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IBM 5280 Distributed Data System

Communications Reference Manual

Program Number
5708-DC1

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This is a major revision of, and obsoletes, SC34-0247-0. Because the changes and additions are extensive, this manual should be reviewed in its entirety.

This edition applies to release 1, modification 0 of the IBM 5280 Communications Utilities Program Product (Program Number 5708-DC1) and to all subsequent releases and modifications unless otherwise indicated in other editions or technical newsletters.

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Preface

This manual provides 5280 programmers with the information necessary to use the communications utilities and to write communications programs using DE/RPG and assembler language. It is intended for programmers who have experience in data communications programming and are familiar with data communications concepts and terminology.

This publication contains the following chapters:

Chapter 1. Introduction summarizes the functions of the Communications Utilities licensed program. It also discusses the BSC and SNA/SDLC support provided on the 5280, communications configurations, and the contents of the communications diskette shipped to you by IBM.

Chapter 2. Preparation Utilities describes how to use four utility programs to describe the communications environment, to describe communications jobs, and to load the communications access method.

Chapter 3. BSC Execution Utilities describes the functions of and how to run three utilities which transfer data using a BSC data link: the BSC Batch Transfer Utility, the BSC Data Communications Utility and the MULTI-LEAVING Remote Job Entry (MRJE) Utility.

Chapter 4. SNA Execution Utilities describes the functions of and how to run two utilities which transfer data in an SNA/SDLC network: the SNA Data Communications Utility and the SNA Remote Job Entry (SRJE) Utility.

Chapter 5. Data Communications Programming Using Assembler Language describes how to write a BSC assembler program and an SNA/SDLC assembler program. It includes explanations of assembler language instructions used in communications and sample BSC and SNA/SDLC programs.

Chapter 6. Data Communications Programming Using DE/RPG explains how to write a communications program using DE/RPG, and includes a sample program.

Chapter 7. Problem Determination Aids describes how to use the BSC Online Test Utility and the functions of the trace table.

Chapter 8. Concepts of Operation discusses some 5280 system considerations as they are implemented and used by communications, including diskette data sets, magnetic reader data format, partition considerations, function and command keys, the status line on the display, RJE messages, and error recovery procedures.

This manual contains the following appendices:

Appendix A. Status Codes Sent by the 5280 to the Host

Appendix B. BSC Data Link Control Characters

Appendix C. BSC Utility/CAM Protocol

Appendix D. MRJE Link Protocol

Appendix E. 5280 SNA BIND Support

Appendix F. SNA Protocol Sequence Diagrams

Appendix G. Layouts of Records Created Using the Preparation Utilities

Appendix H. External Status and Completion Codes

Appendix I. Host Programming Considerations

CONVENTIONS FOR ILLUSTRATING STATEMENT AND INSTRUCTION FORMATS

Capitalized terms, brackets, and braces have special meanings in descriptions of utility control statements and instructions.

Capitalized terms must be entered as they are shown. Numbers and special characters within a capitalized term must also be entered as they are shown. You must replace terms that are not capitalized with appropriate values. For example, the statement

.. READFILE DSN-name

could be entered

.. READFILE DSN-PAYROLL

Brackets ([ ]) are not entered as part of the statement. Brackets indicate that the expression they enclose is optional. For example

[DATE-date]

means that you need not enter the expression.

Braces ({ }) are not entered as part of the statement. Braces indicate that you must select one of the values enclosed within the braces. For example, in the parameter

CMD-{N/Y}

either Y or N must be selected.

Underlining denotes a default value. A default value is one that is automatically assigned when an optional parameter is omitted. In the example shown for braces, N is the default value.

RELATED PUBLICATIONS

Information about the 5280 system and its components can be found in:

- *IBM 5280 General Information*, GA21-9350
- *IBM 5280 Planning and Site Preparation Guide*, GA21-9351
- *IBM 5280 System Concepts*, GA21-9352
- *IBM 5280 Assembler Language Reference Manual*, SC21-7790
- *IBM 5280 DE/RPG Reference Manual*, SC21-7787
- *IBM 5280 DE/RPG User's Guide*, SC21-7804
- *IBM 5280 Operator's Guide*, GA21-9364
- *IBM 5280 Message Manual*, GA21-9354
- *IBM 5280 Utilities Reference/Operation Manual*, SC21-7788

Information about Binary Synchronous Communications (BSC) can be found in:

- *General Information—Binary Synchronous Communications*, GA27-3004

Information about Systems Network Architecture (SNA) and Synchronous Data Link Control (SDLC) can be found in:

- *Systems Network Architecture—General Information*, GA27-3102
- *IBM Synchronous Data Link Control*, GA27-3093
- *SNA Logical Unit Types*, GC20-1868
- *Systems Network Architecture—Types of Logical Unit to Logical Unit Sessions*, GC20-1869
- *Systems Network Architecture Format and Protocol Reference Manual: Architecture Logic*, SC30-3112
- *Systems Network Architecture Reference Summary*, GA27-3136

Additional Related Publications

- *OS/VS2 MVS JES2 Commands*, GC23-0007
- *System Programming Library: Network Job Entry Facility for JES2*, SC23-0003
- *OS/VS2 MVS JES3 Commands*, GC23-0008
- *OS/VS2 MVS System Programming Library JES3*, GC28-0608
- *OS/VS1 RES Workstation User's Guide*, GC28-6879
- *DOS/VS POWER/VS Workstation User's Guide*, GC33-6049
- *IMS Installation Guide*, SH20-9081
- *IMS/VS1 Utilities Reference Manual*, SH20-9029
- *IMS/VS1 Application Programming Reference Manual*, SH20-9026
- *IMS/VS1 Advanced Functions for Communications*, SH20-9054
- *IMS/VS1 System Programming Reference Manual*, SH20-9027
- *CICS System Programmer's Reference Manual*, SC33-0069
- *OS/VS BTAM Manual*, GC27-6980
- *VSE/POWER Remote Job Entry User's Guide*, SH12-5328
- *VSE/POWER Installation and Operations Guide*, SH12-5329
- *VSE/POWER Messages*, SH12-5520
- *RPG Reference Manual*, SC21-7595
- *RPG Reference Manual*, SC21-7667

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Chapter 1. Introduction

The IBM 5280 Distributed Data System is a multipurpose diskette-based system that can be used in a variety of data processing applications. It can consist of a programmable data station or programmable control unit, auxiliary work stations, diskette drives and printers.

The 5280 Communications Utilities licensed program enables the 5280 system to transfer data over a communications line. It consists of communications access method (CAM) support, a set of communications utility programs, and the capability to write your own communications programs using DE/RPG or the 5280 Assembler Language, as shown in Figure 1-1.

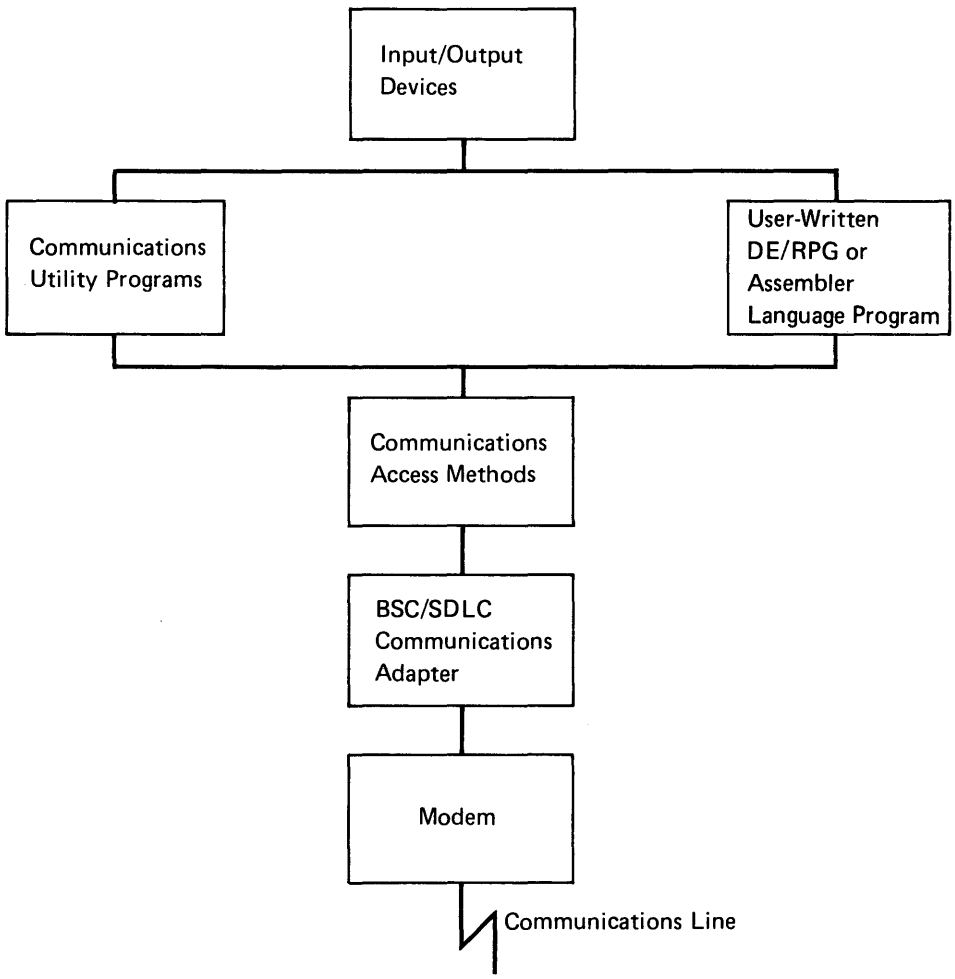

Figure 1-1. Overview of Communications on the 5280 Distributed Data System

COMMUNICATIONS ACCESS METHODS

The communications access method (CAM) links a communications program, either IBM-supplied or your own, with the communications network. It provides data formatting and link protocol functions to relieve the communications program of these responsibilities. Any 5280 communications program that communicates with a terminal or host computer executes in conjunction with the CAM.

Six different versions of CAM are provided. Each version is designed to be used in a specific type of network (BSC or SNA/SDLC) and with a 5280 communications program that performs a specific type of function (batch transfer, inquiry or remote job entry). The CAM executes in its own partition; therefore, to perform data transfers two partitions are required: one for the communications program and one for the CAM.

The Communications Load Utility loads the CAM into main storage. Each execution utility automatically invokes the Communications Load Utility to perform this function.

COMMUNICATIONS UTILITIES

In conjunction with the CAM, the communications utilities can perform the following data transfer functions in either a Binary Synchronous Communications (BSC) or Systems Network Architecture/Synchronous Data Link Control (SNA/SDLC) network:

- Send data to a terminal or host computer
- Receive data from a terminal or host computer
- Inquire into host subsystem files and receive replies
- Submit, execute and obtain results of jobs from a host RJE subsystem

The communications utilities are divided into two groups: *preparation* utilities which are used to prepare for communications and *execution* utilities which actually transfer data over a communications line.

The preparation utilities are interactive in that you respond to prompts using the keyboard/display. The prompts ask you to specify characteristics and select options that will be used by one of the execution utilities. Your responses are saved on a diskette data set and identified by a name you provide. To run one of the execution utilities, you provide this name. Because your responses are saved on diskette, they can be used again and again, thus eliminating repetition and duplication in preparing for communications. The preparation utilities are:

- Communications Configuration Utility
- Communications Load Utility

- Data Communications Description Utility
- RJE Description Utility

The execution utilities transfer data to and from the 5280 Distributed Data System and another terminal or host computer over a communications line. Each execution utility operates in conjunction with a version of the CAM to perform data transfers. The execution utility and the CAM must reside concurrently in two separate partitions in main storage.

An execution utility executes a *communications job*. A communications job is one or several data transfer functions (such as transmit, receive, or inquiry) which the utility performs as one unit of work while communicating with one system or host subsystem. The Data Communications Description Utility or the RJE Description Utility must be used to describe and name a job before it can be executed. The execution utilities are:

- BSC Batch Transfer Utility
- BSC Data Communications Utility
- MULTI-LEAVING Remote Job Entry (MRJE) Utility
- SNA Data Communications Utility
- SNA Remote Job Entry (SRJE) Utility
- BSC Online Test Utility

The preparation and execution utilities are described in more detail below. Figure 1-2 shows the interrelationship of the preparation utilities, execution utilities and the CAMs. You may want to refer to this figure while reading about each utility.

Preparation Utilities

Communications Configuration Utility

The Communications Configuration Utility allows you to describe the communications environment to be used. By responding to a series of prompts, you select parameters to describe and control communications hardware and the CAM; you also describe characteristics of the system or terminal with which your 5280 system will be communicating. Your responses are saved on diskette as a *communications configuration record*. When you describe your communications job using the Data Communications or RJE Description Utility, you identify the communications configuration record to be used when your job is executed. For a program you have written, you identify the configuration record to be used with your program to the Communications Load Utility.

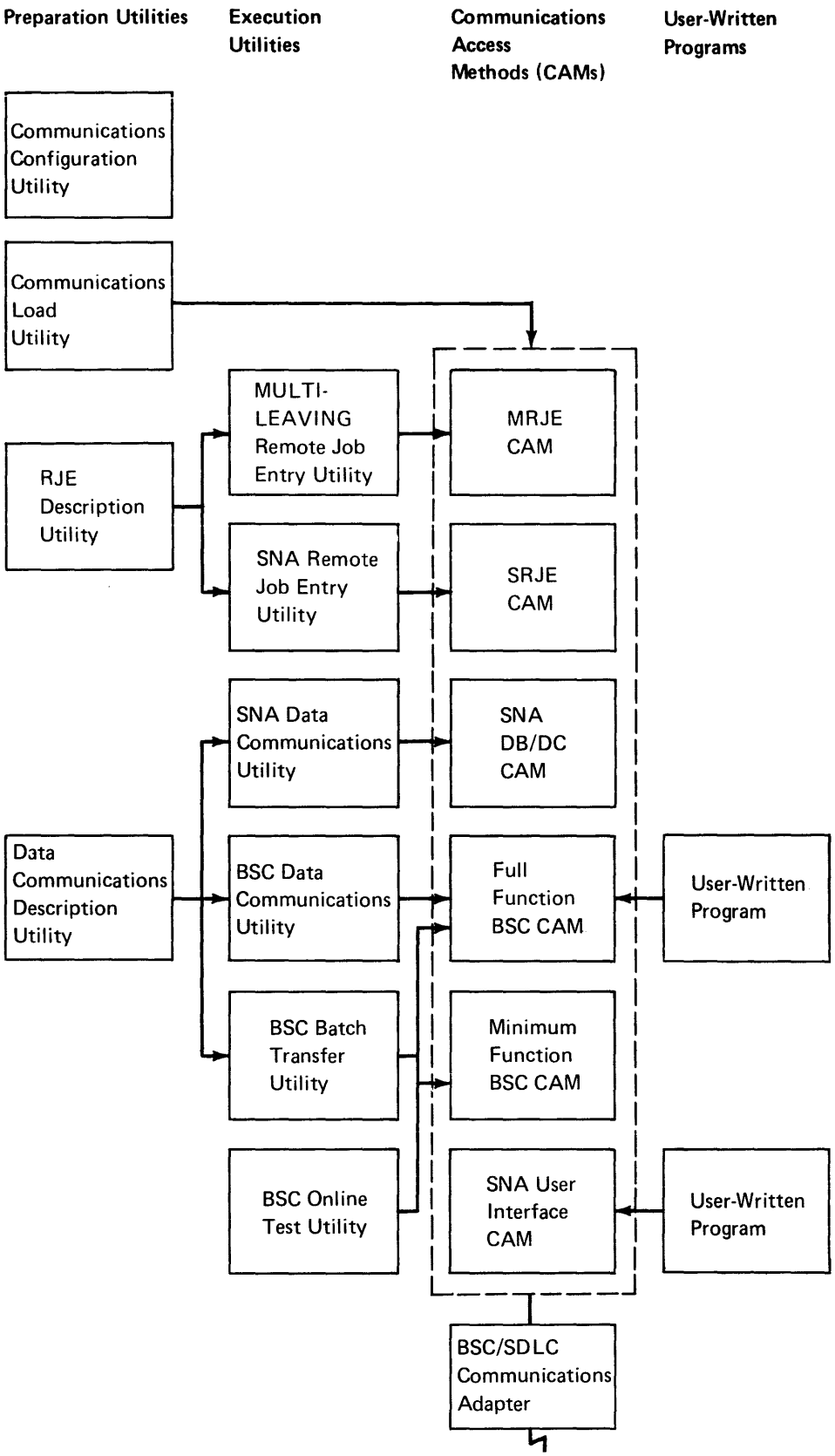

Figure 1-2. Interrelationship of Communications Programs

Communications Load Utility

The Communications Load Utility loads the CAM into main storage. Each execution utility automatically invokes this utility to load the CAM into a partition. For a DE/RPG or assembler language communications program you have written, you need to use this utility to load the CAM. This utility is classified as a preparation utility because it does not transfer data over a communications line.

