.
- Line feed (0A), carriage return (0D), and end-of-data (1A) characters are not transmitted. These characters signal end of record and end of data to RJE.
- RJE transmits the data as 80-character records. If the records are less than 80 characters, then RJE pads them with blanks. If the records are larger than 80 characters, they are divided into 80 characters each, and the last record is padded if necessary.

Note: A file created by EDLIN would be processed this way.

READFILE Command Statement

Y = Transparent: RJE transmits all data to the host exactly as it appears in the file. Eighty-character records are sent regardless of the data they contain. The last record is padded with zeros. XPC = Y and CMD = Y cannot be specified in the same READFILE.

Remarks:

CMD and XPC parameters have default values that can be changed. If you specify the value, you get the value you specified. If you do not specify a value, you get the default value.

Examples:

1. A file (EDLIN.FLE) created by EDLIN contains data, command statements, or both. You want the data (if any) to be sent to the host and the commands (if any) to be processed by RJE. You enter:

```
.. r fsp = a:edlin.fle
```

The defaulted parameter XPC = N specifies that the file is to be processed as non-transparent. The defaulted parameter CMD = Y specifies that command statements (if any) are to be processed by RJE and all other records are to be sent to the host.

READFILE Command Statement

2. A file (DATAFILE.ALL) contains only data to be sent to the host. You want all the data sent as is — nothing discarded. You enter:

```
.. r fsp = a:datafile.all,xpc = y
```

The parameter XPC = Y specifies that all characters would be sent to the host. Note that if the file were created by EDLIN, even the line feed, carriage return, and EOF characters would be sent to the host. The defaulted parameter CMD = N specifies that command statements (if any) will not be processed by RJE. They will be sent to the host.

3. A file (EDLIN.ALL) created by EDLIN contains data, commands, or both. You want all records (both data records and command records) sent to the host. You enter:

```
.. r fsp = a:edlin.all,xpc = n,cmd = n
```

The parameter XPC = N specifies that the file is to be processed as if it were created by EDLIN. The parameter CMD = N specifies that commands (if any) will not be processed by RJE. The commands will be sent to the host.

EXAMPLE USING RJE OPERATION

Following is an example of one way that you can build a reader stream to be sent to the host. This example uses a reader stream composed of records from a readfile on diskette (named CATHY), a single line entered on the keyboard, and additional records from a readfile on diskette (named CATHY1). You can change the single keyboard line each time you send this reader stream to the host.

Line	Screen Input and Output
1	.. r fsp = b:cathy
2	Utility command accepted
3	B:cathy opened
4	B:cathy closed
5	Reader terminated
6	.. m rdr = k
7	Utility command accepted
8	/*ROUTE PRINT RMT33
9	.. r fsp = b:cathy1
10	Utility command accepted
11	B:cathy1 opened
12	.. eof
13	Utility command accepted
14	B:cathy1 closed
15	Reader terminated
16	9.44.54 JOB 480 \$HASP100 #150407 ON R17.RD1 LAWS

Line	Explanation
Line 1	A READFILE command statement entered on the keyboard that directs RJE to send the JCL records (contained in the readfile named CATHY) to the host on the reader stream. <i>CATHY</i> is a file created by EDLIN that contains JCL records to be sent to the host.
Lines 2-5	RJE messages
Line 6	A MODIFY command statement entered on the keyboard that changes the keyboard to the reader stream device. This is necessary because when the reader stream terminated, the keyboard became the console device.
Line 7	RJE message
Line 8	Host JCL records can be entered on the IBM Personal Computer keyboard and sent to the host computer. In this example, only one host JCL record has been entered. This record routes the host print output to the host printer RMT33.
Line 9	A READFILE command statement entered on the keyboard that directs RJE to send the source records (contained in the readfile named CATHY1) to the host on the reader stream. <i>CATHY1</i> is a file created by EDLIN that contains source data records to be sent to the host and an EOF command statement as the last record. If this job were an assembly submission to a host, then CATHY1 might contain the source data, and a different file would be specified for each different assembly.

Line	Explanation
Lines 10-11	RJE message
Line 12	An EOF command statement from the file CATHY1 that directs RJE to signal end of data set to the host.
Lines 13-15	RJE message
Line 16	Message from the host

Starting RJE Operation

Note: There are two ways to start DOS, depending on whether your computer is powered on or off. We are assuming that your computer is powered on.

To start RJE operation, follow these steps:

1. Make sure your SDLC adapter and cable are connected to your modem.
2. Insert your RJE program diskette that you created in the section, "Organizing Your RJE Programs and Files," in Chapter 6 into the DOS default drive.
3. Press and hold both the Ctrl and Alt keys; then press the Del key. Release the three keys. This procedure is known as *System Reset*. Enter the date when prompted. (Your version of DOS may also prompt you for the time.)
4. In response to the DOS prompt **A >**, type:

srje

Press Enter. This loads the RJE support programs (SRJEU.COM, SNACAM.COM, and SDLC.DIA) into your computer's memory.

You then see the following screen:

```
*****
* IBM Personal Computer
* SNA 3270 Emulation and RJE Support
* Version 1.00 (C)Copyright IBM Corp., 1982
* Program: SNA RJE Operation
* Serial No: your serial no.
*****

Enter configuration filename (drive optional)
_
```

You must now specify your configuration filename.

The format for the configuration file specification is:

[d:]filename

where:

d: is the drive. If *d* is not specified, the DOS default drive is assumed.

filename is the name of the file you set up using RJE configuration. The system has generated the extension **.cfg**. You do not need to specify this extension.

Type your filename and press Enter. The configuration file is then loaded into storage and you are now ready for terminal operations.

Once you become familiar with RJE operations, you can try simpler ways to start RJE operation, for example:

1. You can specify your configuration filename as a part of the SRJE command. Enter the command as follows:

srje [d:] *your configuration filename*

If you enter the configuration filename this way, you are not prompted for the configuration filename.

2. You can modify the batch command file (SRJE.BAT) to name your configuration file internally by replacing the DOS dummy parameter (%1) with your configuration filename. You will not be prompted for the configuration filename. Then you need to specify only **srje** to start operations.
3. You could rename your batch command file (SRJE.BAT) to AUTOEXEC.BAT. Then, your RJE programs would be started every time you started DOS.

you then see the message:

Establish connection if necessary

If you are connected to your host computer by a switched modem, you must now dial the phone number of the host computer. When you hear the answer tone from the modem (a high-pitched sound) you must press the data button on your modem. If you have any questions about this part of the connection, ask your host system programmer or telephone company representative.

When the line connection is complete, the following message will scroll onto the screen:

SNA RJE initialization complete

If your configuration file does not contain automatic logon data, when the line has been connected you have to enter a logon command to the host. The status line shows:

Enter logon

If your configuration file contains automatic logon data, the status line remains blank.

When the host accepts your logon command, the status line shows:

Ready for input

If your automatic or entered logon fails, this message will not appear. The host will send you a scroll message telling you that your logon has failed. In this case, enter the correct logon.

During RJE operation, respond to the information being presented to you from the host. You need to know something about the host application you are connected to. The requirements of the host application are beyond the scope of this book. If you need information about the host application, contact your host system programmer.

Ending a RJE Session and Starting a New Session

You can end your RJE session and start a new session by doing the following steps:

1. Entering a logoff command that conforms to your host requirements. After you enter your logoff command, statistics are displayed for your RJE session. See the next section, “Ending RJE Operation” for the information contained in the session statistics.
2. Entering a logon command that conforms to your host requirements.

Your logoff/logon sequence does not change device assignments, reset parameter defaults, or reset the counter for print/punch/exchange filenames.

Note: The way your host is generated or your line is configured may prevent a logoff/logon sequence. If this happens, to start a new session you must end RJE operation and then restart RJE operation.

Ending RJE Operation

You can end RJE operation by doing either of the following:

- If you have not received the message **SNA RJE initialization complete**, and the message **Establish connection if necessary** is displayed, press the Ctrl-Break keys. You return to DOS.
- If you have received the message **SNA RJE initialization complete** that may now have scrolled off your display, do the following:
 1. Enter a logoff command that conforms to your host requirements. For the format of the appropriate logoff command, see your host manual. After you enter your logoff command, RJE closes all files and shows the following statistics for your session:

Session statistics

Records sent to host
XXXXXX Reader stream

Records received from host
XXXXXX Print stream
XXXXXX Punch stream
XXXXXX Exchange stream

End session statistics

2. Press the Ctrl-Break keys.
3. Press the Enter key. After you press the Enter key, the status line goes blank and the DOS prompt **A >** appears. For a switched line, there is a delay of a few seconds before this occurs. If you want to reenter RJE operation, you must enter **srje** to reload the RJE support programs. For a switched line, redial the phone number of the host computer. See "Starting RJE Operation" earlier in this chapter for the complete instructions.

Notes:

APPENDIXES

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APPENDIX C. DIFFERENCES BETWEEN AN IBM 3270 AND EMULATION C-1

APPENDIX A. MESSAGES

This appendix lists unnumbered messages and numbered messages. The unnumbered messages are listed in alphabetical order and the numbered error messages are listed in numerical order for easy reference.

Unnumbered Messages

The unnumbered messages describe errors that occur during the start of emulation or RJE operation. If one of these messages appears, the SNA program terminates. You return to DOS. You should take corrective action before trying to restart emulation or RJE operation.

Messages

Communications adapter failed a diagnostic test

Make sure your Synchronous Data Link Control (SDLC) Communications Adapter has been installed correctly. See the IBM Personal Computer *Guide to Operations* for installation procedures.

If the adapter is installed correctly and this message appears, a hardware error has occurred. Run the diagnostic procedures described in the IBM Personal Computer *Guide to Operations* to determine the problem.

Configuration filename not found

The configuration file that you named could not be found on the diskette.

Make sure that you have named the configuration file correctly and it exists on the diskette.

Configuration file open error SDLC.DIA open error SNACAM.COM open error

The file that you named could not be opened.

Copy the file from a backup diskette. Retry the operation. If the configuration file could not be opened, you may have to create a new configuration file.

Configuration file read error SDLC.DIA read error SNACAM.COM read error

The file that you named could not be read into storage from the diskette.

Copy the file from a backup diskette. Retry the operation. If the configuration file could not be read, you may have to create a new configuration file.

Drive not ready

When SNA attempted to find and load either your configuration file, the SDLC.DIA file, or the SNACAM.COM file from your diskette, the drive door was open. The file could not be found.

Invalid configuration file

Your configuration file is not valid for the program you are trying to run.

If you are using emulation, see “Setting Up Your 3270 Configuration File” in Chapter 3.

If you are using RJE operation, see “Setting Up Your RJE Configuration File” in Chapter 7.

Invalid configuration filename

The configuration filename you specified is not valid. The format for the configuration filename is:

[d:]filename

where:

d: is the drive. If *d* is not specified, the DOS default drive is assumed.

filename is any alphanumeric name containing 1 to 8 characters.

The DOS reserved filenames (CON, AUX, COM1, LPT1, PRN, and NUL) are invalid.

You do not need to specify an extension of **.cfg** with the filename. The program generates the extension **.cfg**.

Program too big to fit in memory

You need an IBM Personal Computer with at least 128K bytes of memory to run emulation or RJE operation.

Use the DOS CHKDSK (Check Disk) command to determine your system's memory size.

SDLC.DIA not found SNACAM.COM not found

The SDLC.DIA and SNACAM.COM files are needed to run emulation and RJE operation. If they are not on your diskette, copy them from a backup diskette.

Numbered Messages

While you are using your IBM Personal Computer for communications, the programming support continually checks its internal operations to ensure that the work it is doing is correct. If something goes wrong, the computer stops its operation, and uses the status line (bottom line) of the screen to give you information about the problem. When this occurs, the word ERROR is displayed and flashes on and off. Immediately to the right of this flashing ERROR is an error number (that is, a number specifying the unique error condition). In some cases, additional information might be displayed on the screen. This appendix provides detailed information about the error messages that can occur either in 3270 emulation or RJE. It does not include host messages.

How To Correct A Problem

When a problem occurs, you should:

1. Observe any additional information on the screen telling you what has happened. This might be messages from your IBM Personal Computer or messages from the host computer.
2. Look up the error number in this appendix to obtain more detailed information about the problem.
3. Do what action is described by the particular error message description.
4. In all cases, you must acknowledge the error by pressing either the Enter key (during configuration), the Reset key (during 3270 emulation), or the End key (during RJE operation) to reset the error to continue the operation. What happens next depends upon the type of error that has occurred and what corrective action you have taken.

Message Categories

The first two digits of the 4-digit error number have the following meanings:

09XX – Hardware

10XX – Non I/O error

11XX – Diskette error

12XX – Printer error

42XX – SDLC error

46XX – Communications information

Messages

Number	Message
---------------	----------------

0999	Machine check
-------------	----------------------

Execution of an invalid instruction can cause this error. This indicates either a hardware problem or a problem in the program as it is stored on your diskette.

Try to restart using a new copy of your SNA 3270 Emulation and RJE Support diskette.

1001	Invalid filename
-------------	-------------------------

The specified configuration filename is invalid. The filename must be 1 to 8 alphanumeric characters long. The filename must not be one of the reserved DOS filenames, CON, AUX, COM1, LPT1, or NUL.

Press Enter to reset the error. Respecify your filename or press Alt-F1 to cancel configuration.

1002 Invalid drive specification

The drive specified for the file is invalid.

Press Enter to reset the error. Respecify the drive or press Alt-F1 to cancel configuration.

1003 Invalid filename extension

The filename extension specified for the file is invalid. Only the **.cfg** extension is allowed in the configuration filename.

Press Enter to reset. Respecify the extension or press Alt-F1 to cancel.

1004 Filename missing

A filename was not specified.

Press Enter to reset the error. Specify a filename, or press Alt-F1 to cancel configuration.

1005 Input exceeds field length

More characters were specified than requested. The length of the input field is indicated by the underline.

Press Enter to reset the error. Respecify the requested data, or press Alt-F1 to cancel configuration.

- 1006** **Invalid BAT file parameter**
- The parameter specified in the C3270.BAT or CSRJE.BAT file is invalid.
- Press Enter to end configuration. Copy the BAT file from your SNA 3270 Emulation and RJE Support diskette.
- 1007** **Input value is out of range**
- The input value specified was greater than or less than the allowable range.
- Press Enter to reset the error. Respecify the value, or press Alt-F1 to cancel configuration.
- 1008** **Nonnumeric character in numeric field**
- A character other than 0 through 9 was specified.
- Press Enter to reset the error. Specify a numeric character, or press Alt-F1 to cancel configuration.
- 1009** **Invalid local address**
- You specified a local address that is not within the range of hex 01 to hex FF.
- Press Enter to reset the error. Respecify the local address, or press Alt-F1 to cancel configuration.

1010 incorrect file specified

The configuration file that was specified to be modified is not a configuration file or is not the correct configuration file.

Check that the specified filename is correct. If the filename is not correct, press Enter to reset the error. Respecify the filename or press Alt-F1 to cancel configuration.

If the filename is correct, check that you have the correct diskette in the drive. If the correct diskette is in the drive and the filename is correct, then create a new configuration file. To do this, cancel configuration (Alt-F1), erase the existing configuration file, and then run the configuration.

1011 Invalid character in hexadecimal field

You specified a character that is not a hexadecimal value. Only hexadecimal characters are accepted in this field. Valid hexadecimal characters are 0 through 9 and A through F.

Press Enter to reset the error. Respecify the value, or press Alt-F1 to cancel configuration.

1012 Invalid SDLC station address

You specified an SDLC station address that is not within the range of hex 01 to hex FE.

Press Enter to reset the error. Respecify the SDLC station address, or press Alt-F1 to cancel configuration.

1013 Required value not given

You did not specify an answer to a required question. The question appearing on your screen is not optional. You must specify an answer.

Press Enter to reset the error. Specify an answer, or press Alt-F1 to cancel configuration.

1014 Invalid key assignment

You specified a key assignment value that is not within the range of 00 to 44.

Press Enter to reset the error. Respecify the key assignment value, or press Alt-F1 to cancel configuration.

1015 Unexpected error *nn*

An unexpected error occurred. The error was detected by BASIC. The error number *nn* is the BASIC error code. For additional information, see Appendix A, "Messages" in the IBM Personal Computer *BASIC* book.

Press Enter to continue. Configuration will be canceled. You will be returned to DOS.

1021 Punch stream from host and output device is not assigned

No device is assigned for the punch stream just received.

Press End to reset the error. The host will be notified that the stream was not accepted. Use the MODIFY command to assign a punch stream device (PU1 = D). Send a console command to the host that requests the punch stream to be sent again.

1022 Excha stream from host and output device is not assigned

No device is assigned for the exchange stream just received.

Press End to reset the error. The host will be notified that the stream was not accepted. Use the MODIFY command to assign an exchange stream device (EXC = D). Send a console command to the host that requests the exchange stream be sent again.

1023 Print stream from host and output device is not assigned

No device is assigned for the print stream just received.

Press End to reset the error. The host will be notified that the stream was not accepted. Use the MODIFY command to assign a print stream device (PR1 = P or PR1 = D). Send a console command to the host that requests the print stream be sent again.

1100

***filespec* directory full, diskette not initialized, or invalid drive**

The file cannot be opened because either:

- The diskette that you specified already contains the maximum number of files.
- The diskette that you specified has not been formatted.
- Your IBM Personal Computer does not have the diskette drive that you specified.

You correct the problem by either:

- Inserting the correct diskette and pressing End to reset the error.
- Pressing End to reset the error and specifying the correct drive with a MODIFY command statement.

For host streams, the host will be notified that the IBM Personal Computer could not accept the stream. Ask the host to send it again.

1101

***filespec* not found or invalid drive**

The file was not found on the diskette in the drive you specified or you specified a drive that does not exist.

Insert the correct diskette or enter the correct drive identifier. Press End to reset the error. Retype the READFILE command statement.

1102 *filespec* not found on a close

When a close was attempted, the file being written to or read from was no longer in the drive specified.

Insert the original diskette so that RJE can close the file and update the directory. Press End to reset the error. If you cannot find the original diskette, press Ctrl-Break to end RJE.

1103 *filespec* drive not ready

The door was open on the drive you specified.

Close the door. Press End to reset the error. Retry the operation.

Note: The indicated drive may show */x:* for the DOS default drive, */z:* for the invalid drive specified, or the indicated drive may be incorrect, that is, show */a:* when the drive not ready is */b:* The latter case may occur when multiple drives have open files and one drive is not ready.