Data Communications Description Utility

The Data Communications Description Utility allows you to describe communications jobs to be executed by the BSC Batch Transfer Utility, the BSC Data Communications Utility, or the SNA Data Communications Utility. You respond to prompts on the display and your responses are saved on diskette as a *job description record* which you name. At execution time, you identify the job to the execution utility by its name.

The job includes the specific data transfer function to be performed (namely transmit, receive or inquiry) and the 5280 devices to be used (such as the diskette, printer or keyboard). One or many functions can make up a job, and the functions are executed in the sequence you define.

RJE Description Utility

The RJE Description Utility allows you to describe communications jobs to be executed by MRJE or SRJE. To describe a job, you respond to a series of prompts on the display. Your responses are saved on diskette as a *job description record* which you name. To execute a job, you identify it to MRJE or SRJE by its name.

Execution Utilities

BSC Batch Transfer Utility

The BSC Batch Transfer Utility provides entry level batch communications capability for the 5280 system. It and the minimum function BSC CAM can execute in the minimum system configuration for BSC communications. This utility can also execute using the full function BSC CAM.

This utility allows the 5280 to transmit and receive batch data to and from the diskette; the diskette drive is the only supported input/output device. Multiple transmit and receive functions can be chained together and executed as a single job. When this utility is executing, the 5280 system looks like a 3741 Data Entry Station to the communications network.

BSC Data Communications Utility

The BSC Data Communications Utility allows the 5280 to transmit and receive batch data and to send inquiries and receive replies. It executes in conjunction with the full function BSC CAM.

Data to be transmitted can originate at the diskette, keyboard or magnetic stripe reader. Data received from another system or terminal can be directed to the diskette, printer or display or a combination of two of these devices. Inquiries can be entered only from the keyboard. Multiple transmit, receive and inquiry functions can be executed as a single job, and multiple data sets can be transmitted and received.

When using this utility, the 5280 system can appear to the network like a 3741 Data Entry Station or 3780 Data Communications Terminal. The 3780 support enables the 5280 to interface to DOS VSE/POWER.

MULTI-LEAVING Remote Job Entry (MRJE)

The MULTI-LEAVING Remote Job Entry (MRJE) Utility enables the 5280 to submit, execute and obtain results of jobs from a host RJE subsystem using a BSC line. The 5280 serves as a remote job entry terminal to OS/VS1 RES, OS/VS2 JES2 and OS/VS2 JES3. These subsystems and the MRJE CAM, which is the CAM used by this utility, provide MULTI-LEAVING support, which is fully synchronized two-directional transmission of a variable number of data streams between two computers.

MRJE accepts data to be transmitted to the host subsystem from the diskette or keyboard. Output from the host RJE subsystem can be transmitted to the 5280 diskette, display and printer, sent to another RJE work station in the network, or directed to output devices at the host computer. Utility control statements are used to control the 5280 MRJE session. When MRJE is executing, the 5280 appears to the BSC network as a System/3 MRJE work station.

SNA Data Communications Utility

The SNA Data Communications Utility allows the 5280 to send and receive batch data and to send inquiries and receive replies from a host subsystem in an SNA/SDLC network. The 5280 is supported in the network as a Logical Unit (LU) Type 1. This utility uses the SNA Data Base/Data Communications (DB/DC) CAM to communicate with DB/DC subsystems, namely the Customer Information Control System (CICS/VS) and Information Management System (IMS/VS).

Data to be transmitted can originate at the diskette or keyboard. Data from the host subsystem can be received at the diskette, printer or display, or a combination of two of these devices. Inquiries can be entered only from the keyboard. This utility can execute multiple transmit, receive and inquiry functions as a single job, and can transmit and receive multiple data sets.

Up to four copies of this utility can be executing concurrently in main storage to communicate with the same DB/DC subsystem; the programs share utilization of the same DB/DC CAM.

SNA Remote Job Entry Utility (SRJE)

The SNA Remote Job Entry (SRJE) Utility enables the 5280 to submit, execute, and obtain results of jobs from a host RJE subsystem using SDLC protocol. It executes in conjunction with the SRJE CAM to interface as an LU Type 1 to the following host RJE subsystems: DOS VSE/POWER, OS/VS1 RES, and OS/VS2 JES2.

SRJE accepts data to be transmitted to the host subsystem from the diskette or keyboard. Output from the host RJE subsystem can be transmitted to the 5280 diskette, display and printer, sent to another terminal in the network, or directed to output devices at the host computer. Utility control statements are used to control the SRJE session.

BSC Online Test Utility

The BSC Online Test Utility tests the BSC communications link, namely the line and modem, to determine whether the link is operating properly. It can execute with either the minimum function or full function BSC CAM. Fifteen test types and a wrap test can be run. This utility is classified as an execution utility because it transfers data, but the data is test data used for diagnostic evaluation, not user data.

DATA COMMUNICATIONS PROGRAMMING WITH DE/RPG AND ASSEMBLER LANGUAGE

The Communications Utilities licensed program includes a facility for user-written communications programs using DE/RPG and the assembler language. The programs you write can send and/or receive data using either a BSC or SDLC data link. Each program must execute in conjunction with a CAM. The full function BSC CAM is used with a BSC program you code; in this instance the 5280 appears to the network as a 3741 Data Entry Station. An SNA program you code uses the SNA user interface CAM to communicate with DB/DC host subsystems, namely CICS/VS and IMS/VS. Depending upon the language, either the DE/RPG or the Assembler Language licensed program is required to compile your program.

You might want to write your own communications program when:

- You want to process data online as it is received at your 5280 system.
- You want to match your 5280 communications program to a particular host application program.
- The communications utilities do not meet your unique communications needs.

THE 5280 DISTRIBUTED DATA SYSTEM IN A COMMUNICATIONS NETWORK

The communications adapter must be installed on your 5280 system to enable your system to communicate with another terminal or host computer. The adapter supports both BSC and SDLC communications, but, at any given time, only the BSC or SDLC capability is operational. SNA/SDLC communications requires the elapsed time counter feature. If your installation uses both BSC and SDLC communications, the only software changes necessary to switch from one to the other are the CAM, communications configuration and job records, and the utility or user program.

Binary Synchronous Communications

Binary Synchronous Communications (BSC) protocol provides a set of rules for synchronous transmission of binary coded data. The BSC support on the 5280 establishes the line connection, exchanges identification sequences, transmits and receives data, and executes the correct termination or disconnect procedures. The 5280 can appear to a BSC network as a 3741 Data Entry Station, 3780 Data Communications Terminal, or, to host RJE subsystems, as a System/3 MRJE work station.

The 5280 uses BSC to communicate with:

- IBM System/370 Models 115 to 168, 3031, 3032, 3033, 4331 and 4341 Processors via a 3704/3705 Communications Controller
- IBM System/370 Models 115, 125 and 138 via the Integrated Communications Adapter
- IBM System/32 via BSCA (RPG II)
- IBM System/34 via BSCA (RPG II and SSP-ICF)
- IBM System/3 Models 4, 6, 8, 10 (disk), 12 and 15 via BSCC, BSCA, LCA, ICA or EIA (RPG II and CCP)
- 3741 Data Station Models 2 and 4
- 3747 Data Converter
- IBM 5260 Retail System
- IBM Series/1 via native BSC attachment (RPS Version 4)
- Another 5280 Distributed Data System

The DB/DC subsystems with which the 5280 communicates using BSC are IMS/VS and CICS/VS. The RJE subsystems are, DOS/VSE Power, OS/VS1 RES, OS/VS2 JES2 and OS/VS2 JES3.

Only one BSC program, either the BSC Batch Transfer Utility, the BSC Data Communications Utility, MRJE or your own communications program can be executing at any given time.

The 5280 BSC support provides the following capabilities:

- Transmit and/or receive transparent or non-transparent data
- Transmit and/or receive blocked or unblocked records
- Expand blank-compressed data
- Transmit and/or receive blank-truncated data
- Transmit and/or receive data using EBCDIC or ASCII transmission code
- Exchange identification sequences on a switched point-to-point line

Systems Network Architecture/Synchronous Data Link Control

Synchronous Data Link Control (SDLC) is the link protocol used by Systems Network Architecture (SNA). SDLC support on the 5280 system is provided by the communications adapter; SNA is implemented in the communications access method.

In the 5280 SNA/SDLC implementation, the 5280 is always a secondary station which communicates with the primary station, a System/370 models 138 to 168 for CICS/VS, models 145 to 168 for IMS/VS, or 3031, 3032, 3033, 4331 or 4341 Processor. Attachment is through the 3704/3705 Communications Controller.

The 5280 SNA support conforms to the following SNA definitions:

- Logical Unit (LU) Type 1
- Physical Unit (PU) Type 2
- Function Management (FM) Profile 3
- Transmission Subsystem (TS) Profile 3
- Multiple LU-LU sessions for DB/DC subsystems
- Single LU-LU session for RJE subsystems

For multiple LU-LU sessions via a single physical unit, up to four 5280 communications programs can communicate concurrently with the same DB/DC subsystem, either CICS/VS or IMS/VS. The 5280 communications programs can be up to four copies of the SNA Data Communications Utility executing concurrently and sharing use of the SNA DB/DC CAM, or up to four SNA user-written programs sharing use of the SNA user interface CAM.

All of the 5280 programs must use the same version of CAM and the same communications configuration record. Each program, however, requires its own partition. For example, one user may want to use the SNA Data Communications Utility to execute a job that transmits data from diskette on the 5280 system to CICS/VS; another user may want to use this utility to perform inquiries into a CICS/VS application program. In this case, two copies

of the utility would be executing concurrently in two different partitions, and both programs would share usage of the SNA DB/DC CAM.

The RJE subsystems with which the 5280 communicates as an LU Type 1 are OS/VS1 RES, OS/VS2 JES2, and DOS VSE/POWER. A single LU-LU session between the 5280 and a host RJE subsystem is supported.

Host Support

Each execution utility can be used in only one type of network, either BSC or SNA/SDLC. Each utility communicates with certain IBM systems and host subsystems. Likewise, because of the kind of support provided by the CAMs, user-written programs can communicate with certain systems and host subsystems. These relationships are shown in Figure 1-3.

			S/370, 30XX and 43XX Subsystems				
Network Type	**5280 Communications Programs**	**GSD Systems/ Terminals: S/3, S/32, S/34, 3741, Series/1, 5260, 5280**	**CICS/VS**	**IMS/VS**	**DOS VSE/ POWER**	**RES and JES2**	**JES3**
BSC	BSC Batch Transfer Utility	X	X	X			
	BSC Data Communications Utility	X	X	X	X		
	MULTI-LEAVING Remote Job Entry Utility					X	X
	User-written Program	X	X	X			
SNA/ SDLC	SNA Data Communications Utility		X	X			
	SNA Remote Job Entry Utility				X	X	
	User-written Program		X	X			

Figure 1-3. Host Support

COMMUNICATIONS LINES

The communications adapter on the 5285 Programmable Data Station or the 5288 Programmable Control Unit supports one communications line. The line can be point-to-point switched, point-to-point non-switched, or multipoint.

A point-to-point switched line connection is established when one station calls another station. This connection can be made in one of three ways: the 5280 operator manually calls the other station, the 5280 operator manually answers a call from the other station, or the 5280 system automatically answers, without operator action, a call from the other station. A point-to-point non-switched line permanently connects two stations. A multipoint line can support one or more stations; a control station supervises polling and selection of the tributary stations. On a multipoint line, the 5280 can serve only as a tributary station.

For non-switched point-to-point and multipoint lines, the 5280 supports switched network backup (SNBU). This enables the 5280 to use a switched line if the non-switched line is unavailable.

The 5280 system can communicate over either a duplex or half duplex line, but it operates only in half duplex mode. A duplex line can be used to reduce line turnaround time.

The line speeds supported are 600 to 4800 bits per second. The transmission code can be either ASCII or EBCDIC.

The interface between the 5280 and the communications line can be provided by the EIA interface feature, an integrated modem, or the Digital Data Service Adapter (DDSA) feature. The EIA feature provides an interface for attachment of an IBM modem or non-IBM modem meeting RS-232-C specifications. The 1200 bps integrated modem connects to the common carrier network via an FCC registered protective device equivalent to either the CBS or CDT data access arrangement, and can operate at 1200 or 600 bps. The DDSA is an integrated data link adapter for data transmission at speeds of 2400 or 4800 bps over the AT&T non-switched Dataphone* digital service network, or for transmission to another unit which has a compatible DDS adapter. The DDSA interfaces to a Digital Data Service (DDS) channel service unit, the customer site termination of the DDS network.

COMMUNICATIONS CONFIGURATIONS

The communications adapter can be installed on the 5285 Programmable Data Station and the 5288 Programmable Control Unit. The input/output devices which can be used by communications jobs are:

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*Trademark of American Telephone and Telegraph Co. (AT & T)

- Keyboard/displays—5281 Data Station, 5285 Programmable Data Station, and 5282 Dual Data Station
- Diskette drives which read/write IBM diskettes 1, 2 and 2D
- 5256 and 5225 printers

The minimum system configuration required to support communications in a BSC network is:

- 5285 Programmable Data Station or 5288 Programmable Control Unit with minimum main storage size of 32K bytes for the BSC batch transfer and on-line test utilities, and 48K bytes for MRJE and the BSC data communications utilities.
- Communications adapter feature
- 960 character display screen feature
- Communications Utilities licensed program
- 1 diskette drive
- 130 byte buffer
- No printer
- No trace table

Note: The 32K minimum configuration allows you to transfer data with the restrictions associated with having a 6K system common area, 11K partition for SYSBBTU, and a 15K partition for SYSBSCBA. (See partition considerations in Chapter 8 of this manual, and the common area in Chapter 3 of the *System Control Programming Reference/Operation Manual.*)

The minimum system configuration required to support communications in an SNA network is:

- 5285 Programmable Data Station or 5288 Programmable Control Unit with minimum main storage size of 64K bytes
- Communications adapter feature
- 960 character display screen feature
- Elapsed time counter feature
- Communications Utilities licensed program

This configuration enables the 5280 to execute communications jobs using the SNA Data Communications and SRJE Utilities which use the keyboard/display and diskette as input/output devices.