1104 *filespec* attempt to write on write protected diskette

The file was opened but the write failed because the diskette is write protected.

Remove this diskette and insert the correct diskette. If this is the correct diskette, remove the write protect tab. Press End to reset the error.

1105

***filespec* syslog wrapping**

The syslog file is full and has been closed. RJE allocates a syslog file to contain 200 records. If the diskette contains insufficient free space, RJE allocates syslog the maximum size available.

If you want to save this syslog file, put a new diskette in the drive. Press End to reset the error.

If you want to reuse this file (allow syslog to wrap), press End to reset the error.

1106

***filespec* diskette is full**

The diskette receiving a print, punch, or exchange file is full and the file has been closed.

Press End to reset. The host will be notified that the stream has been terminated. You will probably want to rerun this job, starting with a blank formatted diskette that can contain the entire stream.

If you choose not to rerun your job, then you may be able to restart the data stream with a host command. Another file will be opened. You will have to determine the contents of each file and, if necessary, merge them. Some of the data may be repeated on the new file.

1111-
1115

filespec errors

1111 *filespec* data error

1112 *filespec* seek error

1113 *filespec* sector not found

1114 *filespec* write fault

1115 *filespec* general diskette
failure

A serious DOS error has occurred. The diskette operation cannot continue.

Press End to reset the error.

1125

Configuration file error *nn*

A file error occurred while reading or writing the configuration file. The error was detected by BASIC. The error number *nn* is the BASIC error. For additional information, see the explanation of this error in the IBM Personal Computer *BASIC* book.

Press Enter to reset the error.
Configuration will be canceled. You will be returned to DOS.

1126

Drive not ready

The configuration diskette drive door is open or the diskette is not in the drive.

Put the configuration diskette in the drive.
Press Enter to reset the error.

1127 Diskette write protected

You tried to create or modify a configuration file. The configuration diskette is write protected.

Insert an unprotected diskette and press Enter to reset, or press Alt-F1 to cancel.

If the correct diskette is already in the specified drive, remove the write-protect tab, and press Enter to reset.

1128 Directory space unavailable

You tried to create a new configuration file. The diskette directory is full.

Insert a new diskette. Press Enter to reset the error, or press Alt-F1 to cancel configuration.

1129 File space unavailable

You tried to create a new configuration file. No file space is available on the diskette.

Insert a new diskette. Press Enter to reset the error, or press Alt-F1 to cancel configuration.

1201 Printer is offline

Press the Online button on the printer to continue.

Either your printer is powered off or it is not attached.

This error occurs if your printer is powered off or not attached when you start RJE. If you want to run RJE with a printer, attach the printer and switch the power on. Press End to reset the error.

If you choose not to run RJE with a printer, press End to reset the error.

This error also occurs if you power off the printer while printing. If you power off the printer while receiving a print stream, the print stream device is set to not assigned and the host is notified that you are unable to continue to accept the print stream at this time. Press Enter to reset the error.

If you power off the printer while printing the log, you can power on the printer and press End to reset the error.

1210**Printer error**

During RJE operation, this error occurs because of a serious printer error. If this error occurs while a print stream is being sent to the printer, the print stream device is set to not assigned and the host is notified that the IBM Personal Computer is unable to accept the print stream at this time.

If this error occurs while you are logging your session to the printer, the LOG parameter is reset to CRT.

Press End to reset the error. The host will be notified that the printer is broken.

for all printer errors. Make sure the printer is connected, has paper, and is ready.

4202 Data set ready dropped

The electrical signal (data set ready) from the modem telling the IBM Personal Computer that contact has been established with the host was lost. SNA is terminated. The cause of this problem can range from modem problems to open transmission lines. This error can also occur if the host did not activate the physical unit.

Restart the SNA program. Reestablish contact with the host computer.

4203 Receive inactivity timeout

There is still no activity on the data link after SDLC has been in the receive mode for at least 30 seconds. SNA is terminated. The problem was probably caused by a host computer failure or the loss of the connection with the host computer.

Restart the SNA program. Reestablish contact with the host computer.

4204

Clear to send dropped

The electrical signal (clear to send) from the modem telling the IBM Personal Computer that data may be sent from the computer to the modem was lost. SNA is terminated. The cause of this problem can range from modem problems to open lines in the modem/computer connecting cable.

Restart the SNA program. Reestablish contact with the host computer.

4205

Clear to send with no request to send

The electrical signal (clear to send) from the modem telling the IBM Personal Computer that data may be sent from the computer to the modem was on even though it had not been requested (request to send). SNA is terminated. This error can also occur because you set up your configuration file for line turnaround required and your modem was set up for constant request to send.

Check the modem for possible problems. Restart the SNA program. Reestablish contact with the host computer.

Data set ready failed to drop

The electrical signal (data set ready) from the modem telling the IBM Personal Computer that contact with the host had been established was on even though the modem had not been activated or had been deactivated.

In the former case, SNA is terminated. Restart the SNA program. Reestablish contact with the host computer.

In the latter case, SNA was ending normally. No further action can be taken.

In either case, check the modem for possible problems.

4208 SDLC adapter failed

A hardware error has occurred.

Run the diagnostic procedures described in the IBM Personal Computer *Guide to Operations*.

4209 Transmit failure

Nothing was transmitted across the line to the host for at least 10 seconds. SNA is terminated.

Check the modem for possible problems. Also check for cable problems between the IBM Personal Computer and the modem and between the modem and the host computer.

Restart the SNA program. Reestablish contact with the host computer.

4210

Disconnect received

A disconnect command was received from the host computer. SNA is terminated.

Restart the SNA program. Reestablish contact with the host computer.

4214

Interim set normal response mode

A command to set normal response mode was received while SDLC was already in normal response mode. SNA was terminated.

Restart the SNA program. Reestablish contact with the host computer.

4215

Physical unit session lost

The communication session was ended at the physical unit level, because the host computer has tried to activate an already active physical unit session or has deactivated a physical unit session.

If you are on a switched line, and you entered a logoff command, this error is a normal response; otherwise, call your host computer operator to determine the current status of your host computer.

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4216

Logical unit session lost

The communication session was ended at the logical unit level.

Call your host computer operator to determine the current status of your host computer.

4234

Invalid Bind received

The Bind command from the host does not match the IBM Personal Computer's configuration; that is, the host parameters, which define the communication session, do not match the IBM Personal Computer's parameters.

Run the SNA print trace program (see "Formatted Communications Trace" in Appendix B) to get a printout of the Bind command. Have the host system programmer check the trace printout to determine which parameters (IBM Personal Computer or host) need to be changed.

Note: If a negative response to the Bind is encountered in the trace table, a series of error messages for the last Bind received will be generated directly after the Bind image on the SNA formatted trace print (see Appendix B).

4653 Clear received

The host is in error recovery and has sent the IBM Personal Computer a Clear command. In RJE operation, if any READFILE is active, the file is closed. If any punch or exchange streams are active, the files are closed.

Press Reset or End to reset the error.

4659 RU larger than 256

The host computer has sent a RU (Request Unit) larger than 256 bytes. Bind (SNA command) specified zero. A RU of 256 bytes is assumed for a Bind of zero.

Run the SNA print trace program (see Appendix B, "Formatted Communications Trace") to determine the RU size. Have your host system programmer check the trace printout.

4660 RU larger than Bind

The host computer has sent a RU (Request Unit) larger than was specified in the Bind (SNA command).

Run the SNA print trace program (see Appendix B, "Formatted Communications Trace") to determine the RU size. Have your host system programmer check the trace printout.

Notes:

APPENDIX B. TROUBLESHOOTING COMMUNICATIONS PROBLEMS

Problem Determination Guidelines

This appendix discusses information to aid you in solving communication problems between your IBM Personal Computer and the host computer. Since it is assumed that you are familiar with the problem determination tools available with your host system, the information included here does not attempt to be host-specific or all-inclusive. Instead, the information is intended to provide a systematic, structured approach to problem determination through a general set of guidelines for symptom analysis and isolation of the symptom's cause. Using the basic structure given here, you can develop a method for problem determination that fits your individual system and takes into account your system's requirements, resources, and organization.

There are three main resources for performing problem determination on the IBM Personal Computer. These resources include:

1. The IBM Personal Computer *Guide to Operations* (6025000) that shows you how to run several diagnostic tests
2. Error messages, system analysis, and symptom analysis
3. Internal trace programs

Initial Problem Determination

Most problems that are not hardware problems occur because of the wrong configuration parameters. Before you go any further, you should check the following configuration parameters and make sure they are correct.

- NRZI (if NRZI is wrong, you will see no line activity in the SDLC trace printout.)
- Local address (DAF)
- SDLC station address
- Station ID for switched line.

Error Messages

Host System Messages

Have any messages been received either in your output data, at your host console, or on your host console log? If they have, refer to the appropriate programming guide for the meaning of the message, its cause, and the recommended response.

Once the cause of the message has been identified, correct it (if possible) and continue with the operation.

IBM Personal Computer Messages

Has the Personal Computer generated any messages or prompts? If so, verify that the action recommended has been taken.

Once the cause of the message has been identified and you have corrected it (if possible), continue with the operation.

System Analysis

Does the Problem Involve a New or a Modified Resource?

1. Have recent hardware changes been made? For example, has a new modem been installed at either location, or have configuration changes been made to the communications controller?
2. Has the existing host software system been modified? For example, has a new release of a program product or program maintenance been applied?
3. Has the host application program accessed by the Personal Computer been modified?

Do Other Terminals Have the Same Problem?

If other non-IBM Personal Computer terminals in the same system have the same problem, notify the appropriate host personnel that the cause of the problem probably is a host hardware or software resource. If they do not have the same problem, continue with the next step.

Do Other IBM Personal Computers Have the Same Problem?

If they do, continue with problem isolation. If they do not, check the hardware and software of the IBM Personal Computer with the problem against that of an IBM Personal Computer that operates correctly. Are there differences in:

- Modem type or modem setup?
- Communication setup or logon procedure?

Make the necessary changes. Retry the operation.

Symptom Analysis

If the cause of a problem remains unknown after the above preliminary checks are completed, symptom analysis may be helpful in discovering it and resolving the problem. The procedure for symptom analysis that is used here is chronological in nature and based on operation flow. The broad, general problem symptoms that can be evident during an IBM Personal Computer/ host operation are:

- No physical line established
- Line dropped or disconnected
- No logical connection established
- Logon failed
- Data transmission errors
- Incorrect output (RJE)

Select the general symptom that is appropriate, and read through the more specific symptoms that follow. Each specific symptom has a number of questions (checkpoints) that may isolate the cause of the problem.

Remember, the specific symptoms that follow and the questions associated with them are not meant to be host-specific or all-inclusive. Their basic purpose is to help you logically search for the cause of a problem and perhaps trigger other questions that can be asked.

No Physical Line Established

No Answer from Host

1. Did the IBM Personal Computer operator dial a correct number? (switched line)
2. Is the host system powered on and available?

3. Is there power at the host modem wall outlet?
4. Are all cables properly connected at the host modem?
5. Is the host modem plugged into the appropriate port and are the modems compatible?
6. Was a host modem self-test done to verify operation?
7. Does the host modem have the auto-answer function, and was auto-answer enabled? (switched line)
8. Was a line defined for the IBM Personal Computer? Usually host software requires a line definition to generate communication support.
9. Is the host software line definition correct? Check the operands of the line definition for compatibility with line protocol, line speed, and modem characteristics.
10. Was the line started or enabled (switched or leased)? The host software that services the communication line must be started to enable auto-answer (switched line only).

The IBM Personal Computer Does Not Answer Host

1. Did the IBM Personal Computer operator dial a correct number (switched line only)?
2. Is the IBM Personal Computer powered on, and has the SNA 3270 Emulation or RJE Support diskette been loaded?
3. Is there power at the IBM Personal Computer modem wall outlet?
4. Are all cables properly connected at the IBM Personal Computer modem?

5. Is the IBM Personal Computer modem plugged into the appropriate adapter at the rear of the computer?
6. Has communication equipment been checked at the IBM Personal Computer. Use the IBM Personal Computer Diagnostics diskette and the *Guide to Operations* manual (6025000) to verify the IBM Personal Computer communication interface. Also, do the modem self-test to verify modem operation.
7. Is the host software definition correct? Check the line definition operands for compatibility with line protocol, line speed, and modem characteristics.

Line Busy (Switched Line)

1. Did the IBM Personal Computer operator dial a correct number?
2. Is the communication port available? Ask the host operator to inquire on the line status to see if another terminal is using the line.

Line Dropped or Disconnected

No Response from Answering Terminal or Line Dropped Immediately

1. Did power drop, or has the modem become unplugged at either location?
2. Are the operating parameters of the two modems compatible (line speed and strapping options, for example)?
3. Is the selected IBM Personal Computer communication setup compatible with host line definitions, protocols, and operating procedures, and are the modem line descriptions compatible?

4. Did an inactivity time-out occur either at the host or at the IBM Personal Computer?
5. Is the host software definition correct? Check the line definition operands for compatibility with line protocol, line speed, and modem characteristics.
6. Did any line activity occur? (You should print a copy of SDLC trace to determine this. (See “Formatted Communications Trace” in this appendix.) If any activity did occur, the problem is probably in a system generation parameter.

If you are running on a switched line and the IBM Personal Computer sent an XID and nothing occurred afterwards, you should check the host XID system generation. For instance, if your host system has VTAM, the XID is in the PU macro parameter. IDNUM and IDBLK are defined in the Network Control Program (PU macro) during the host system generation. IDBLK should equal 03D. IDNUM should match the configuration parameter in the configuration file.

If the host is sending data but the IBM Personal Computer is not responding, you should check that the NRZI and station address parameters in your configuration file match the host parameters.

No Logical Connection Established

Establish Connection Message Stays on Permanently

The **Establish connection if necessary** message stays on with line activity. This message is cleared by emulation when the logical unit defined by the configuration file has been activated by the host.

For RJE, the **Establish connection if necessary** message is scrolled up along with an **SNA RJE initialization complete** message when the logical unit is activated.

You should ensure that the host starts your logical unit and that your local address matches the host's.

Logon Failed

1. Has the system been set up for automatic logon? Automatic logon means that you do not need to log on because your configuration file contains your logon data. If you are already logged on, a second logon will fail. In RJE an **Enter logon** message on the 25th line tells whether a logon is needed. **Ready for input** means that you are logged on. Absence of either of the above messages means you have entered a logon in your configuration file, but the logon has not been accepted.

For 3270, **SYS.AVAIL LS** means that you need to log on. **SYS.AVAIL LL** means that you are logged on.

2. Was the terminal previously logged on, and is it still active? Ask the host operator to inquire on the terminal status. If the terminal is active, sign off the terminal or cancel. Restart a switched line.
3. Was the logon sent from the IBM Personal Computer? If there is no logon in the configuration file, you have to type in the logon.
4. Was the logon complete, and was the syntax correct?
5. Was an ID or password received from the IBM Personal Computer valid? Check the remote terminal software definition at the host to verify remote ID, password, and terminal characteristics.
6. If you are getting error messages from the host, you should contact your host system programmer.

7. If you are logging on and getting error message 4234, the host is sending the wrong Bind. You can run the SNA trace program (see “Formatted Communications Trace” in this appendix) to find out what is wrong with the Bind. Also, the way the Bind is checked is defined in the “Formatted Communications Bind” section also in this appendix.

Data Transmission Errors

Cannot Input Data to the Host (for RJE)

1. Was the terminal signed on successfully? Check messages received from the host after sign on, and have the host operator inquire on the terminal status. If not signed on correctly, refer to “Logon Failed” above.
2. Does a check of terminal status by the host operator show an active reader? If the reader is inactive or offline, have the host operator start the reader or vary the reader online.
3. Were incorrect operator commands or JCL statements sent to the host? If command syntax is incorrect, sometimes the host will flush the data without notification. Verify that JCL and ID parameters are correct.
4. Make sure the READFILE specified is on the diskette.
5. Make sure the EOF command statement is sent at the logical end of the input data.

Cannot Initiate Output from Host (for RJE)

1. Was the terminal signed on successfully? Check messages received from the host after sign on, and have the host operator inquire on the terminal status. If not signed on correctly, refer to “Logon Failed” above.

2. Does a check of terminal status by the host operator show an active printer and punch? If the printer or punch is inactive or offline, start the device or vary the device online.
3. Were the printer and punch defined correctly? Verify that a printer or punch definition is included in the remote terminal software definition.

Note: RJE does not support commands that require printer forms information to be entered from the IBM Personal Computer.

4. Was the printer started with the correct output forms information and job class? When output requests a special form or class, it will not start transmitting until the device has been restarted with the correct forms information or parameters.

If not, problems exist with output forms information or job class. You should check:

- a. the backlog to see if jobs are waiting to print,
 - b. whether the application started or abended,
 - c. the destination specified by the JCL.
5. Is the job on hold status? If it is, release the job from hold status.
 6. Ensure that the punch, print or exchange output is activated at the IBM Personal Computer by using a MODIFY command. You can check the current definition by entering `. . m.`

Incomplete Data Received at Host (for RJE)

Did the IBM Personal Computer abend the job because of an operator error or system failure? Operator errors can range from misspelling a filename to appending of jobs incorrectly.

Incorrect Output (RJE)

Data Received, But Prints Incorrectly at IBM Personal Computer

1. Does the host application have a programming logic error? Check the application's output data set on the host for the same formatting errors. This may indicate an application program error.
2. Did the applicationabend? Check program listings or host output for error messages.
3. Are the receive format defaults of the active setup compatible with the receive job?
4. If the data is a punch or exchange file, ensure that the MODIFY punch type equals the type of data you want. See "MODIFY Command Statement" in Chapter 8 for more information.
5. If the data prints output incorrectly, this may be because you are sending the data in a transparent mode. RJE translates all received EBCDIC print data to ASCII, except if it is sent in transparent mode.

Data Received, But Is Incomplete or Unintelligible

Does the host application have a programming logic error? Check the application's output data set on the host for the same formatting errors. This may indicate an application program error.

Data Lines Are Truncated

Has the specification for printer or punch width been checked at the host? The IBM Personal Computer supports a maximum width of 132.

Formatted Communications Trace

The SNA communication code saves information about request and response units and SDLC commands that have occurred with your communication sessions in trace tables for the following:

- SNA protocol
- SDLC protocol

Whenever you encounter difficult problems, these tables can be printed and used to aid in error analysis.