All of the preparation utilities can be run in either of the minimum configurations.

COMMUNICATIONS DISKETTE

Contents of the Diskette

The communications diskette shipped to you by IBM contains the communications utilities and the CAMs in assembler language object code. Each resides as a separate data set on the diskette. The data set name is the same as the program name.

Utility Programs

Data Set Name	Contents
SYSCCU	Communications Configuration Utility
SYSDCDU	Data Communications Description Utility
SYSRJEDU	RJE Description Utility
SYSCLU	Communications Load Utility
SYSBBTU	BSC Batch Transfer Utility
SYSBDCU	BSC Data Communications Utility
SYSMRJE	MULTI-LEAVING Remote Job Entry Utility
SYSSDCU	SNA Data Communications Utility
SYSSRJE	SNA Remote Job Entry Utility
SYSBOLT	BSC Online Test Utility

Communications Access Methods

Data Set Name	Contents
SYSBSCBA	Minimum Function BSC CAM
SYSBSCEX	Full Function BSC CAM
SYSBSCR	MRJE CAM
SYSSNAD	SNA Data Base/Data Communications CAM
SYSSNAR	SRJE CAM
SYSSNAU	SNA User Interface CAM

The diskette also contains a data set named SYSDCCR which contains IBM-supplied communications configuration records.

Creating a Backup Diskette

You should make a backup copy of the communications diskette. The Diskette Copy Utility of the IBM 5280 Utilities licensed program provides the copy function; the program name is SYSCOPY. For information on how to execute SYSCOPY, see the *5280 Utilities Reference/Operation Manual*.

You may want to back up the entire diskette or only the data sets you plan to use. For example, if your installation will use only BSC communications, you would need to back up only the data sets used for BSC. The following chart shows which data sets to copy depending upon the type of communications network.

BSC	MRJE	SNA(DB/DC)	SRJE
SYSCCU	SYSCCU	SYSCCU	SYSCCU
SYSCLU	SYSCLU	SYSCLU	SYSCLU
SYSDCCR	SYSDCCR	SYSDCCR	SYSDCCR
SYSDCDU	SYSRJEDU	SYSDCDU	SYSRJEDU
SYSBSCBA	SYSMRJE	SYSSDCU	SYSSRJE
SYSBSCEX	SYSBSCR	SYSSNAD	SYSSNAR
SYSBBTU		SYSSNAU	
SYSBDCU			
SYSBOLT			

Chapter 2. Preparation Utilities

Four preparation utilities enable you to prepare for communications: Communications Configuration Utility, Communications Load Utility, Data Communications Description Utility, and RJE Description Utility.

These preparation utilities are run before the execution utilities. Three of them create records which are saved on diskette and then used by the execution utilities; this is shown in Figure 2-1. The Communications Load Utility must be run to load the CAM before a user-written communications program can be executed.

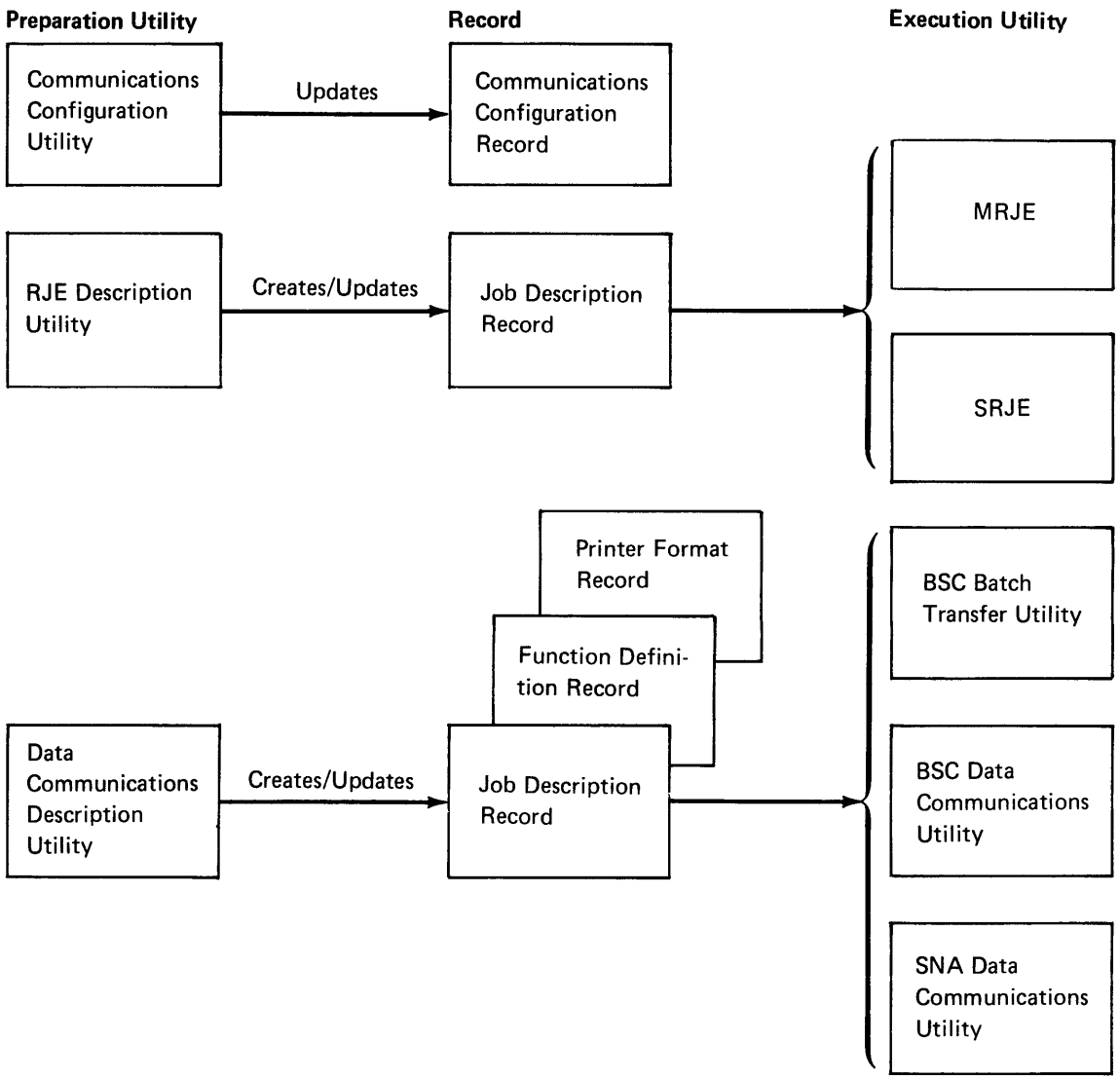


Figure 2-1. Records created using the Preparation Utilities

Communications Configuration Utility (SYSCCU)

The Communications Configuration Utility (SYSCCU) enables you to define your communications environment by selecting parameters to:

- Control the operation of communications hardware, including the modem
- Control the execution of the communications access method (CAM)
- Describe certain characteristics of the system or terminal with which your 5280 system will be communicating

You define the environment by keying responses to a series of prompts on the display. SYSCCU saves your responses as a communications configuration record on a diskette data set.

This configuration record serves as input to the Communications Load Utility. The Communications Load Utility, the CAM to be loaded and the configuration record to be used *must* be on the same diskette. The configuration record contains a CAM name, which identifies the version of CAM to be loaded, and other values which control the CAM while it is executing. Because each version of CAM is used in *either* a BSC or SNA/SDLC network, the configuration record contains a set of values unique to *either* BSC or SNA/SDLC protocol.

Your 5280 system can communicate with a variety of other systems and terminals; therefore you may want to define more than one communications environment. You can save as many different communications configuration records as you want. However, if you are using the IBM-supplied SYSDCCR data set, there is enough space for only nine user communications configurations records.

Defining the communications environment is an installation responsibility. Because the communications configuration record is critical to the successful execution of communications on the 5280 system, SYSCCU should be run by personnel familiar with data communications.

OPERATING CHARACTERISTICS

SYSCCU issues prompts which enable you to select or enter a value for a parameter. The prompts (or parameters) are grouped into three distinct categories:

- The *common prompts* request information about the modem and the communications line.
- The *BSC prompts* deal with parameters for a BSC network, such as the control station on the line, identification sequences, record format and BSC timeouts.
- The *SNA prompts* deal with parameters for an SNA network, such as pacing counts, names assigned to the 5280 in the network, and SNA timeouts.

To enable you to differentiate between the categories, a unique question ID is used to identify each prompt. The first character of the question ID is either C (for common), B (for BSC), or S (for SNA). This first character is followed by a number which defines a relative sequence of the prompts within a given category. The range of question IDs is C1 through C19, B1 through B27 and S1 through S13.

To create a configuration record, you use only two categories of prompts. To create a BSC record, the common and BSC prompts are used; for SNA/SDLC communications, the common and the SNA prompts are utilized.

The SYSCCU prompts are interdependent in that a value for one parameter can affect other parameters. Your response to a given prompt can determine:

- Which options or values are valid for another prompt
- Whether a value will automatically be set for another parameter
- Whether other prompts are applicable and will appear on the display

An example of the first case involves the line type and line interface. If the line type (prompt C1) is switched point-to-point, the Digital Data Service Adapter (DDSA) cannot be used as the line interface (prompt C2). Therefore if you select the switched point-to-point line in prompt C1, DDSA is not displayed as an option in prompt C2.

In other instances, the utility automatically sets a value for a parameter. For example, the MRJE utility supports EBCDIC line code only. If you select MRJE as the device type (prompt B1), SYSCCU automatically sets the line code option (prompt C18) to EBCDIC. Furthermore, in many cases in which the utility automatically presets a value, the prompt for that parameter does not appear on the display.

Finally, your response to a prompt sometimes determines whether or not other prompts are applicable, that is, relevant to the configuration record being updated. For example, polling and selection addresses are used only in a multipoint network. Therefore, if you select a point-to-point line in prompt C1, prompts B6 and B7 would not be relevant, and therefore would not be displayed.

SYSCCU can be run in either non-sequential or sequential mode. This is determined by how you respond to the last line of each prompt, which is "Enter next question ID."

For non-sequential mode, enter the question ID for the specific prompt you want to be displayed. For example, to change the data set ready timeout, you would enter C14 the first time "Enter next question ID" appears. The utility then displays prompt C14; prompts C1 through C13 would be skipped. This mode allows you to selectively skip through the contents of a configuration record, displaying only the specific prompts you identify, in the sequence you want.

To use the sequential mode of operation, do not enter any question IDs; SYSCCU displays the next prompt based upon a pre-determined sequence. By leaving the "Enter next question ID" field blank, you accept a default question

ID supplied by the utility. This default question ID is not displayed because the next prompt in the sequence is often determined by your response to the current prompt.

Because the SYSCCU prompts are interdependent, you should run SYSCCU in sequential mode. Following the sequence of prompts as defined by the utility:

- Ensures that only applicable prompts, based upon your responses to previous prompts, are displayed
- Prevents you from changing preset values and entering conflicting values for different parameters
- Ensures that the configuration record will be complete, that is, contain values for all required parameters

When you finish entering parameter values, you can optionally print the contents of the configuration record. The printout lists the question ID and the value entered for each parameter. The parameters which are applicable or valid for the particular configuration are denoted by an asterisk next to the question ID. You can use this listing to verify that the record contains values for all applicable parameters; this is particularly important if you updated the record using the non-sequential mode of operation.

IBM-SUPPLIED CONFIGURATION RECORDS

The communications diskette contains six IBM-supplied configuration records which are provided to serve as realistic models of correctly-defined configuration records. The contents of the IBM-supplied records cannot be changed using SYSCCU. You should review the contents of these records, select the one that most closely describes your communications environment, and use the utility to change parameters as needed and complete the record. The result of the changes and additions is a new configuration record on a diskette data set; the IBM-supplied record remains unchanged.

Figure 2-2 summarizes the contents of the six IBM-supplied records. Note that the record name identifies the network and protocol type. Note: The information on the records does not necessarily reflect a situation which can run in the minimum partition sizes described in "Summary of Partition Sizes" in CHAPTER 8. Use the calculation under "CAM Partition Sizes" in Chapter 8 to determine the actual partition size needed.

Question ID	Parameter Description	Communications Configuration Record Name					
		BSC3741	BSC3780	BSCMRJE	SNADBDC	SNASRJE	SNAUSER
C1	1. Nonswitched point-to-point line 2. Switched point-to-point line 3. Multipoint line	2	2	2	2	2	2
C2	1. Integrated modem 2. EIA - external modem 3. DDSA	2	2	2	2	2	2
C5	1. Manual call/answer 2. Auto answer	1	1	1	1	1	1
C10	1. IBM external modem with wrap capability 2. Non-IBM external modem	1	1	1	1	1	1
C11	1. Internal clocking 2. Modem clocking	2	2	2	2	2	2
C12	1. Full speed modem rate 2. Half speed modem rate	1	1	1	1	1	1
C14	Data set ready timeout (in seconds)	01	01	01	01	01	01
C15	Line speed (in bps)	2400	2400	2400	2400	2400	2400
C16	Clear to send delay (in seconds)	02	02	02	02	02	02
C17	CAM name	SYSBSCBA	SYSBSCEX	SYSBSCR	SYSSNAD	SYSSNAR	SYSSNAU
C18	1. EBCDIC line code 2. ASCII line code	1	1	1	1	1	1
C19	Number of entries in trace table	100	100	100	100	100	100
B1	1. 3741 look-alike 2. 3780 look-alike 3. MRJE	1	2	3			
B2	1. 5280 sends initial line bid 2. Host sends initial line bid	1	1				
B3	1. 5280 is primary station 2. 5280 is not primary station	1	1				
B4	Terminal ID	*	*				
B5	Host ID	*	*				
B8	1. Unblocked record format 2. Blocked record format	1	2				
B9	ITB blocking factor		1				
B10	1. Use IRS characters 2. Do not use IRS characters		1				
B11	Block size		512				
B12	1. Transmit in transparent mode 2. Do not transmit in transparent mode	2		2			

* Unique system dependent parameters

Figure 2-2 (Part 1 of 2). Contents of IBM-Supplied Configuration Records

Question ID	Parameter Description	Communications Configuration Record Name					
		BSC3741	BSC3780	BSCMRJE	SNADBDC	SNASRJE	SNAUSER
B13	1. Expand blanks in data received 2. Do not decompress blanks	2	1				
B14	1. Use blank truncation 2. Do not use blank truncation	2					
B15	1. Enable reverse interrupt 2. Do not enable reverse interrupt	2	2				
B16	TTD receive limit	00	07				
B17	CAM I/O buffer size	00130	00514	00514			
B18	Maximum number of line bid retries	15	15	07			
B19	Number of EOTs to send to EOT	07	00	00			
B20	Number of leading PAD characters	02	02	02			
B21	Number of trailing PAD characters	01	01	01			
B22	Receive timeout (in seconds)	03	03	03			
B23	Receive timeout retry count	07	07	07			
B24	Transmit timeout (in seconds)	01	01	01			
B25	Continue timeout (in seconds)	02	02	02			
B26	WACK receive limit	015	015				
B27	Record retransmit limit	03	03	07			
S1	Primary LU name				*	*	*
S2	Secondary PU name				*	*	*
S3	Specific ID for XID (in hex)				*	*	*
S4	SDLC station address (in hex)				*	*	*
S5	Receive pacing count				1	3	1
S6	Send pacing count				1	3	1
S7	1. SYSSRJE 2. SYSSDCU 3. User program				2	1	3
S8	Maximum number of users				4	1	4
S9	1. Program issues logon 2. Program does not issue logon				1	1	1
S10	1. Use NRZI 2. Do not use NRZI				1	1	1
S11	Communications program timeout (in minutes)				10	10	10
S12	Inactivity timeout (in seconds)				26	26	26
S13	Block size				0000	0000	0000

* Unique system dependent parameters

Figure 2-2 (Part 2 of 2). Contents of IBM-Supplied Configuration Records

The valid combinations of IBM-supplied configuration records and CAMs are shown below. The names of the programs which use the CAMs are also provided.