How to Print the Formatted Trace Table

The program to print the formatted trace table is resident at all times. To print the formatted trace table for SNA, do these steps:

For SNA Protocol

1. Make sure the printer is ready.
2. Press Alt-F10 only once to print the formatted trace table for SNA.

Note: If Alt-F10 is pressed again before the SNA protocol completes, the printing of the SNA trace will stop and the printing of the SDLC trace will start. After the SDLC trace printing is completed, the SNA trace printing will continue where it left off.

3. Press Ctrl-Break to stop the SNA trace and resume normal operations.

If the printer stops without errors, all SNA trace table entries have been printed and the following message is printed:

SNA formatted trace complete

Normal operations are resumed.

If any printer error occurs, the trace will stop without printing the **SNA formatted trace complete** message. Normal operations are resumed.

For SDLC Protocol

1. Make sure the printer is ready.
2. Press Alt-F10 once. When the SNA trace printing starts, press Alt-F10 again to print the SDLC formatted trace table.

If the printer stops without errors, all SDLC trace table entries have been printed and the following message is printed:

SDLC formatted trace complete

You return to SNA trace printing.

3. Press Ctrl-Break to stop SNA trace printing and return to normal operations.

If any printer error occurs, the SDLC trace will stop without printing the **SDLC formatted trace complete** message and return to SNA trace.

Note: Once SDLC trace printing starts, it cannot be ended with Ctrl-Break. The SDLC trace printing will continue until completion unless a printer error occurs.

Formatted Communications Bind

The data in the Bind is kept in a special control table. If more than one Bind is received, only the data from the last Bind is saved; therefore, the formatted trace printout will display the last Bind data for all the Binds.

Bind Support for RJE

Bind session (Bind) is sent by the host to the IBM Personal Computer to establish a session between the two logical units. Bind is sent either in response to a terminal initiated logon request or as an unsolicited request to start a session.

The Bind request is sent to the IBM Personal Computer from the host on the expedited flow, formatted, and with a definite response request.

The format and parameters of the Bind request unit (RU) as accepted by the IBM Personal Computer are given below.

Displacement			Field	Description
Hex	Dec	Bytes		
0	0	1	Request code X'31'	Bind request code
1	1	1	Format and type 00000001	Format 0 CODE
2	2	1	FM profile X'03'	FM profile 3
3	3	1	TS profile X'03'	TS profile 3
4	4	1	FM usage	PLU protocol

Displacement			Field	Description
Hex	Dec	Bytes		
			0	Only single RU chains are allowed from the primary
			1	Multiple RU chains are allowed from the primary
			.0	Immediate request mode
			.01	Exception response request
			..10	Definite response request
			..11	Definite or exception response request
			....00..	Reserved
			.....0.	Compression will not be used on requests from primary
			.....1.	Compression may be used on requests from the primary only
			.....1	Primary may send EB
5	5	1	FM usage	SLU protocol
			1	Multiple RU chains are allowed from the secondary
			.0	Immediate request mode
			..01	Exception response request
			..10	Definite response request
			..11	Definite or exception response request
			....00..	Reserved
			.....0.	Compression will not be used on requests from secondary

Displacement			Field	Description
Hex	Dec	Bytes		
			.....1.	Compression may be used on requests from the secondary only
6	6	1	FM usage	Common protocol
			0....000	Reserved
			.1.....	FM headers allowed only
			..1.....	Brackets are used
			...1....	Bracket termination rule 1 will be used during the session
			....0...	Alternate code set not allowed
			....1...	Alternate code set may be used
7	7	1	FM usage	Common protocol
			10.....	Half-duplex flip flop (HDX-FF) transaction mode
			..0.....	Primary is responsible for recovery
			...0....	Secondary is first speaker
			....000.	Reserved
			.....0	Secondary sends data first if HDX-FF or wins contention if HDX-contention
8	8	1	TS usage	
			0.....	One-stage pacing
			1.....	Two-stage pacing
			.0.....	Reserved
			..NNNNNN	Secondary send pacing count

Displacement			Field	Description
Hex	Dec	Bytes		
9	9	1	TS usage	
			00 . . . . ...NNNNNN	Reserved Secondary receive pacing count
A	10	1	TS usage	
			X'85'	Secondary maximum send RU size (larger values are acceptable but not used)
B	11	1	TS usage	
			X'85'	Primary maximum send RU size (smaller values are acceptable)
C	12	1	TS usage	
			0	Two-stage pacing
			1	One-stage pacing
			.0	Reserved
			..NNNNNN	Primary connection point manager send pacing count
D	13	1	TS usage	
			00	Reserved
			..NNNNNN	Primary connection point manager receive pacing count (not checked)
E	14	1	PS usage	LU profile
			0	PS usage field basic format
			.0000001	LU type 1

bytes 15-25 of the BIND contain information pertinent only to function management header (FMH) support.

Displacement			Field	Description
Hex	Dec	Bytes		
F	15	1	PS usage	
			0000	No FM headers allowed
			0001	FM header type 1 subset
			0010	FM header type 1 subset less restricted
			. . . . 0000	SCS basic controls, cards may not span RUs
			. . . . 0001	SCS basic controls, cards may span RUs
10	16	1	PLU usage	FMH flags
			0	Two destinations outstanding
			. 0	Compacted data must not be sent
			. . 0	PDIR not allowed
			. . . 000000	Reserved
11	17	1	PLU usage	FMH flags
			000 . 0000	Reserved
			. . . 0	Use of structured field for ERP not allowed
12	18	1	PLU usage	Data stream flags
			0	BS, CR, INP, ENP, LF, HT (defaultable), VT (defaultable) must not be sent
			1	BS, CR, INP, ENP, LF, HT (defaultable), VT (defaultable) may be sent

Displacement			Field	Description
Hex	Dec	Bytes		
			.0.....	SHF must not be sent
			.1.....	SHF may be sent
			..0.....	SVF must not be sent
			..1.....	SVF may be sent
			...0....	SVF (channels) and SEL must not be sent
			...1....	SVF (channels) and SEL may be sent
			....0...	SLD must not be sent
			....1...	SLD may be sent
			.....0..	Reserved
			.....0.	BEL must be sent
			.....1.	BEL may be sent
			.....0	TRN, IRS must not be used
			.....1	TRN, IRS may be used
13	19	1	PLU usage	Data stream flags
			0.....	SLU will initiate attended
			.0.....	SLU will not alternate from attended to unattended
			..000000	Reserved
14	20	1	PLU usage	Media flags
			0.....	Document output must not be sent
			1.....	Document output may be sent
			.0.....	Card format not allowed
			.1.....	Card format allowed
			..0.....	Exchange media format not allowed
			..1.....	Exchange media format Allowed
			...0....	Disk data management format not allowed

Displacement			Field	Description
Hex	Dec	Bytes		
			...1...	Disk data management format allowed This setting is allowed during bind; however, any FM header type 2 received will be rejected with a -RSP (1003).
			....0...	Extended card format not allowed
			.....0..	Extended document format not allowed
			.....0.	SLU may send CD every EDS
			.....1.	SLU must send CD every EDS
			.....0	Reserved

The following 5 bytes describe the IBM Personal Computer support of the indicated items as they will be sent from the IBM Personal Computer. These bytes will not be validated by the IBM Personal Computer system upon receipt of the Bind from the host, since the host may support more than the IBM Personal Computer will send.

15	21	1	SLU usage	FMH flags
			0.....	Two destinations outstanding
			.0.....	Compacted data must not be sent
			..0.....	PDIR not allowed
			...0....	Keyed direct data set not allowed
			....0...	Sequential data set not allowed

Displacement			Field	Description
Hex	Dec	Bytes		
			.....0..	Sequential access to addressed direct data set not allowed
			.....0.	Series ID not allowed
			.....0	Add replicate, replace replicate not allowed
16	22	1	SLU usage	FMH flags
			0...0000	Reserved
			.0.....	Query for data set not allowed
			..0.....	Create data set, scratch data set, scratch all data sets not allowed
			...0....	Execute FP not allowed
17	23	1	SLU usage	Data stream flags
			0.....	BS, CR, INP, ENP, LF, HT, VT must not be sent
			.0.....	SHF must not be sent
			..0.....	SVF must not be sent
			...0....	SVF (channels) and SEL must not be used
			....0...	SLD must not be sent
			.....00.	Reserved
			.....1	TRN, IRS may be used
18	24	1	SLU usage	Data stream flags
			0.....	PLU will initiate attended

Displacement			Field	Description
Hex	Dec	Bytes		
			.0	PLU will not alternate from attended to unattended
			. . 000000	Reserved
19	25	1	SLU usage	MEDIA FLAGS
			0	Document output not allowed
			.0	Card format not allowed
			.1	Card format allowed
			. . 0	Exchange media format not allowed
			. . . 0 . . .	Disk data management format not allowed
			. . . . 0 . .	Extended card format not allowed
			. . . . . 0 . .	Extended document format not allowed
			. . . . . . 0 .	PLU may send CD every EDS
			. . . . . . . 0	Reserved
1A	26	1	CRYPTO	
			0000	Reserved
			. . . . 0000	Length of CRYPTO field
1B	27	1	LUNAME	
			X'00'	Length of LUNAME field
			0-8	LUNAME
N	M	1	USER DATA	
			X'00'	Length of user data field

Any remaining Bind fields are ignored.