Configuration Record Name	CAM Name	Execution Program
BSC3741	SYSBSCBA	SYSBBTU
	SYSBSCEX	SYSBBTU SYSBDCU (3741 mode) User-written program (DE/RPG or Assembler)
BSC3780	SYSBSCEX	SYSBDCU (3780 mode)
BSCMRJE	SYSBSCR	SYSMRJE
SNADBDC	SYSSNAD	SYSSDCU
SNASRJE	SYSSNAR	SYSSRJE
SNAUSER	SYSSNAU	User-written program (DE/RPG or Assembler)

Not all of the prompts are shown in Figure 2-2; note that C3, C4, C6 and others are missing. In addition, the entries in the chart for some prompts are blank, which means that these prompts do not apply to the configuration record. For example, the SNA prompts are not relevant to configuration records to be used with a BSC CAM. Therefore, the SNA prompts (those with a question ID beginning with "S") are blank for the three BSC configuration records.

Another example of non-applicable prompts involves prompts B8 through B11 for the configuration record named BSC3741. In this case, the record format (prompt B8) is unblocked. Therefore, because prompts B9, B10 and B11 deal with blocked records, the entries for these prompts are blank. In addition, if this record were created using sequential mode, these three prompts would not appear on the display during the prompting sequence.

Other entries in Figure 2-2 contain an asterisk (*). This denotes prompts which involve identification sequences, network addresses and other parameters which will be *unique* to *your* 5280 system in *your* communications network. In the model records, these parameters have been left blank because they will be unique for each system. Values for these parameters must be coordinated with and match the system with which the 5280 will be communicating.

Some parameters in the IBM-supplied records contain standard or recommended values; examples include timeout values and certain BSC link protocol parameters. These parameters are included to allow experienced data communications personnel to finely tune the operation of the communications system. Because it is not *necessary* to finely tune communications, in most cases the IBM-supplied values for certain parameters should be used. These parameters are identified at the beginning of each section of the three prompt categories.

The IBM-supplied records are in a data set named SYSDCCR on the communications diskette. The first eight bytes (positions 1–8) of each record contain the configuration record name; the next three bytes (positions 9–11) identify the network type as either BSC or SNA. (For the complete record layout, see Appendix G.)

The IBM-supplied configuration records are models only; they cannot be changed or modified using SYSCCU. However, you can use an IBM-supplied configuration record as input to the utility, and the values in the record will appear as defaults for the prompts. SYSCCU saves the defaults you accept and the values you enter as a new record, and the IBM-supplied configuration record remains unchanged. This is part of the recommended procedure for running SYSCCU.

A RECOMMENDED PROCEDURE FOR RUNNING SYSCCU

The following is a recommended procedure for running the utility. Use this procedure, particularly the first several times you run SYSCCU, to ensure that your configuration records will be complete and valid.

First determine the CAM you need to use based upon the execution utility or application program to be executed. Find the IBM-supplied configuration record designed to be used with this CAM in Figure 2-2.

Next refer to Figure 2-3, which lists *all* the parameters in the configuration record. Use this chart to describe (plan) your communications environment on paper, *before* you actually run the utility. Planning your configuration record will help to ensure the accuracy of the record and reduce confusion while running the utility.

Review the IBM-supplied record you selected to see whether the values provided are accurate for your environment. (You may need to refer to the detailed prompt explanations provided later in this chapter.) Go through the prompts in the order in which they are explained; this is also the sequence in which they will appear if you run the utility in sequential mode. If a value in the IBM-supplied record needs to be changed, make a note of it in the planning chart. If possible, write down the value you will enter when you run the utility.

Pay particular attention to the entries marked with an asterisk in Figure 2-2. Because these parameters will have unique values for your installation, you may want to contact personnel at the host system for assistance.

For some parameters, you may want to contact other sources to determine the proper values for your configuration. If necessary, check with the modem supplier for parameters involving the modem, the common carrier (in the U.S., usually the telephone company) for parameters about the line and its operation, or personnel at your installation or the host system who were involved in the installation planning for communications.

Question ID	Parameter Description	Communications Configuration Record Name			
C1	1. Nonswitched point-to-point line 2. Switched point-to-point line 3. Multipoint line				
C2	1. Integrated modem 2. EIA - external modem 3. DDSA				
C3	Integrated modem attenuation level				
C4	1. Use switched network backup 2. Do not use switched network backup				
C5	1. Manual call/answer 2. Auto answer				
C6	1. Connect data-set-to-line 2. Data-terminal-ready				
C7	1. Modem answer tone 2. Business machine answer tone				
C8	Timer value for answer tone send (in seconds)				
C9	1. 1300 Hertz answer tone frequency 2. 2100 Hertz answer tone frequency				
C10	1. IBM external modem with wrap capability 2. Non-IBM external modem				
C11	1. Internal clocking 2. Modem clocking				
C12	1. Full speed modem rate 2. Half speed modem rate				
C13	1. Constant request to send 2. No constant request to send				
C14	Data set ready timeout (in seconds)				
C15	Line speed (in bps)				
C16	Clear to send delay (in seconds)				
C17	CAM name				
C18	1. EBCDIC line code 2. ASCII line code				
C19	Number of entries in trace table				

Figure 2-3 (Part 1 of 3). Planning Chart for Configuration Records

Question ID	Parameter Description	Communications Configuration Record Name			
B1	1. 3741 look-alike 2. 3780 look-alike 3. MRJE				
B2	1. 5280 sends initial line bid 2. Host sends initial line bid				
B3	1. 5280 is primary station 2. 5280 is not primary station				
B4	Terminal ID				
B5	Host ID				
B6	Polling address (in hex)				
B7	Selection address (in hex)				
B8	1. Unblocked record format 2. Blocked record format				
B9	ITB blocking factor				
B10	1. Use IRS characters 2. Do not use IRS characters				
B11	Block size				
B12	1. Transmit in transparent mode 2. Do not transmit in transparent mode				
B13	1. Expand blanks in data received 2. Do not decompress blanks				
B14	1. Use blank truncation 2. Do not use blank truncation				
B15	1. Enable reverse interrupt 2. Do not enable reverse interrupt				
B16	TTD receive limit				
B17	CAM I/O buffer size				
B18	Maximum number of line bid retries				
B19	Number of EOTs to send to EOT				
B20	Number of leading PAD characters				
B21	Number of trailing PAD characters				
B22	Receive timeout (in seconds)				
B23	Receive timeout retry count				
B24	Transmit timeout (in seconds)				
B25	Continue timeout (in seconds)				
B26	WACK receive limit				
B27	Record retransmit limit				

Figure 2-3 (Part 2 of 3). Planning Chart for Configuration Records

Question ID	Parameter Description	Communications Configuration Record Name			
S1	Primary LU name				
S2	Secondary PU name				
S3	Specific ID for XID (in hex)				
S4	SDLC station address (in hex)				
S5	Receive pacing count				
S6	Send pacing count				
S7	1. SYSSRJE 2. SYSSDCU 3. User program				
S8	Maximum number of users				
S9	1. Program issues logon 2. Program does not issue logon				
S10	1. Use NRZI 2. Do not use NRZI				
S11	Communications program timeout (in minutes)				
S12	Inactivity timeout (in seconds)				
S13	Block size				

Figure 2-3 (Part 3 of 3). Planning Chart for Configuration Records

After your configuration record is completely planned, you are ready to run SYSCCU. Use the sequential mode of operation; this means to leave the "Enter next question ID" field blank on each prompt. Using this mode ensures that the record you create will contain applicable, non-conflicting values and will be complete.

When you run SYSCCU in sequential mode, you should respond to each prompt that appears on the display. For some prompts, such as Terminal ID, a response is optional. If, for example, you do not want to specify a terminal id, leave the field blank and press enter. When you are using an IBM-supplied configuration record as input, the values in the record appear as defaults on the display. To accept a default value, press ENTER. To change a default value which is displayed, key in the value you want.

When you have completed the sequence of prompts, SYSCCU writes the record to diskette. If your 5280 system includes a printer, you are asked if you want to print the record. You should do so to verify that the record contains values for all applicable parameters and to save a printed copy of the contents of the record.

REQUIREMENTS

SYSCCU requires a 21K partition in main storage. To update an IBM-supplied record, you need the SYSDCCR data set. You must save the configuration record you update either in SYSDCCR or on an EBCDIC diskette with a data set allocated for 256 byte records. The SYSDCCR data set contains space for you to save some of your own configuration records. The configuration record data set, SYSCLU and the CAM to be used must be on the same diskette at execution time.

This utility does not perform any data transfers with another system or terminal; therefore, it can run concurrently with any other communications program.

STARTING AND TERMINATING SYSCCU

The following prompts appear each time you start to run and terminate SYSCCU. Except for the configuration name, the responses to the prompts in this section are not saved in the configuration record.

```
SYSCCU - COMMUNICATIONS CONFIGURATION UTILITY

Specify communications information to be updated

Enter data set name:

Enter device address:

Enter configuration name:

                                  Press ENTER                    61-01
```

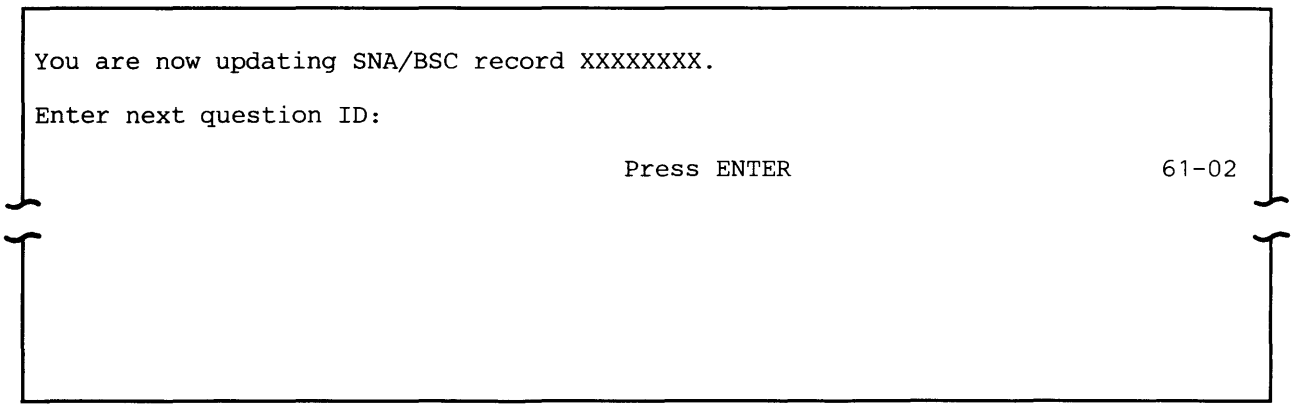
This prompt appears after SYSCCU has been loaded into a partition.

Data set name: Enter the name of the data set which contains the communications configuration record to be modified. The IBM-supplied configuration records are in a data set named SYSDCCR on the communications diskette; SYSDCCR is the default you can specify another data set name by keying the name over the default.

Device address: Enter the address of the diskette drive on which you have mounted the diskette containing the above-named data set. Enter two characters for a logical device address or four characters for a physical device address.

Configuration name: Enter the name of the communications configuration record to be modified. The name must be 1–8 alphanumeric characters. The names of the records supplied by IBM are: BSC3741, BSC3780, BSCMRJE, SNADBDC, SNASRJE and SNAUSER. (See the information on IBM-supplied

configuration records in this chapter.)



XXXXXXXX is the configuration name you provided in the previous prompt. This prompt appears after SYSCCU has retrieved the record.

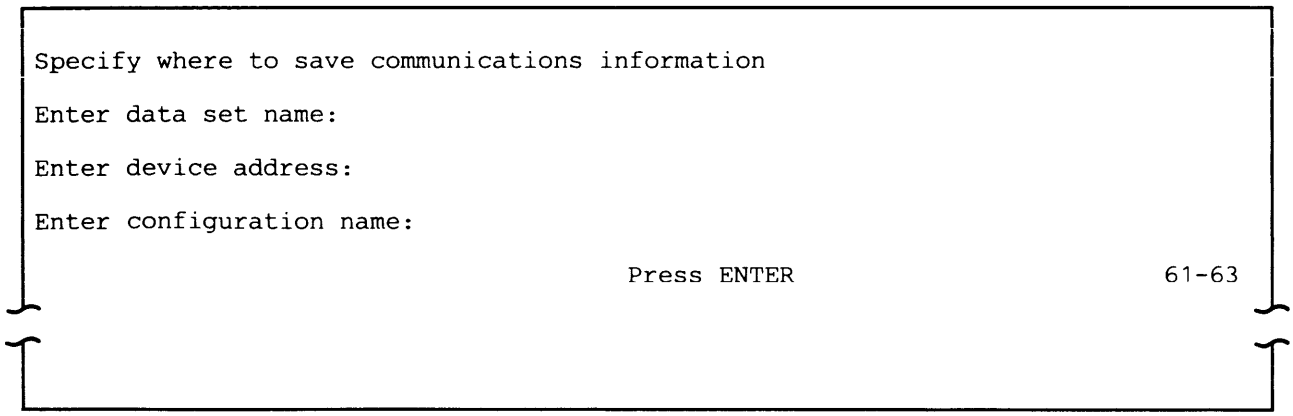
and will display whether the configuration record is to be used in a BSC or an SNA environment.

The phrase "Enter next question ID" appears at the bottom of each prompt as you are running SYSCCU. To run the utility in sequential mode, which is the recommended method of operation, leave this field blank and press ENTER. SYSCCU then displays the next applicable prompt based upon parameter values already entered.

To run the utility in non-sequential mode, enter the question ID for a prompt and press ENTER. If the prompt applies to the configuration information up to that point and its value is not preset, SYSCCU displays it. Use this mode only to change a parameter which has no interdependencies, such as a timeout value.

To end the succession of prompts at any time, regardless of the mode of operation, press the End Input command key sequence. SYSCCU then displays prompt 61–63, which asks where to save the record. SYSCCU always saves your responses to the prompts by writing a configuration record on diskette.

Prompt 61-63 is also displayed at the end of the prompting sequence if you let the utility display the prompts sequentially.

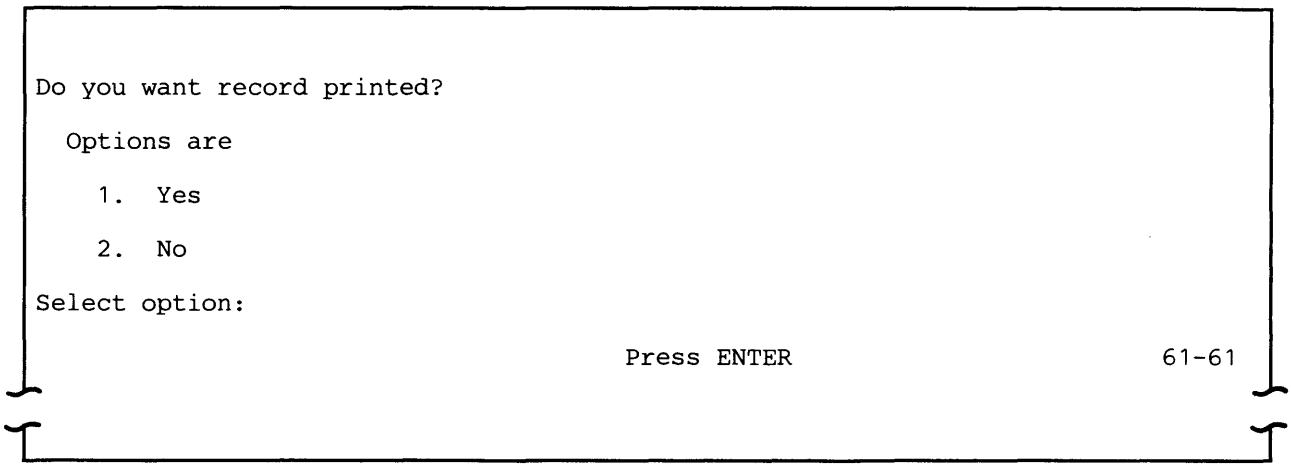


Data set name: Enter the name of the data set on which you want to save the configuration record. The default is the data set name you specified for prompt 61–01.

Device address: Enter the address of the diskette drive on which you have mounted the diskette which contains the above-named data set. Enter two characters for a logical device address or four characters for a physical device address. The default is the address you specified for prompt 61–01.

Configuration name: Enter the name of the configuration record to be saved; the name can be up to 8 characters in length. If you used an IBM-supplied configuration record as input to SYSCCU, you must specify a new name; an IBM-supplied record cannot be updated. If an IBM-supplied record was not used as input, the name defaults to the configuration name specified in prompt 61-01. If the name you enter is the same as that specified for prompt 61–01, the contents of the existing record will be replaced by the values you have just specified. To save the configuration data you have just provided as a new record, enter a configuration name which does not already exist. To replace the contents of an existing record, enter the name of the existing record.

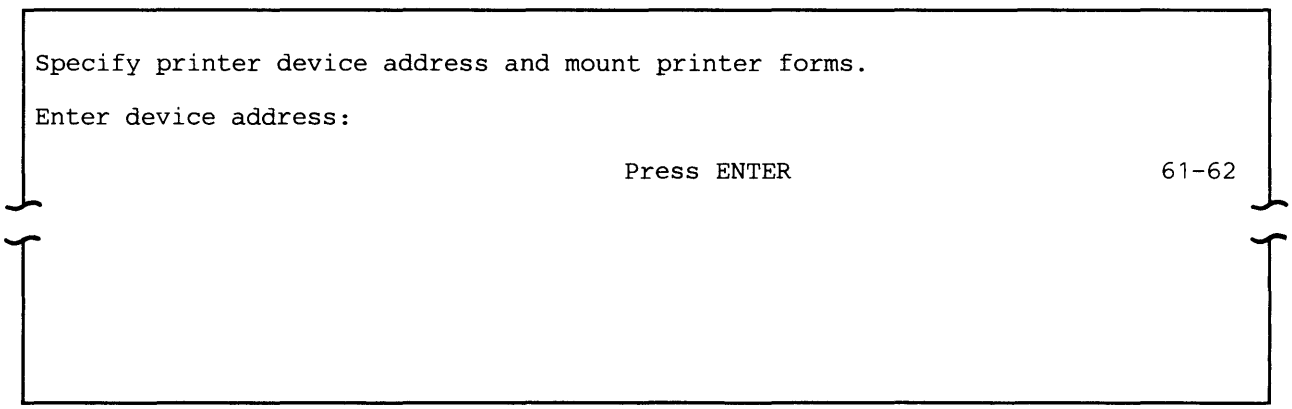
Note: Make sure that you save the communications configuration record on the same diskette as the CAM which uses it.



This prompt appears only if your 5280 system configuration includes a printer.

Select 1 to print the contents of the communications configuration record you have just modified.

Select 2 if you do not want to print the record.



This prompt appears only if the record is to be printed.

Before you respond to this prompt, make sure that the printer is available for your use, that it is turned on and ready, and that the proper set of forms or paper has been mounted.

Enter the address of the printer to be used to print the contents of the configuration record. Enter two characters for a logical device address or four characters for a physical device address.

SYSCCU prints the data set name, configuration record name and, in two columns, the contents of the configuration record. The left column identifies the question ID, and the right column shows the value for the parameter. All common parameters are listed first, in ascending order, followed by either BSC or SNA parameters. Parameters which apply to or are valid for the configuration record are denoted by an asterisk next to the question ID, therefore, those parameters without an asterisk are not used by SYSCLU.

```
Specify end option

  Options are

    1.  Restart

    2.  Exit

Select option:

                                    Press ENTER                    61-64
```

Select 1 to return to the first SYSCCU prompt (prompt 61–01). Then you will be able to update another configuration record.

Select 2 to terminate the utility. SYSCCU will be taken out of main storage and the partition it occupied will be available for other work.

EXPLANATIONS OF SYSCCU PROMPTS

The following sections explain the common, BSC and SNA prompts. Within each category, the prompts are shown in the relative sequence in which they appear on the display when SYSCCU is being run in sequential mode.

As previously explained, the configuration parameters are interdependent. Therefore, based upon your response to a given prompt, SYSCCU may preset values for other parameters and other prompts may not be applicable. When you are running SYSCCU in sequential mode, non-applicable prompts and prompts with preset values are not displayed.

The prompts in the following sections should be answered based on the 5280 for which this communications configuration record is being built.

Common Parameters

The common parameters are included for all configuration records, regardless of the network type. They are identified by a question ID beginning with "C."

Unless you want to finely tune the operation of your system, use the values in the IBM-supplied configuration records for:

- Data set ready timeout (prompt C14)
- Clear to send delay (prompt C16)

```
C1  Which line type do you want?
      Options are
        1.  Nonswitched point-to-point
        2.  Switched point-to-point
        3.  Multipoint
    Select option:
Enter next question ID:
                                        Press ENTER                    61-03
```

Select 1 if the communications line is non-switched point-to-point.

Select 2 if the communications line is switched point-to-point.

Select 3 if the communications line is non-switched multipoint. If bytes 9–11 of the configuration record being updated contain "BSC" and you select this option, SYSCCU sets the device type (prompt B1) to 3741, and prompt B1 will not appear during the prompting sequence. (BSC 3780 protocol and MRJE do not support a multipoint line.)

```
C2  Which line interface do you want?
      Options are
        1.  Integrated modem
        2.  EIA-External modem
        3.  DDSA
    Select option:
Enter next question ID:
                                        Press ENTER                    61-04
```

Select 1 if an integrated modem is installed on your 5280 system. If you select this option, SYSCCU presets the following parameters and these prompts will not appear during the prompting sequence:

- Wrap capability modem (prompt C10) is set to 2, no
- Clocking type (prompt C11) is set to 1, internal

Select 2 if the EIA/CCITT interface adapter is installed.

Select 3 if the Digital Data Service Adapter (DDSA) is installed. If the line type (prompt C1) is switched point-to-point (option 2), DDSA is not valid for the line interface, and option 3 is not displayed.

If you select option 3, SYSCCU presets the following parameters and these prompts will not appear during the prompting sequence:

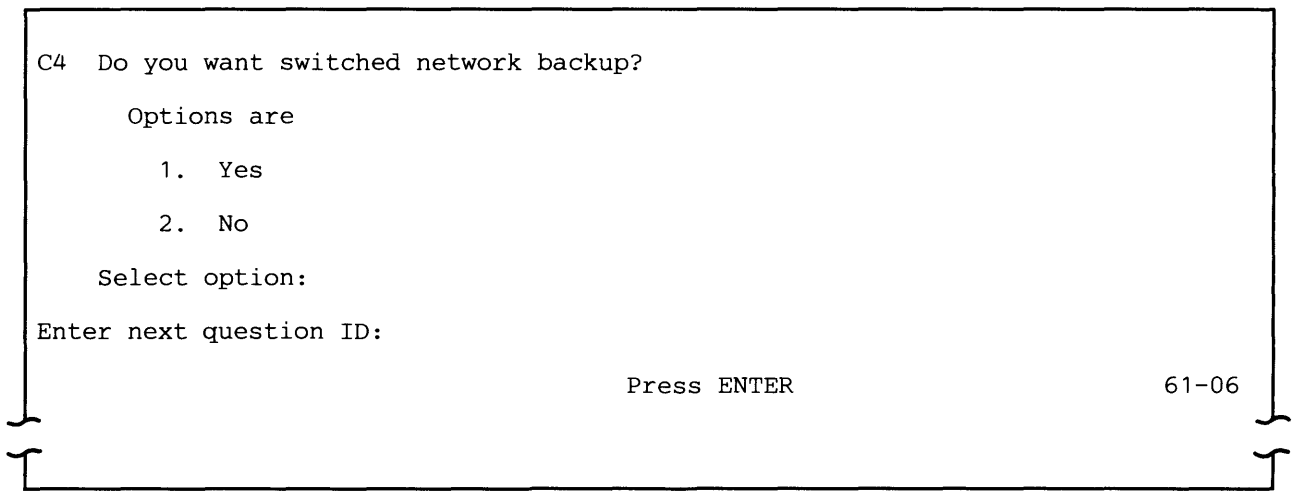
- NRZI (prompt S10) is set to 2, no
- Switched network backup (prompt C4) is set to 2, no
- Wrap capability modem (prompt C10) is set to 2, no
- Clocking type (prompt C11) is set to 2, modem

```
C3  Enter integrated modem attenuation level:

Enter next question ID:

                                    Press ENTER                    61-05
```

This prompt appears only if the line interface (prompt C2) is the integrated modem (option 1).

Attenuation is defined as a decrease in magnitude of current, voltage or power of a signal in transmission between points. The telephone company requires certain signal power levels on its lines, and this prompt allows you to set the level on the communications adapter. You must obtain the proper level from your common carrier, usually the telephone company. The valid range is 00–15 decibels.

Note: For World Trade integrated modems, the attenuation level is set on the modem, and cannot be set by the user. Therefore, although this prompt appears, the value is ignored.



This prompt appears only if the line type (prompt C1) is non-switched point-to-point (option 1) or multipoint (option 3) and the line interface (prompt C2) is the integrated modem or EIA-external modem (option 1 or 2).

Select 2 if your installation uses a non-switched point-to-point or multipoint line. If, for some reason, this non-switched line becomes unusable and you want to run on a switched line, load SYSCCU and select 1 for this prompt. The integrated or EIA external modem must be equipped with a SNBU feature/capability. This is the only parameter in the record that you need to change. Because you have changed the configuration record and its parameters are loaded when the CAM is loaded, you now need to remove the CAM that is in main storage and reload it. If you are executing a communications utility and want the CAM to run in a background partition, restart or reload the utility; if you are executing a user-written communications program or want the CAM to execute in a foreground partition, use SYSCLU to reload the CAM. Then physically establish the switched line connection with the other station, either by manual call, manual answer or auto answer.

When the non-switched line again becomes operational, update the configuration record and change the value of this parameter to 2 before you resume normal operation using the non-switched line.

An alternate method is to create and save a separate configuration record with parameter C4 set to 1. This record would then be ready if the SNBU capability needed to be used.

Note: If your installation uses the IBM 3863 or 3864 modem, always select 2 for this prompt. These modems support SNBU internally. If the 3863 or 3864 is installed and you want to use SNBU, do not change any parameters in the configuration record; use the same record you use for normal operation on a non-switched line.

```
C5  What connection type do you want?

      Options are

        1.  Manual call/answer

        2.  Auto answer

    Select option:

Enter next question ID:

                                    Press ENTER                    61-07
```

This prompt appears only if the line type (prompt C1) is switched point-to-point (option 2).

This parameter specifies how a switched line connection is to be established, and depends on whether the modem has auto-answer capability.

Select 1 if the modem does *not* support auto-answer. To establish the line connection, manually call or answer a call from the terminal or host system, and then put the modem in data mode to establish the line connection.

Select 2 if the modem supports auto answer. When another terminal or system calls the 5280, the line connection is automatically established without operator intervention. In the 5280 communications implementation all connect-data-set-to-line (CDSTL) modems are by definition auto-answer.

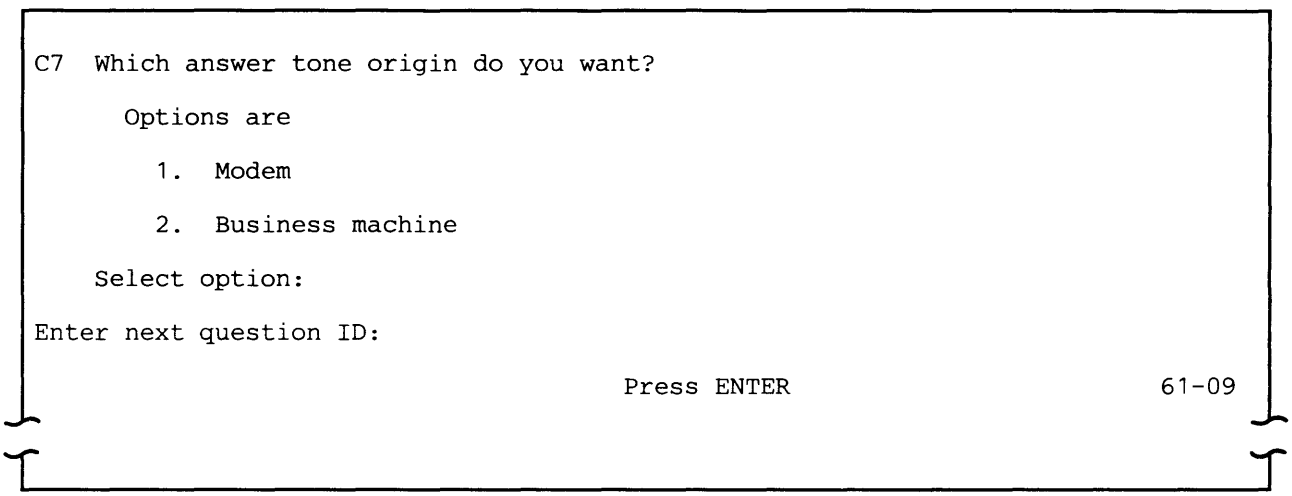
```
C6  Do you want to use connect data set to line option?

      Options are

        1.  Yes

        2.  No

    Select option:

Enter next question ID:

                                    Press ENTER                    61-08
```

This prompt appears only if the line type (prompt C1) is switched point-to-point (option 2), the line interface (prompt C2) is EIA-external modem (option 2), and the connection type (prompt C5) is auto answer (option 2).

There are basically two different types of modems: connect-data-set-to-line (CDSTL) and data-terminal-ready (DTR).

Select 1 if the modem uses CDSTL. A CDSTL modem depends on the the 5280 for sequencing and timing. The 5280 must not turn on DTR (CDSTL) until the physical line connection is successfully established. Since the 5280 controls this type of modem, the modem must be described in prompt C5 as an auto-answer device.

Select 2 if the modem is operated by DTR. A DTR modem requires that DTR be turned on before the modem will recognize any activity on the communications line. This means that nothing can happen until the 5280 turns on DTR. When the DTR modem receives a call, it informs the 5280 by turning on data set ready (DSR).



This prompt appears only if the line type (prompt C1) is switched point-to-point, the line interface (prompt C2) is EIA-external modem (option 2) and the connection type (prompt C5) is auto answer (option 2).