In the secondary LU parameter request protocol, the IBM Personal Computer system supports either exception response or definite response.

The IBM Personal Computer system will never request “no response.” The Bind will be rejected if this parameter specifies no response (B'00').

Logical Unit Type 1 Bind for RJE

The Bind parameters sent to the IBM Personal Computer are validated (checked) according to the following:

Byte	Bit	Check	Reject If
1	0-3	C	---- X'0'
	4-7	C	---- X'1'
2-3		C	---- X'03'
4	0	NC	
	1	C	B'1'
	2-3	C	B'00'
	4-5	NC	
	6	NC	
	7	C	B'0'
5	0	NC	
	1	NC	
	2-3	C	B'00'
	4-5	NC	
	6	NC	
	7	C	B'0'
6	4-7	NC	
	0	NC	
	1	C	B'0'
	2	C	B'0'
	3	C	B'0'
	4-7	NC	
7	0-1	C	---- B'10'
	2	C	B'1'
	3	C	B'1'
	4-7	NC	
8	0-1	NC	
	2-7	C	(2)
9	0-1	NC	

byte	bit	check	Reject If
	2-7	C	(2) (4)
10	0-7	NC	
11	0-7	C	> X'85'
12-13		NC	
14		C	---- X'01'
15-19		C	
20-23		C	
24		C	---- X'00'
25		C	
26		C	---- X'00'
27		NC	
		NC	
28-35		NC	

Notes:

1. Bytes 26-35 are reserved for the Encrypt/Decrypt feature.
2. Pacing must be less than or equal to the number of buffers available. See “Formatted Trace Buffer Count” in this appendix.
3. Abbreviations:
 - C = checked
 - NC = not checked
 - B = bit
 - ---- = logical not

The format and parameters of the Bind request as accepted by the IBM Personal Computer are:

Displacement			Field	Description
Hex	Dec	Bytes		
0	0	1	Request code X'31'	Bind request code
1	1	1	Format and type....0001	Code
2	2	1	FM profile X'03'	FM profile 3
3	3	1	TS profile X'03'	TS profile 3
4	4	1	FM usage 0.....	PLU protocol Only single request unit chains allowed from the primary
			1.....	Multiple request unit chains are allowed from the primary
			.0.....	Immediate request mode
			..01....	Exception response request
			..10....	Definite response request
			..11....	Definite or exception response request
			....00..	Reserved
			.....0.	Compression will not be used on requests from primary
			.....1	Primary half-session can send EB

Displacement			Field	Description
Hex	Dec	Bytes		
5	5	1	FM usage	SLU protocol
			1	Multiple request unit chains are allowed from the secondary
			.0	Immediate request mode
			..01	Exception response request
			..10	Definite response request
			..11	Definite or exception response request
			....00 . ......0 .	Reserved
.....0	Compression will not be used on requests from secondary			
6	6	1	FM usage	Secondary will not send EB
			....000	Common protocol
			.0	Reserved
			..1	No FM Headers allowed
			...1	Brackets are used
7	7	1	FM usage	Brackets termination rule 1 will be used during the session
			10	EBCDIC
			..0	Common protocol
			...0	HDX flip flop mode
8	8	1	TS usage	Primary responsible for error recovery
			.0	Secondary is first speaker contention if HDX-CON
			..NNNNNN	Reserved
9	9	1	TS usage	Secondary send pacing count
			00	Reserved
			..NNNNNN	Secondary receive pacing count

Displacement			Field	Description
Hex	Dec	Bytes		
A	10	1	TS usage	Secondary max send request unit size
B	11	1	TS usage	Primary max send request unit size
C	12	1	TS usage	Two-stage pacing
			0	One-stage pacing
			1	Reserved
			.0	Primary CPMGRS send pacing count (not checked by the IBM Personal Computer)
D	13	1	TS usage	Reserved
			00	Primary CPMGRS RCV pacing count (not checked by the IBM Personal Computer)
			. . NNNNNN	Logical unit profile PS usage field basic format
E	14	1	PS usage	Logical unit type 2
			0	
			.0000010	

Note: FM headers are not supported for 3270 Emulation. The following 3 bytes (15-17) of the Bind contain information pertinent only to FM Header support and they are not validated when using 3270 Emulation.

F	15	1	PS usage	Reserved
			00000000	
10	16	1	PL usage	FMH flags
			00000000	Reserved
11	17	1	PLU Usage	FMH flags
			00000000	Reserved

Displacement			Field	Description
Hex	Dec	Bytes		
12	18	1	PLU usage 00000000	Data Stream flags Reserved
13	19	1	PLU usage	Data stream flags
14	20	0-7		Default screen size: rows
			00011000	24 rows Default
			01010000	screen size: columns 80 columns
16	22	0-7		Alternate screen size
			01010000	24 rows
17	23			Alternate screen size
			01010000	Reserved
18	24			screen size
			00000000	Undefined (24 x 80 assumed)
		1-7	00000100	24 rows by 80 columns
			01111111	24 x 80 defined in bytes 20-23, all other values rejected
19	25		00000000	Reserved
1A	26	1	CRYPTO 0000 0000	Reserved Length of CRYPTO field
1B	27	1	LUNAME X'00'	Length of LUNAME field
M ⁴	N ⁴ 1	0-8	LUNAME X'00'	User data Length of user data field

Note:

1. Any remaining user data fields are ignored by the IBM Personal Computer.
2. In the secondary logical unit parameter request protocol, the IBM Personal Computer supports either exception response or definite response.
3. The IBM Personal Computer never requests "no response." The Bind is rejected if this parameter specifies no response (B'00').

Logical Unit Type 2 Bind For 3270

The Bind parameters sent to the IBM Personal Computer are checked according to the following:

Byte	Bit	Check	Reject If
1	0-3	C	--- X'0'
	4-7	C	--- X'1'
2-3		C	--- X'03'
4	0	NC	
	1	C	B'1'
	2-3	C	B'00'
	4-5	NC	
	6	C	B'1'
	7	C	B'0'
5	0	C	B'0'
	1	NC	
	2-3	C	B'00'
		save	
6	4-7	NC	
	0	NC	
	1	C	B'1'
	2	C	B'0'
	3	C	B'0'
	4	C	B'1'
	5-7	NC	
7	0-1	C	--- B'10'
	2	C	B'1'
	3	C	B'1'
	4-7	NC	

Byte	Bit	Check	Reject If
8		NC	
	2-7	C	(2)
9	0-1	NC	
	2-7	C	(2)
10	0-7	C	<X'85'
11	0-7	C	>X'F8'
12-13		NC	
14		C	--- X'02'
15-19		NC	
20-23		C(4)	--- X'18501850'
24		C	--- X'00', X'02', X'7E', or X'7F'
25		N	
26		C	--- X'00'
27		C	
28-35		NC	

Notes:

1. Byte 26 is reserved for the encrypt/decrypt feature.
2. Abbreviations:
 - C = checked
 - NC = not checked
 - B = bit
 - --- = logical not

Formatted SNA Trace Table Terms

Term	Meaning
(ABORT)	Abort data set
(ADS/CPC)	Abort data set compacted
(ADS/CPR)	Abort data set compressed
(ADS/EXC)	Abort data set basic exchange
(B&E/CPC)	Begin and end data set compacted
(B&E/CPR)	Begin and end data set compressed
(B&E/EXC)	Begin and end data set basic exchange
(BDS)	Begin data set
(BDS/CPS)	Begin data set compacted
(BDS/CPR)	Begin data set compressed
(BDS/EXC)	Begin data set basic exchange
(BDS/EDS)	Begin and end data set
(CDS/CPC)	Continue data set compacted
(CDS/CPR)	Continue data set compressed
(CDS/EXC)	Continue data set basic exchange
(CONTINUE)	Continue data set
(EDS)	End data set
(EDS/CPC)	End data set compacted
(EDS/CPR)	End data set compressed
(EDS/EXC)	End data set basic exchange
(RESUME)	Resume data set
(RDS/CPC)	Resume data set compacted
(RDS/CPR)	Resume data set compressed
(RDS/EXC)	Resume data set basic exchange
(SDS/CPC)	Suspend data set compacted
(SDS/CPR)	Suspend data set compressed
(SDS/EXC)	Suspend data set basic exchange
(SUSPEND)	Suspend data set
+ RSP	Positive response indication
-RSP	Negative response indication
ACTLU	Activate logical unit command
ACTPU	Activate physical unit command
BB	Begin bracket
BB,EB	Begin and end bracket
BC	Begin chain indication
BC,EC	Begin chain, end chain
BID	Bid command
BIND	Bind command
CANCEL	Cancel command
CARD	Card media
CD	Change direction

CHASE	Chase command
CLEAR	Clear command
CONS	Console media
DACTLU	Deactivate logical unit command
DACTPU	Deactivate physical unit command
DAF	Destination address field (equivalent to local address field in configuration)
DFC	Data flow control command type
DR1	Definite response one
DR1&2	Definite response one and two
DR2	Definite response two
EB	End Bracket
EC	End chain indication
ER	Exception response
EXCH	Exchange media
EXPED	Expedited flow
FIS	First in segment
FMD	Function management data type
FMH	Function management header
LIS	Last in segment
LUSTAT	LU status command
MIS	Middle in segment
MOC	Middle of chain indication
NC	Network control command type
NORMAL	Normal flow
NORSP	No response
NOTIFY	Notify command
OAF	Origin address field
PACREQ	Pacing request
PACRSP	Pacing response
PRNT	Print media
RECFMS	Record formatted maintenance statistics command
RECMS	Record maintenance statistics command
REQDSC	Request discontact command
REQMS	Request maintenance statistics command
RSHUTD	Request shutdown command
SC	Session control command type
SHUTC	Shutdown complete command
SHUTD	Shutdown command
SIGNAL	Signal command
UNBIND	Unbind command

Formatted SNA Trace Table Bind Error Messages

ERR001 BYTE 01 — FORMAT & TYPE MISMATCH

This error occurs if this byte is not X'01'.