Select 1 if the modem generates the answer tone.

Select 2 if the 5280 supplies the answer tone for an external modem on a switched line.

```
C8  Enter timer value for answer tone send:

Enter next question ID:

                                    Press ENTER                    61-10
```

This prompt appears only if the answer tone origin (prompt C7) is business machine (option 2).

Enter the length of time in seconds required to send the answer tone signal. The valid range is 01–27 seconds.

```
C9  Which answer tone frequency do you want?

      Options are

        1.  1300 HZ

        2.  2100 HZ

    Select option:

Enter next question ID:

                                    Press ENTER                    61-11
```

This prompt appears only if the answer tone origin (prompt C7) is business machine (option 2).

This parameter is a consideration only in World Trade countries. If your system is installed in the United States, select 2 to set the answer tone frequency to 2100 hertz.

In World Trade countries, select 1 (1300 hertz) if your network requires a mark answer tone; select 2 (2100 hertz) if your network requires a space answer tone.

```
C10  Is wrap capability modem installed?

       Options are

         1.  Yes

         2.  No

     Select option:

Enter next question ID:

                                        Press ENTER                    61-12
```

This prompt appears only if the line interface (prompt C2) is EIA-external modem (option 2).

Select 1 if your installation uses an IBM external modem with wrap capability.

Select 2 if a non-IBM external modem or an IBM external modem without wrap capability is installed.

```
C11  Which clocking type do you want?

       Options are

         1.  Internal clock

         2.  Modem clock

       Select option:

Enter next question ID:

                                        Press ENTER                    61-13
```

This prompt appears only if the line interface (prompt C2) is EIA-external modem (option 2).

Select 1 if the external modem is non-synchronous, that is, does *not* provide clocking signals.

Select 2 if the external modem is synchronous, that is, provides clocking signals.

```
C12  Which modem rate do you want?

       Options are

         1.  Full speed

         2.  Half speed

     Select option:

Enter next question ID:

                                    Press ENTER                    61-14
```

Select 1 to use 1200 bps on the integrated modem or full speed on an external modem.

Select 2 to use 600 bps on the integrated modem or half speed on an external modem.

At times, the communications line may not be capable of transferring data at full speed because of interference or distortion, such as that caused by electrical storms. Selecting half speed may allow data to be transferred during such periods.

Note: The modem at the 5280 and the modem at the other system or terminal must be set to operate at the same speed.

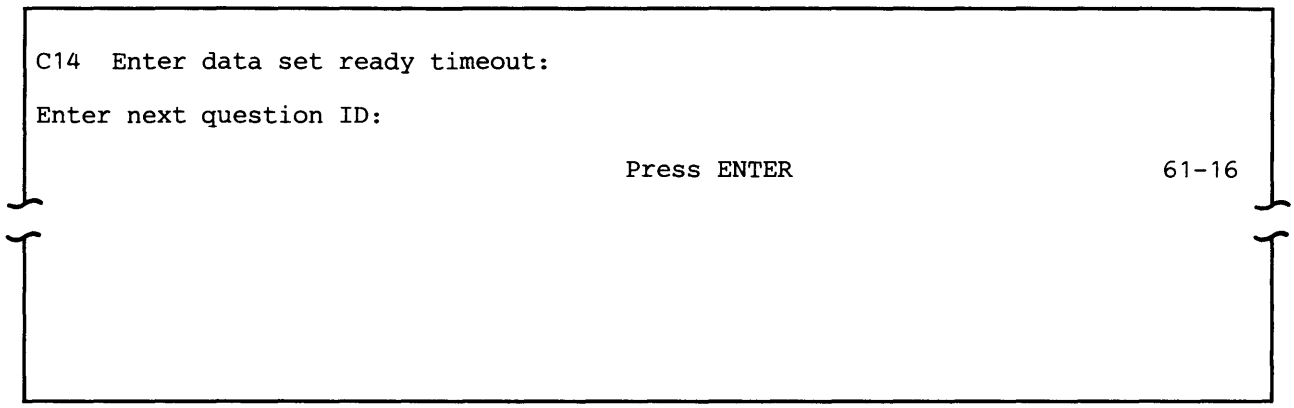
```
C13  Do you want constant request to send?

       Options are

         1.  Yes

         2.  No

     Select option:

Enter next question ID:

                                    Press ENTER                    61-15
```

This prompt appears only if the line type (prompt C1) is non-switched point-to-point.

This parameter depends on whether the modem supports constant request to send.

Select 1 if the modem and the 5280 are to operate in constant request to send mode. If constant request to send is supported by the modem, you should select this option; it decreases line turnaround time by getting rid of the clear to send (CTS) delay in the modem. Constant request to send mode is usually implemented in 4-wire connections.

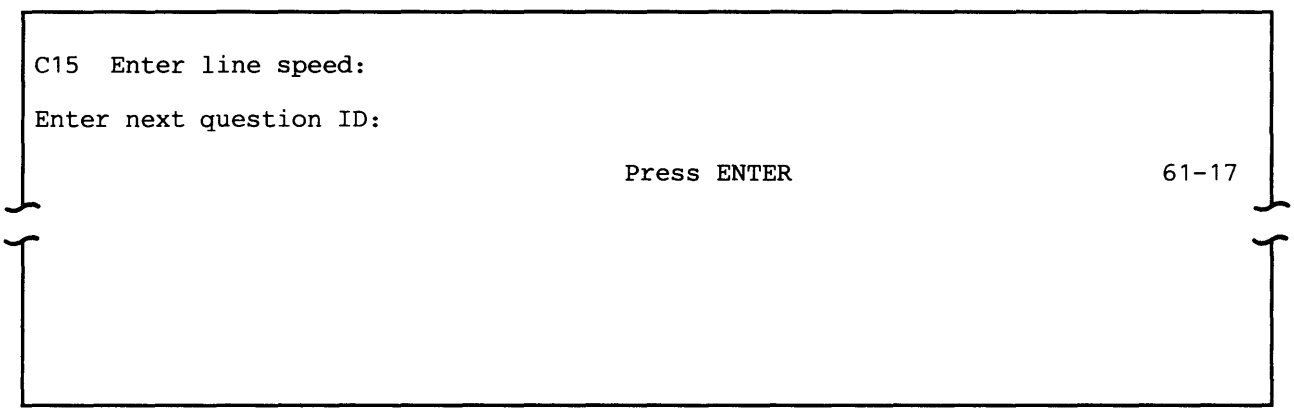
Select 2 if you do not want the 5280 to operate in constant request to send mode. This means that the 5280 drops request to send (RTS) after transmitting. When the 5280 wants to transmit again, it raises RTS and then waits for CTS from the modem before it can transmit.



This timeout depends upon the length of time the modem requires to equalize the line. It tells the 5280 how long to wait for the line to be equalized before posting a permanent modem error.

For a non-switched line, the data set ready timeout is the number of seconds the 5280 waits for data set ready to be returned from the modem after data terminal ready has been set on. For a switched line, this timeout is the number of seconds the 5280 waits for data set ready to be removed by the modem after data terminal ready has been set off.

The valid range is 01 to 27 seconds.



Enter the line speed in bits per second (bps). The valid range is 0600 to 4800.

```
C16  Enter clear to send delay:

Enter next question ID:

                                    Press ENTER                    61-18
```

Some modems re-equalize (or retrain) the line at odd times. This parameter allows the 5280 to accommodate this kind of delay without signalling an error.

Enter the number of seconds to wait for clear to send to be returned after request to send has been set on. The valid range is 01–99 seconds.

```
C17  Enter communications access method name:

Enter next question ID:

                                    Press ENTER                    61-19
```

Enter the name of the communications access method (CAM) to be used with this configuration record. Each CAM shipped by IBM is contained in a separate data set on the communications diskette. The CAM names are: SYSBSCBA, SYSBSCEX, SYSBSCR, SYSSNAD, SYSSNAR, and SYSSNAU. Refer to "IBM-SUPPLIED CONFIGURATION RECORDS" in this chapter for a list of which CAMs can be used with a specific execution utility and with user programs.

```
C18  Which line code do you want?

       Options are

         1.  EBCDIC

         2.  ASCII

     Select option:

Enter next question ID:

                                        Press ENTER                    61-20
```

Select 1 to use EBCDIC code to transmit and receive data.

Select 2 to use ASCII code to transmit and receive data.

Note: The MRJE utility does not support ASCII. If you select MRJE as the device type (prompt B1), SYSCCU sets the line code option to EBCDIC.

```
C19  Enter number of entries in trace table:

Enter next question ID:

                                        Press ENTER                    61-21
```

Enter the number of entries to be allocated for the trace table. One entry consists of 20 bytes.

The valid range is 000–999. If you enter 000, no trace table will be allocated.

BSC Parameters

The BSC parameters apply only to a configuration record to be used with a BSC CAM. If bytes 9–11 of the configuration record being updated contain "BSC" the following prompts appears. They are identified by a question ID beginning with "B".

If this record is to be used with the MRJE utility and SYSBSCR (the MRJE CAM), many BSC parameters are pre-defined by SYSCCU and others do not apply. In both instances, you cannot change these parameter values. If you select MRJE as the device type (prompt B1), the prompts which appear while SYSCCU is running in sequential mode are:

B12—Transparency
B17—CAM I/O buffer size
B18—Maximum number of line bid retries
B19—Number of EOTs to send to EOT
B20—Number of leading pad characters
B21—Number of trailing pad characters
B22—Receive timeout
B23—Receive timeout retry count
B24—Transmit timeout
B25—Continue timeout
B27—Record retransmit limit

Unless you want to finely tune the operation of your system, use the values in the IBM-supplied configuration records for prompts B18 through B27, which deal with timeouts and BSC link protocol.

```
B1  Which device type do you want?

      Options are;

        1.  3741 Look-alike

        2.  3780 Look-alike

        3.  MRJE

    Select option:

Enter next question ID:

                                    Press ENTER                    61-34
```

This prompt appears only if the line type (prompt C1) is non-switched or switched point-to-point (option 1 or 2).

Select 1 if the 5280 is to look like a 3741 Data Entry Station in the communications network.

Select 2 if the 5280 is to look like a 3780 Data Communications Terminal in the communications network. This enables the 5280 to communicate with DOS VSE/POWER.

Select 3 if the 5280 is to look like a S/3 MRJE work station in the communications network. If you select this option, SYSCCU sets the line code (prompt C18) to EBCDIC (option 1).

```
B2  Which station do you want to send initial line bid?

       Options are

         1.  5280

         2.  Host

    Select option:

Enter next question ID:

                                        Press ENTER                    61-35
```

This prompt appears only if the line type (prompt C1) is switched point-to-point (option 1 or 2).

Select 1 if the 5280 for which you are creating this configuration record will send the initial line bid to establish communications using a switched line with another terminal or system. Conventionally, the station that places the call to establish a switched line connection is the one that sends the initial line bid, but this is not a requirement for a switched line. It is a requirement that when establishing a point to point non-switched line connection, the station that wants to transmit first must send the initial line bid because the user will not be prompted for this option, and CAM will always assume this fact.

Select 2 if the 5280 for which you are creating this configuration record is to wait (listen) for another system or terminal to send the initial line bid.

```
B3  Do you want the 5280 to be the primary station?

      Options are

        1.  Yes

        2.  No

    Select option:

Enter next question ID:

                                        Press ENTER                    61-36
```

This prompt appears only if the line type (prompt C1) is non-switched or switched point-to-point (option 1 or 2).

Select 1 if the 5280 for which you are creating this configuration record will be the primary station and the other system or terminal on the line is the

secondary station. This means that if both stations are simultaneously contending (bidding) for the line, the 5280 gains control and has the right to transmit first.

Select 2 if the 5280 for which you are creating this configuration record will be the secondary station.

```
B4  Enter terminal ID (in quotes):

Enter next question ID:

                                    Press ENTER                    61-37
```

This prompt appears only if the line type (prompt C1) is switched point-to-point (option 2).

The terminal ID and host ID (prompt B5) allow the calling station and the called station to exchange ID characters when the line connection is being established.

The terminal ID is an identification assigned to the 5280 in the network, and can be 1–15 alphanumeric characters. Because it can contain blanks as valid characters and is variable in length, *you must enclose the terminal ID in quotation marks*. The quotation marks do not count toward the 15 character maximum length.

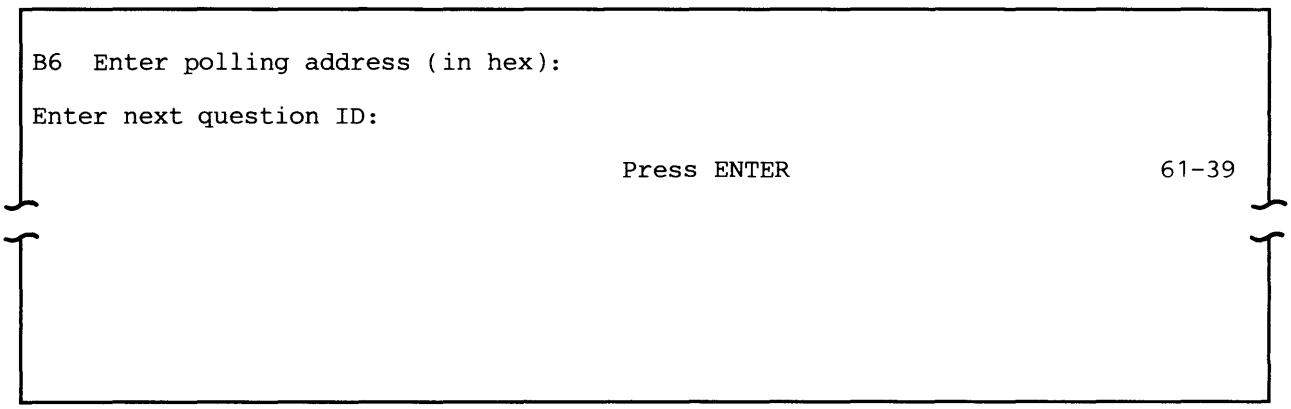
If all blanks are specified, no terminal ID is used.

```
B5  Enter host ID (in quotes):

Enter next question ID:

                                    Press ENTER                    61-38
```

This prompt appears only if the line type (prompt C1) is switched point-to-point (option 2).

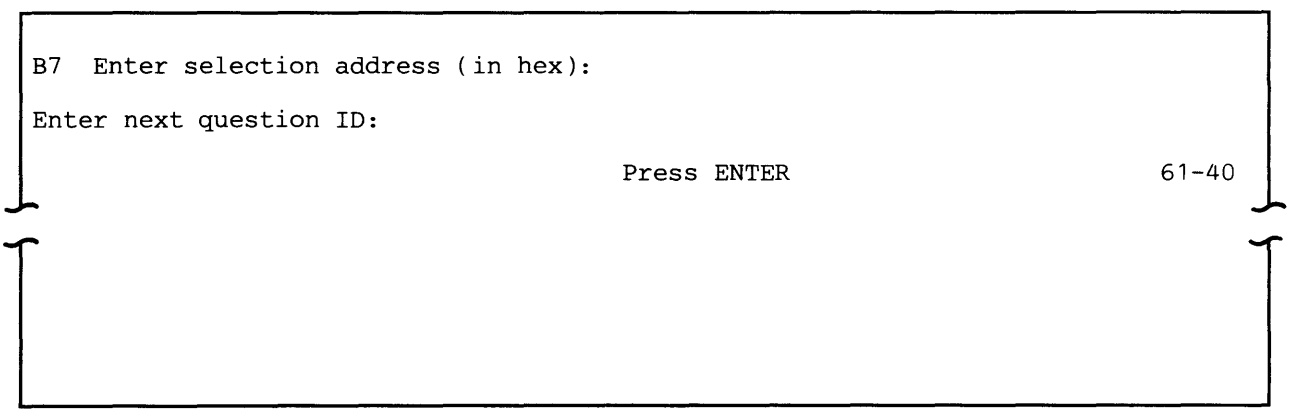
The host ID is an identification assigned to the system or terminal with which the 5280 is to communicate, and can be 1–15 alphanumeric characters. Because it can contain blanks as valid characters and is variable in length, *you must enclose the host ID in quotation marks.* The quotation marks do not count toward the 15 character maximum length.