ERR002 BYTE 02 — FM PROFILE MISMATCH

The FM Profile allowed is X'03'.

ERR003 BYTE 03 — TS PROFILE MISMATCH

The TS Profile allowed is X'03'.

ERR004 BYTE 04 — PLU PROTOCOL MISMATCH

This error occurs if the immediate request mode bit is on (bit 1) (bit 0 for 3270), the primary may send EB bit is off (bit 7), or if either of the reserved bits is on (bits 4 & 5). In addition when using 3270 this error will occur if the compression bit is on (bit 6).

ERR005 BYTE 04 — NO RESPONSE NOT ALLOWED

This error occurs if both response bits are off (bits 1 & 2). Response types are: exception response (b'01'), definite response (b'10'), or both (b'11').

ERR006

BYTE 05 — SLU PROTOCOL MISMATCH

This error will occur if the multiple RU chains allowed bit is off (bit 0), if immediate request mode bit is on (bit 2), or if the reserved bits (bits 4 & 5) are on.

ERR007

BYTE 05 — NO RESPONSE NOT ALLOWED

This error will occur if both response bits are off (bits 1 & 2). Response types allowed are: exception response (b'01'), definite response (b'10'), or both (b'11').

ERR008

BYTE 05 — END BRACKET SHOULD BE ALLOWED

This error will occur only when using RJE if the send EB bit is off (bit 7).

ERR010

BYTE 06 — COMMON PROTOCOL MISMATCH

This error will occur if the brackets used bit is off (bit 2), the bracket rule termination bit is off (bit 3), or, if not 3270 Emulation, any of the reserved bits are on (bits 0, 5, 6, & 7). In addition, in 3270 Emulation, this error will occur if the FM headers bit is off (bit 1). In 3270 Emulation, if FM headers allowed (bit 0) or EBCDIC is not specified (bit 4) is on this error will occur.

- ERR013** **BYTE 07 — COMMON PROTOCOL MISMATCH**
- This error will occur if the byte is not X'80'. In addition, if in 3270 Emulation and primary LU not responsible for error recovery (bit 2) or SLU not first speaker (bit 3) is on this error will occur.
- ERR014** **BYTE 08 — SEC SEND PACING COUNT MISMATCH**
- This error will occur if the secondary send pacing count in the bind is greater than the secondary send pacing count allowed per setup instructions. See the section "Formatted Trace Buffer Count" later in this appendix.
- ERR015** **BYTE 09 — SEC RECV PACING COUNT MISMATCH**
- This error will occur if the secondary receive pacing count in the bind is greater than the secondary receive pacing count allowed per setup instructions. See the section "Formatted Trace Buffer Count" later in this appendix.
- ERR016** **BYTE 11 — PRI MAX SEND RU SIZE GT 256**
- This error will occur during RJE operation if the RU size specified is greater than 256. The specification for 256 is X'85' meaning $8 \times (2^* * 5)$.
- ERR017** **BYTE 10 — SEC MAX SEND RU SIZE LT 256**
- This error will occur during RJE operation if the RU size specified is less than 256. The specification for 256 is X'85' meaning $8 \times (2^* * 5)$.

- ERR018** **BYTE 14 — LU PROFILE TYPE NOT EQUAL TO 1**
- This error will occur if the LU profile type is not equal to one.
- ERR019** **BYTE 15 — INVALID FM HEADER SUBSET**
- This error will occur during RJE operation if the FM header subset bits (bits 0 to 3) are anything other than b'0010'.
- ERR020** **BYTE 15 — INVALID SCS CHARACTER SUBSET**
- This error will occur during RJE operation if the SCS control bits (bits 4 to 7) are anything other than b'0000' or b'0001'.
- ERR021** **BYTE 16 — PLU USAGE MISMATCH**
- This error will occur during RJE operation if any of the bits in this type are on.
- ERR022** **BYTE 17 — PLU USAGE MISMATCH**
- This error will occur during RJE operation if any of the bits are on.
- ERR023** **BYTE 18 — PLU USAGE MISMATCH**
- This error will occur during RJE operation if the reserved bit (bit 5) is on.

ERR024 BYTE 19 — PLU USAGE MISMATCH

This error will occur during RJE operation if any of the bits in this byte are on.

ERR025 BYTE 20 — PLU USAGE MISMATCH

This error will occur during RJE operations if the extended card format bit is on (bit 4), the extended document format bit is on (bit 5), or the reserved bit is on (bit 7).

ERR027 BYTE 20 — MUST NOT SEND CD EVERY EDS

This error will occur during RJE operation if the SLU must send CD every EDS bit is on (bit 6).

ERR028 BYTE 20 — DATA MANAGEMENT NOT ALLOWED

This error will occur during RJE operation if the disk data management allowed bit is on (bit 3).

ERR029 BYTE 26 — CRYPTO FIELD NOT ALLOWED

This error will occur if the crypto field is anything other than X'00'.

ERR032 BYTE 24 — SCREEN SIZE

This error will occur during 3270 Emulation if the LU type is two and the screen size sent from the host is not 80 X 24. The acceptable values in this byte are X'00', X'02', X'7E', or X'7F'.

Formatted Trace Buffer Count

The number of buffers allocated determines if a Bind can be accepted. The number of buffers must be equal to or greater than the (RU size divided by 256) multiplied by the pacing.

SDLC Formatted Trace

SDLC Formatted Trace formats and prints the contents of the SDLC trace table, the error log, and the RAS counters to the printer.

SDLC Trace Table

The SDLC trace table is a wraparound table. Once the table has been filled, the earliest data is overlaid with the latest data. Whether the table is filled (wraparound has occurred) or only partially filled, the data is printed in chronological order (oldest data first).

The printing of SNA trace is suspended during the printing of the SDLC trace. It is continued after the SDLC trace printing is completed. In addition, once the contents of the table have been printed, the entire table is filled with hexadecimal zeros and the entry pointer is restored to the start of the trace table.

When you invoke the SDLC Formatted Trace program, the printer issues a page eject and prints two header lines. The first header line identifies the four major columns of the dump as Received, Transmitted, Frame Reject, and Other. The second header line identifies sub-columns beneath each major column.

Received

The received column is divided into five sub-columns identified as CNTL, P/F, NS, NR, and RXIRQ.

- | | |
|--------------|--|
| CNTL | The entry under CNTL will be an acronym described in the section “Trace Table Entry” later in this appendix, where byte 1 contains X‘08’. An entry of ‘.XX.’ means the hexadecimal code encountered (represented by XX) is either unrecognized or unsupported. |
| P/F | An entry of 1 or 0 means that the poll/final bit in the received control byte was either on or off respectively. |
| NS | The value of the NS count in the received I-frame. This value can range from 0 to 7. |
| NR | The value of the NR count in the received I-frame or supervisory command. This value can range from 0 to 7. |
| RXIRQ | The last 8273 receive IRQ input result. See the section “Trace Table Entry” later in this appendix for the hexadecimal codes and their meanings. |

Transmitted

The transmitted column is divided into six sub-columns identified as CNTL, P/F, NS, NR, TXIRQ, and STAT.

- CNTL** The entry under CNTL will be an acronym described in the section “Trace Table Entry;” where byte 1 contains X‘04’. An entry of ‘XX.’ means that the hexadecimal code encountered (represented by XX) is either unrecognized or unsupported.
- P/F** An entry of 1 or 0 means that the poll/final bit in the transmitted control byte was either on or off respectively.
- NS** The value of the NS count in the transmitted I-frame. The value can range from 0 to 7. If a frame-reject was sent, this value represents this station’s present NS count.
- NR** The value of the NR count in the transmitted I-frame or supervisory command. The value can range from 0 to 7. If a frame-reject was sent, this value represents this station’s present NR count.
- TXIRQ** The last 8273 transmit IRQ input result. See the section “Trace Table Entry” for the hexadecimal codes and their meanings.
- STAT** The last 8255 port a modem status. See the section “Trace Table Entry” in this appendix for the hexadecimal codes and their meanings.

Frame Reject

The frame reject column is divided into two sub-columns identified as RJC and REJ-TYPE.

RJC The hexadecimal notation of the rejected control byte.

REJ-TYPE An acronym reflecting the reason for the rejection. If there is more than one reason, they all will be printed under this column. See the section “Trace Table Entry” under byte 6 in this appendix for the acronyms and their meanings.

Other

The other column is divided into three sub-columns identified as TYPE, DESCRP, and STAT.

TYPE Identifies the type of trace table entry. The entry will either be time-out completion (TC) or modem transition (MT).

DESCRP An acronym describing the time-out completion or modem transition. See the section “Trace Table Entry.” Byte 1 contains X‘01’ for the time-out completion acronyms and their meanings and X‘02’ for the modem transition acronyms and their meanings.