If all blanks are specified, no host ID is used.



This prompt appears only if the line type (prompt C1) is multipoint (option 3).

The polling address is the address to which the 5280 responds when it is polled (invited to transmit) on a multipoint line. Enter two hex digits between X'80' and X'FF'. Typical polling addresses are in the range X'C0' to X'FF'.



This prompt appears only if the line type (prompt C1) is multipoint (option 3).

The selection address is the address to which the 5280 responds when it is selected (addressed) to receive data on a multipoint line. Enter two hex digits between X'80' and X'FF'. Typical selection addresses are in the range X'80' to X'BF'. SYSCCU compares the selection address to the polling address to ensure that they are not the same.

Note: The selection address is normally the lower case representation of the polling address (see Appendix A).

```
B8  Which record format do you want?
      Options are
        1.  Unblocked
        2.  Blocked
    Select option:
Enter next question ID:
                                        Press ENTER                    61-41
```

This prompt appears only if the device type (prompt B1) is 3741 or 3780 (option 1 or 2).

Select 1 if you do not want records transmitted to be blocked or if records received by the 5280 will not be blocked.

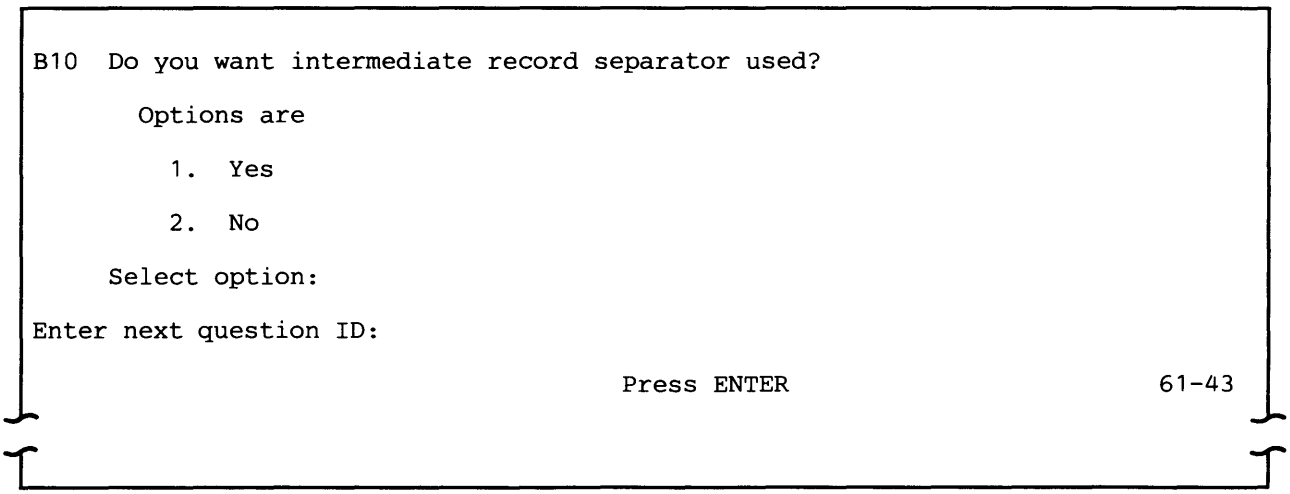
Select 2 if records are to be blocked before they are transmitted or if the 5280 will be receiving blocked records.

When the 5280 is the transmitting station, base your response upon whether or not the other station expects to receive blocked data.

```
B9  Enter maximum ITB blocking factor:
Enter next question ID:
                                        Press ENTER                    61-42
```

This prompt appears only if the record format (prompt B8) is blocked (option 2).

Enter the number of intermediate blocks per transmission. The valid range is 1–9. If you enter 1, intermediate text block (ITB) characters will not be used.

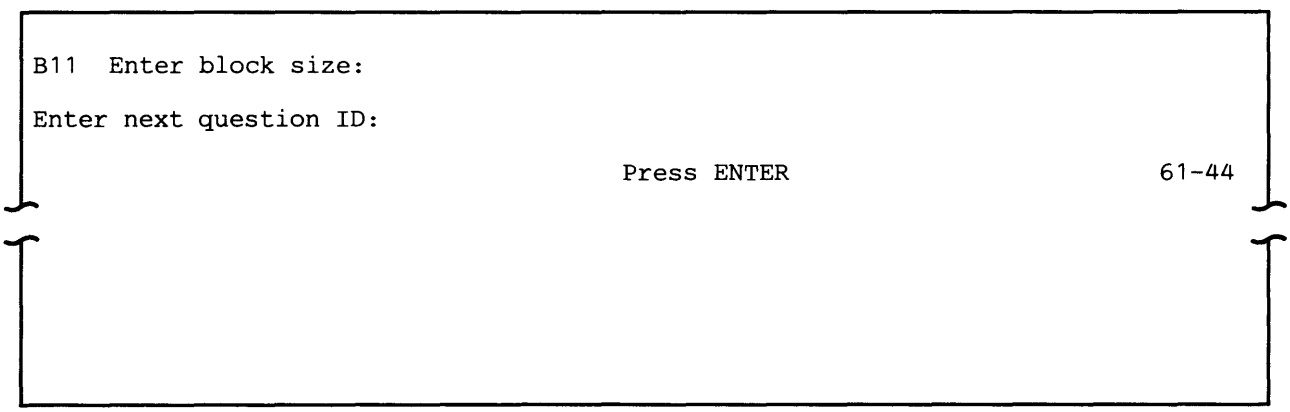


This prompt appears only if the record format (prompt B8) is blocked (option 2).

Select 1 if IRS characters are to be used to separate logical records when blocked records are being transmitted or received.

Select 2 if IRS characters are not to be used.

Note: If the device type (prompt B1) is 3741 (option 1), you cannot specify IRS characters to be used with transparent data (prompt B12).



This prompt appears only if the record format (prompt B8) is blocked (option 2).

Enter the size of the largest data block to be transmitted or received; the maximum block size is 512 bytes. Include IRS characters in the block length. If ITB blocking is being used, the blocksize is the number of characters between STX and ITB.

The 5280 does not transmit spanned records, but can receive them, provided IRS characters are the separators. A spanned record is a logical record which is contained in two different blocks. A block size of zero is not permitted.

```
B12  Do you want to transmit in transparent mode?

       Options are

         1.  Yes

         2.  No

     Select option:

Enter next question ID:

                                    Press ENTER                    61-45
```

This prompt appears only if the line code (prompt C18) is EBCDIC (option 2) and if the record format (prompt B8) is unblocked or, for blocked records, if IRS characters (prompt B10) are *not* to be used (option 2).

Transparent mode permits greater versatility in the range of coded data that can be transmitted. This is because all data, including the normally restricted data link control characters, are treated only as specific bit patterns. Transparent mode is particularly useful for transmitting binary data, floating point numbers, packed-decimal data, unique specialized codes, or object code computer programs. All data link control characters can be transmitted as transparent data without taking on control meaning; to be recognized as control characters, they are preceded by DLE.

Select 1 if the 5280 is to transmit in transparent mode.

Select 2 if you do *not* want to use transparent mode.

```
B13  Do you want blank expansion?

       Options are

         1.  Yes

         2.  No

     Select option:

Enter next question ID:

                                    Press ENTER                    61-46
```

This prompt appears only if the device type (prompt B1) is 3741 or 3780 (option 1 or 2) and transparency (prompt B12) is no (option 2).

If the received data is being handled by the CAM and utility as print data, the blanks will be decompressed regardless of the selection made for this prompt. This is also true if the data is IRS blocked data (option 1 selected for prompt B10).

Select 1 if blanks are to be decompressed in data that is received.

Select 2 if blank-compressed data will not be received.

Note: The 5280 does not support blank compression for data to be transmitted.

```
B14  Do you want blank truncation?

       Options are

         1.  Yes

         2.  No

     Select option:

Enter next question ID:

                                        Press ENTER                    61-47
```

This prompt appears only if transparency (prompt B12) is yes or if transparency is no and blank expansion (prompt B13) is no (option 2).

Select 1 if the 5280 is to truncate trailing blanks when transmitting data and insert trailing blanks when receiving. (The first received record will not have trailing blanks reinserted.)

Select 2 if blank truncation should not be performed.

```
B15  Do you want to enable reverse interrupt?

       Options are

         1.  Yes

         2.  No

     Select option:

Enter next question ID:

                                    Press ENTER                    61-48
```

This prompt appears only if the device type (prompt B1) is 3741 or 3780 (option 1 or 2).

The reverse interrupt (RVI) control sequence is a positive response used in place of the ACK0 or ACK1 positive acknowledgement. RVI is transmitted by a receiving station to request termination of the current transmission because of a high priority message which it must transmit to the sending station.

Select 1 to have the 5280, when it is transmitting, abort the transmit operation and notify the application program (via completion code 5605) when it receives an RVI from the slave station. The application program must then process the completion code.

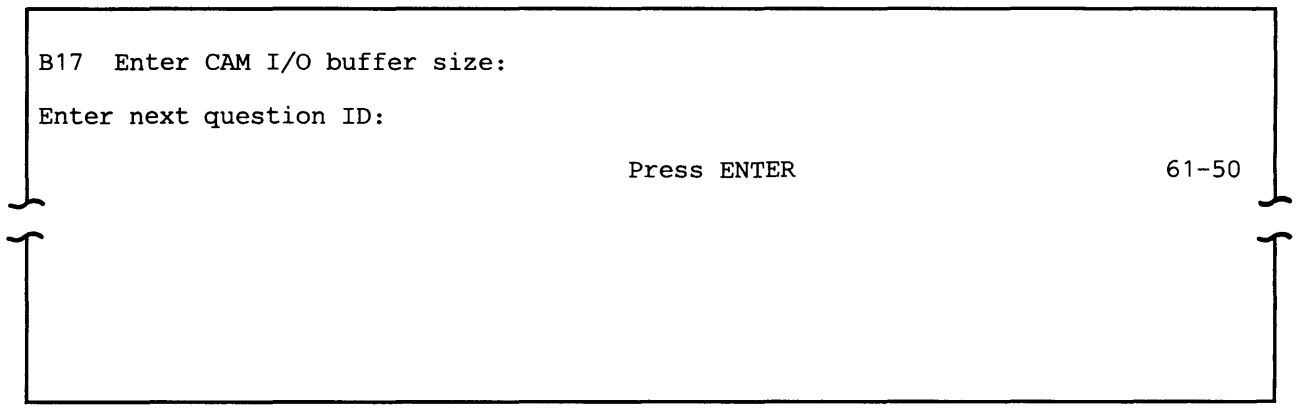
Select 2 if the 5280 is to continue transmitting after it receives an RVI from the slave station. In this instance the 5280 treats the RVI as a positive acknowledgement and completes its current transmission before giving up control of the line.

```
B16  Enter TTD receive limit:

Enter next question ID:

                                    Press ENTER                    61-49
```

This prompt appears only if the device type (prompt B1) is 3741 or 3780 (option 1 or 2).

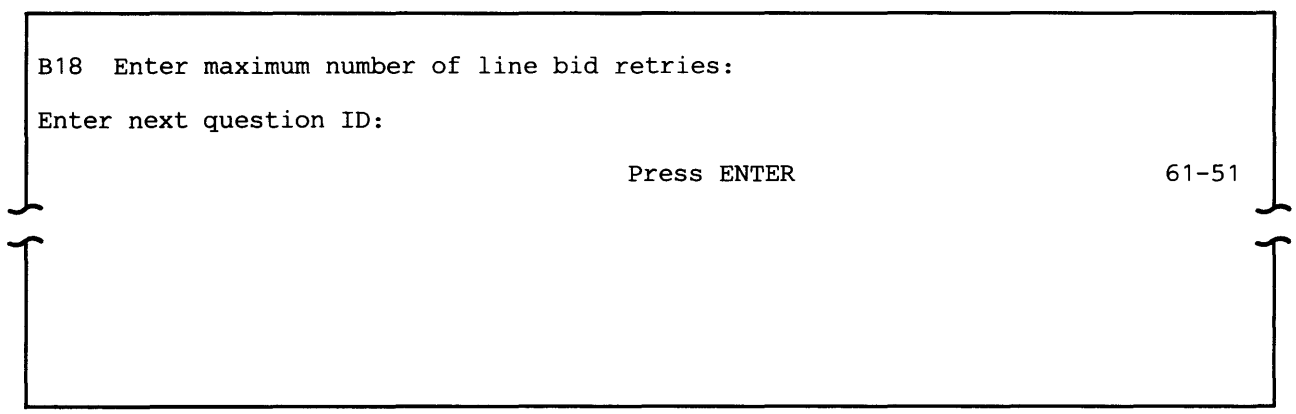
Temporary text delay (TTD) is sent by a sending station in message transfer state when it wants to retain the line but is not ready to transmit. Enter the number of TTDs that the 5280 allows to occur before transmitting EOT.

The valid range is 01–99 times. If 99 is specified, there is no TTD receive limit.



Enter the length in bytes for the I/O buffers. If the device type (prompt B1) is 3741 or 3780, the valid range is 00004–00514 bytes. If the device type is MRJE, the valid range is 00138–12288.

If blocked format is being used, the buffer size should be two greater than the blocksize. The line control characters, such as STX, ETX, and ETR must be included in the calculation for buffersize.



Enter the number of times the 5280 bids for the line before a line bid timeout error occurs. The valid range is 01–99. If 99 is specified, the 5280 will bid for the line indefinitely.

```
B19  Enter number of EOTs to send to EOT:

Enter next question ID:

                                    Press ENTER                    61-52
```

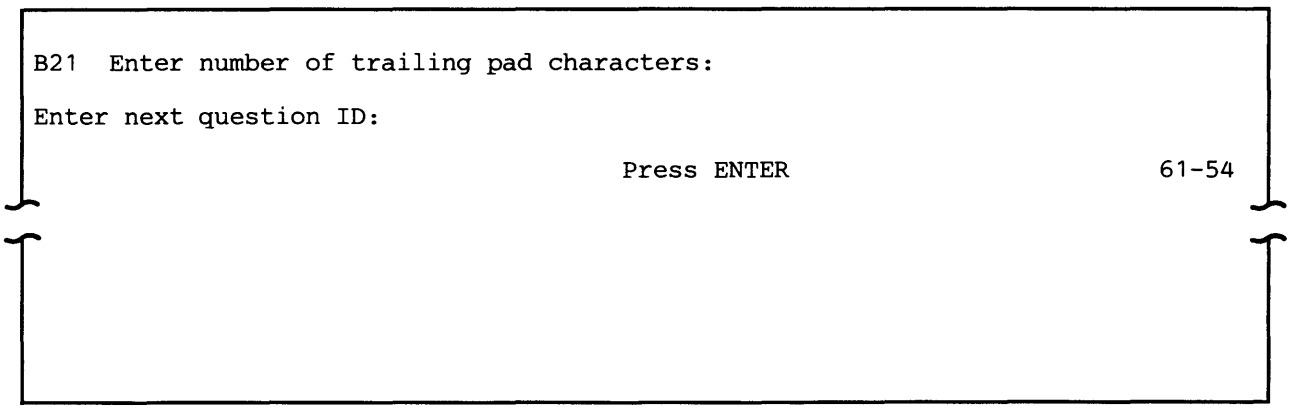
End of transmission (EOT) to EOT is required by some host access methods. Therefore, a limit should be placed on the number of times that the two stations will send EOT to each other.