STAT The last 8255 port a modem status.

Byte 1 Contents	Byte 2 Contents	Meaning	Acronym
X'08'	Last 8273	RXIRQ input	
	X'03'	Invalid I-Frame (FCS error)	INVF
	X'05'	Idle detected	IDLE
	X'08'	DMA overrun	DMAO
	X'09'	Buffer overflow	BUFO
	X'0A'	Carrier detect failure	CDF
	X'0B'	Receive IRQ overrun	IRQ
	X'E0'	Receive complete. Addr A1 match	(See control byte)
	X'E1'	Receive complete. Addr A0 match	(See control byte)

Byte 3 Byte 1	Byte 2	Byte 3	Acronym
X'01'		Last 8255 port a modem status	(See byte 1 contents)
X'02'		Last 8255 port a modem status	(See byte 1 contents)
X'04'	X'0C'	Control byte	(See control byte contents)
	X'0D'	8255 port a modem status	XCMP
	X'0E'	8255 port a modem status	DMAU
	X'0F'	8255 port a modem status	CTSE
	X'10'	8255 port a modem status	ABRT
X'08'	X'03'	8255 port a modem status	INVF
	X'05'	8255 port a modem status	IDLE
	X'08'	8255 port a modem status	DMAO
	X'09'	8255 port a modem status	BUFO
	X'0A'	8255 port a modem status	CDF
	X'0B'	8255 port a modem status	IRQO
	X'E0'	Control byte	(See control byte contents)
	X'E1'	Control byte	(See control byte contents)

Byte 4

Rejected control byte

Byte 5

This station presents NR/NS count

Byte 6

Contents	Meaning	Acronym
X'01'	Invalid or non-implemented command	INVAL CMD
X'02'	Prohibited I-field	PROH IFLD
X'04'	Buffer overrun I-field too long	BUF OVRUN
X'08'	Received NR is incongruous	NR INCONG

Control Byte Contents (Non-Sequenced Format)

Commands

Hex Value	Acronym	Meaning
PF = 1 PF = 0		
33 23	NSP	Non-sequenced poll
13 03	NSI	Non-sequenced information
93 83	SNRM	Set normal response mode
53 43	DISC	Disconnect
17 07	SIM	Set initialization mode
BF AF	XID	Exchange station identification
F3 B3	TEST	Test

Responses

Hex Value	Acronym	Meaning
PF = 1 PF = 0		
13 03	NSI	Non-sequenced information
73 63	UA	Unnumbered acknowledgement
17 07	RQI	Request for initialization
1F 0F	DM	Disconnect mode
97 87	FRMR	Frame reject
BF AF	XID	Exchange station identification
F3 E3	TEST	Test

Control Byte Contents (Supervisory Format)

Bits	Hex Value	Meaning	Acronym
0-2	0-7	NR count	NR
3	0/1	Off/on	P/F
4-6	0-7	NS count	N/S
7	0	Information frame	IFRM

SDLC Error Log Trace

The SDLC error log is a wraparound table where, once the table has been filled, the earliest log entry is overlaid with the latest log entry. Each entry is 2 bytes in length and the table has sufficient space for 32 entries. Whether the table is filled (wraparound has occurred), or only partially filled, the entries are printed in chronological order (oldest entries first).

The SDLC Formatted Print Trace program does not zero the error log once the contents have been printed.

At the start of the error log trace, the printer is issued a page eject and two header lines are printed. The first header line identifies the report as an Error Log Summary. The second header line identifies the two columns of the report as Error and Status.

Error

This column contains the meaning of the first byte of the error log entry. See the section “Error Log Entry” later in this appendix for the error codes contained in byte 1 and their meanings.

Status

The entry in this column is the hexadecimal value of byte 2 of the error log entry. The meaning of this code varies with the content of byte 1. See the section “Error Log Entry” for the content of byte 2 and the relationship with byte 1.

Error Log Entry

Byte 1 Contents	Byte 2 Contents
X'08'	8273 status
X'0B'	8273 status
X'0E'	8273 status
X'2E'	8273 status or X'04' (frame reject reason)
X'2F'	8273 status
X'3F'	8273 status
X'11'	8255 port a modem status
X'14'	8255 port a modem status
X'15'	8255 port a modem status
X'1A'	8255 port a modem status
X'1E'	8255 port a modem status
X'1F'	8255 port a modem status
X'24'	8255 port a modem status
X'21'	Frame reject reason
X'01'	Invalid command
X'02'	Invalid I-field
X'08'	NR count received out of range

Error Log Entry

Byte 1 Contents

Meaning

X'08'	DMA overrun
X'0B'	Receive IRQ overrun
X'0E'	DMA underrun
X'11'	DSR failed to drop
X'14'	DSR dropout
X'15'	Transmit failure time-out
X'1A'	CD dropout in receive
X'1E'	CTS active without RTS
X'1F'	CTS dropout in transmit
X'21'	Invalid command received
X'24'	Inactivity time-out
X'2E'	Receive serial buffer overflow
X'2F'	Frame off byte boundary
X'3F'	Hardware failure — abort

RAS Counters

SDLC maintains 14 RAS counters:

1. Total I-frames transmitted
2. Total I-frame retransmitted
3. Valid I-frames FCS (frame check sequence)
4. Frames with FCS error
5. Invalid commands/responses received
6. DSR dropouts
7. CTS dropouts
8. CD dropouts
9. Transmit failure time-outs
10. Inactivity time-outs
11. False interrupts
12. Procedural errors
13. SDLC adapter errors
14. Valid test commands received

These counters are 4-byte binary counters. However, the maximum number printed on the counter dump is 99,999,999. The counters are not reset to zero by the RAS dump program.

When the SDLC Formatted Trace program is invoked, the printer is issued a page eject and two header lines are printed. The first line identifies the report as the RAS Counter Summary. The second header line identifies the two columns of the report as Counter and Count. The Counter column identifies one of the counters listed above. The Count column lists the contents of the specified counter. Only those counters having a value greater than zero are reported.

APPENDIX C. DIFFERENCES BETWEEN AN IBM 3270 AND EMULATION

When an IBM Personal Computer operates in emulation mode, the following differences from 3274 Model 51C, logical type 2, Control Unit using a 3278 Model 2 display/keyboard operation might be observed:

- The size of the data stream accepted by the IBM Personal Computer is limited by storage. Because a 3274 control unit handles data streams dynamically, there is no effective limit to the data stream size that can be handled. However, the IBM Personal Computer requires that the entire data stream be in storage before mapping to screen image takes place. A maximum storage size of 4,096 bytes has been allocated for that purpose. So, if more than 4,096 bytes are received, only 4,096 bytes are processed before the next 4,096 bytes are processed.
- Address bytes and attribute bytes outside the graphic range defined for IBM 3270 control character I/O codes are not supported.
 - If an IBM 3270 field attribute within a 3270 data stream is not as specified in the *IBM 3270 Information Display System Data Stream Programmer's Reference*, the resulting field attribute on the screen is indeterminate as is the corresponding attribute returned on a subsequent read buffer command.

- If the address bytes of a Set Buffer Address order, Erase Unprotected to Address order, or Repeat to Address order within an IBM 3270 data stream are not encoded as specified in the programmer's guide mentioned above, an invalid address error results and an error is reported to the host.
- Multiple Request Unit (RU) processing for error recovery for the IBM Personal Computer displays the previous screen when an error is found in any of the RUs that constitute a complete screen. The 3274-51C/3278 displays the data for each RU as it is processed. Thus if an error occurs in the 4th RU of a 4-RU data stream, the IBM Personal Computer displays the first three RUs of the data stream being processed like the 3278 if the error occurs in the actual data. If the above error occurs in DFC protocol, the IBM Personal Computer does not change the screen, whereas the 3278 would change the screen. The IBM Personal Computer sends the same error responses to the host as the IBM 3274 for the same conditions.
- OIA differences:
 - The Operator Information Area (OIA) codes for Machine Check (MC), Program Check (PC), and Communications Check (CC) are not supported as they are in the 3278. Instead, a unique set of error codes is used for these functions.
 - The displaying of NUM in the mode area when the numeric lock feature is enabled is not done. If a nonnumeric key is pressed, the input inhibited numeric field (NF) is displayed. Pressing the Reset key always allows you to continue entering numeric data.

- The 3278 comes up in the unknown state but emulation comes up with an **Establish connection if necessary** message. This message goes away after the first ACTLU and is replaced by the LS state. After going to the LS state (when there is no LL session), emulation goes to unknown state if you press the Sys Req key. This latter operation is the same as 3278; the former is not.
- Print support differences:

The 3287 Models 1 and 2 Printers are not emulated. Each local copy (pressing of the Shift-PrtSc keys) and host-initiated local copy (write to the screen with the print bit on in the WCC) will create a copy of the display screen.

- IBM Personal Computer 3270 Emulation supports only one logical unit (terminal) for each 3274 control unit.

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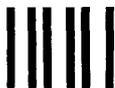
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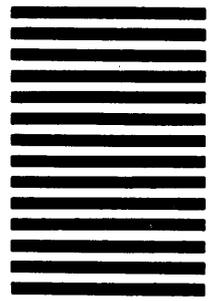


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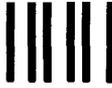
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