Enter the number of times the 5280 will transmit EOT in response to an EOT. After this limit is reached, the 5280 will respond only to a line bid. The valid range is 00–99.

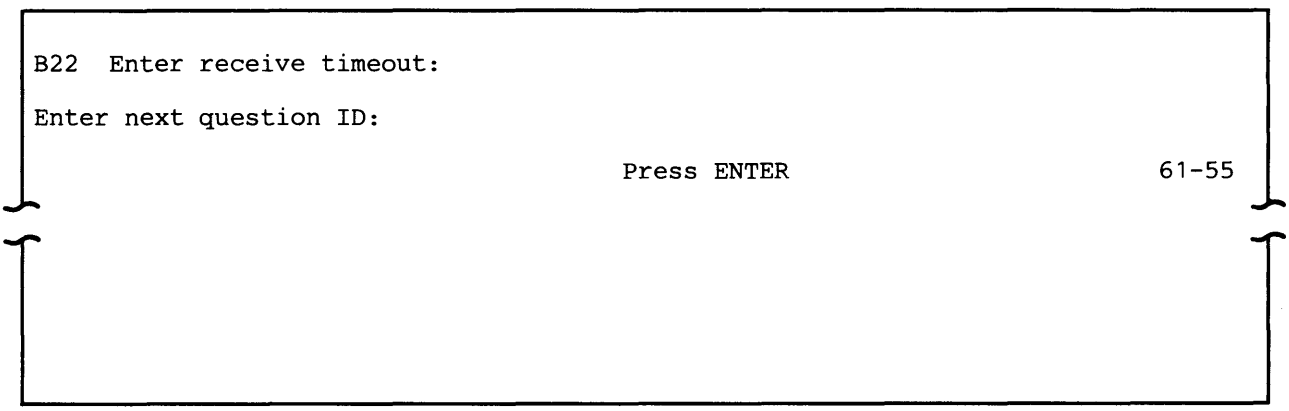
```
B20  Enter number of leading pad characters:

Enter next question ID:

                                    Press ENTER                    61-53
```

Both ends of a communications line must be synchronized in order for the stations to communicate. Leading pad characters establish bit synchronization; synchronous modems and modem eliminators do not need them.

Enter the number of pad characters to precede the character phase pattern (SYN SYN) sent during line turnaround. The valid range is 02–15. If internal clocking (prompt C11) was specified, the minimum number of leading pad characters is 03.

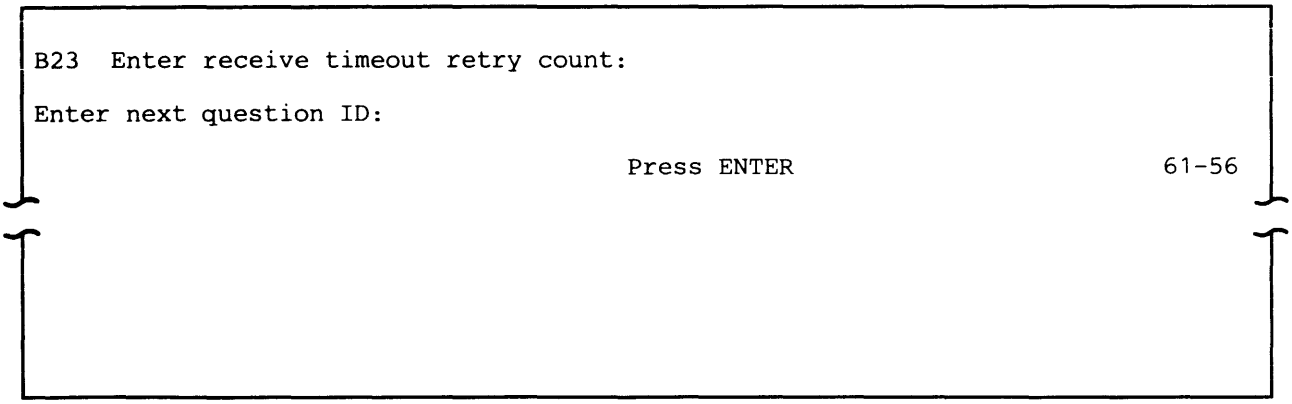


Enter the number of trailing pad characters to be transmitted. The valid range is 00–10 characters.

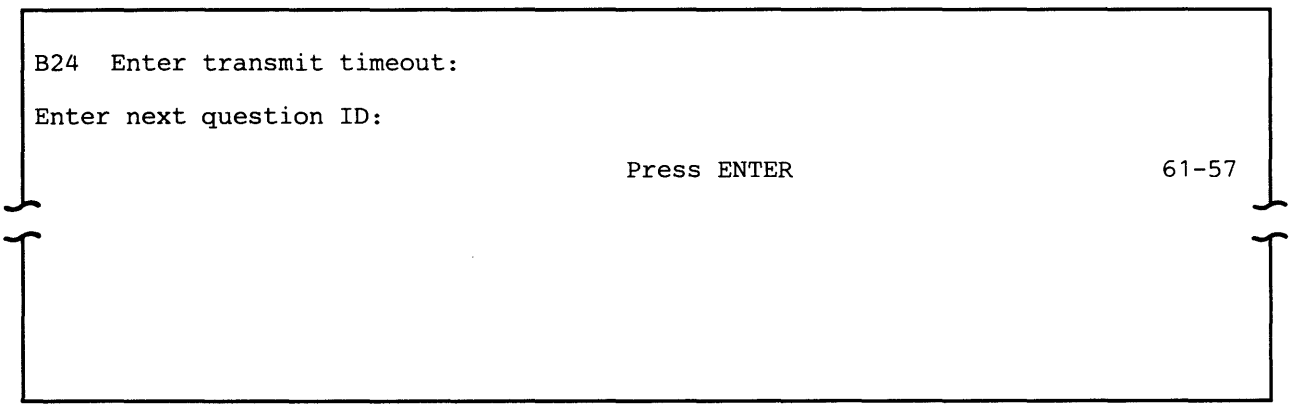


A receive timeout occurs when no response to a transmission has been received by the 5280 in a given period of time. If the 5280 is the master station, the receive timeout indicates how long it waits to receive a reply before sending an ENQ, which asks the slave station to repeat its last reply. If the 5280 is the slave station, it uses the receive timeout to check that transmission from the master station is continuing satisfactorily.

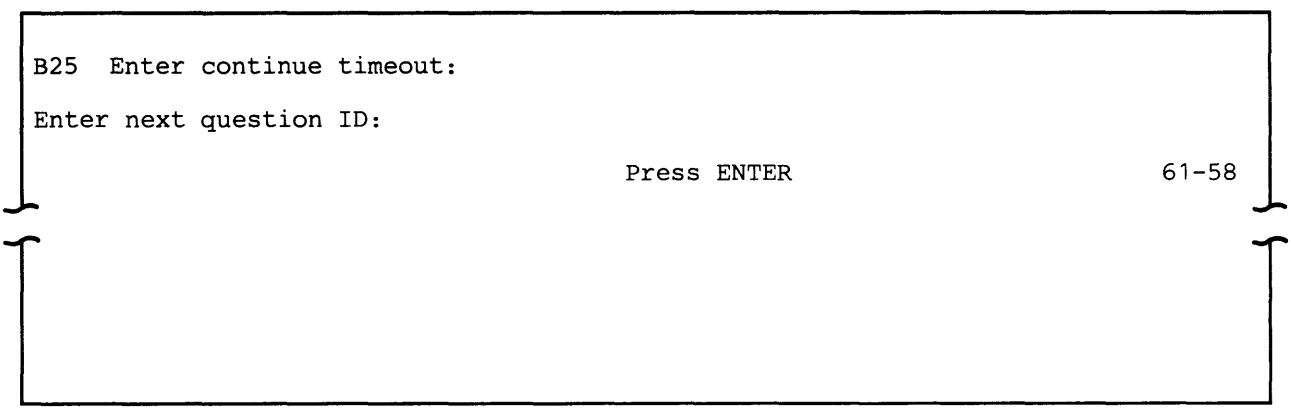
Enter the length in seconds of the receive timeout. The valid range is 01–27 seconds. The BSC standard, and the required value for MRJE, is 03 seconds.



Enter the number of consecutive receive timeouts that will be allowed to occur before the 5280 sends an EOT to terminate the current transmission. If the line connection is switched point-to-point, a disconnect sequence is sent following the EOT to terminate the line connection. The valid range is 00–99.



The transmit timeout sets the rate at which the character phase pattern (SYN SYN) is inserted into transmitted heading and text data. The valid range is 01–27 seconds. The BSC standard, and the required value for MRJE, is 01 second.

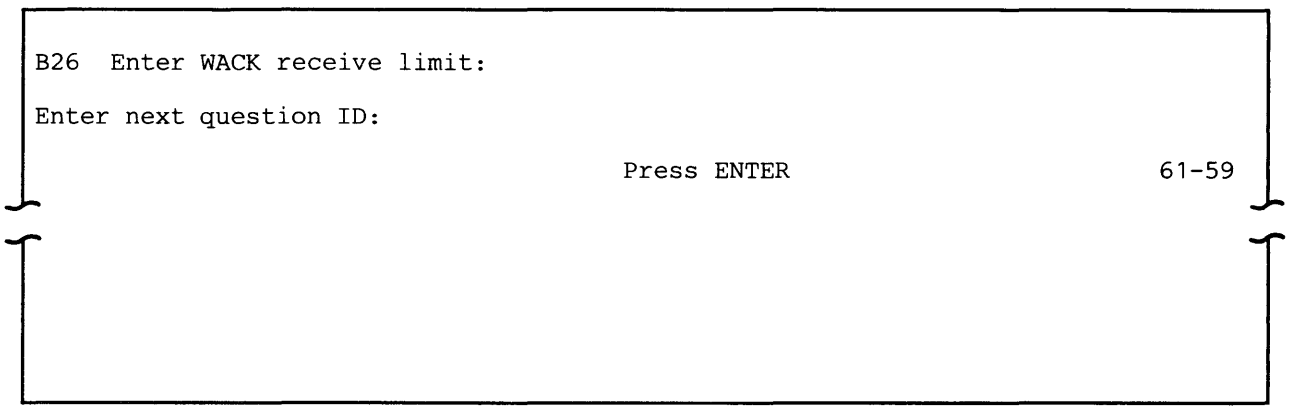


The continue timeout is used when the speed of input devices (for transmitting stations) or output devices (for receiving stations) affect buffer availability and may cause transmission delays. It is used as follows:

- If the 5280 is the master station and is temporarily unable to continue transmitting, it sends TTD to the slave station. The continue timeout is the number of seconds the 5280 waits, after receiving the slave response, before sending TTD.

- If the 5280 is the slave station and is temporarily unable to receive data, it sends WACK to the master station. The continue timeout is the number of seconds the 5280 waits, after receiving a valid message block, before sending WACK.

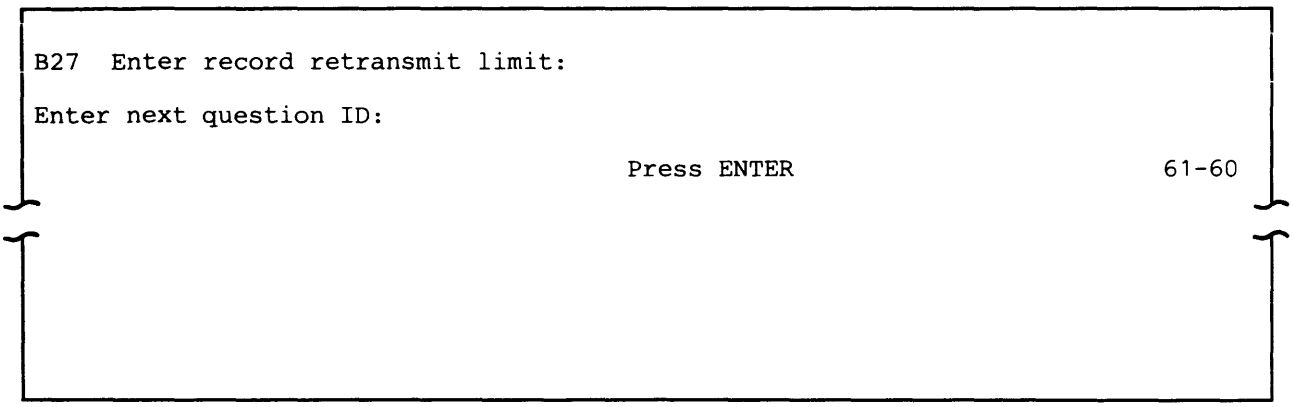
The continue timeout should be less than the receive timeout (see prompt B22). The valid range is 02–27 seconds. The BSC standard is 02 seconds.



This prompt appears only if the device type (prompt B1) is 3741 or 3780 (option 1 or 2).

Wait-before-transmit positive acknowledgement (WACK) allows a receiving station to indicate a "temporarily not ready to receive" condition. When unable to receive more information, the slave station transmits WACK every two seconds.

Enter the number of WACKS that the 5280, when it is the master station, will accept from the slave station before it transmits EOT. The valid range is 001–255; 255 implies no limit.



The record retransmit limit is the number of times the 5280, as a master station, retransmits a message in response to a NAK from the slave station. After the 5280 retransmits the message the number of times specified, it transmits an EOT to abort the transmission. For MRJE, use the value you entered for the receive timeout retry count (prompt B23). The valid range is 01–15 retries.

SNA Parameters

The SNA parameters apply only to a configuration record to be used with an SNA CAM. If bytes 9–11 of the configuration record being updated contain "SNA" the following prompts appear. They are identified by a question ID beginning with "S".

Unless you want to finely tune the operation of your system, use the values in the IBM-supplied configuration records for:

- Communications program timeout (prompt S11)
- Inactivity timeout (prompt S12)

```
S1  Enter primary LU name:

Enter next question ID:

                                    Press ENTER                    61-22
```

Enter the name of the host application logical unit (LU) with which the 5280 communications program, for example SYSSRJE or SYSSDCU, is to establish an LU-LU session. It can be 1–8 alphanumeric characters.

The primary LU name provides a level of security in that, if specified, it is checked against the PLU (primary logical unit) name sent in the BIND. If the PLU names do not match, a session cannot be established. If you specify all blanks, the 5280 does not check the LU name sent by the host.

```
S2  Enter secondary PU name:

Enter next question ID:

                                    Press ENTER                    61-23
```

Enter the name assigned to the 5280 physical unit (PU) in the network. It can be 1–8 alphanumeric characters.

The secondary PU name is sent by the 5280 to the host in response to the activate physical unit (ACTPU) command. It provides a level of security in that, if specified, it is checked against a table of valid secondary PU names at the host. If a valid entry is not found, a session cannot be established. If you specify all blanks, the 5280 does not send a PU name to the host.

```
S3  Enter specific ID for XID (in hex):

Enter next question ID:

                                  Press ENTER                    61-24
```

In an SNA/SDLC network, the primary station may request that the secondary station identify itself; this occurs most frequently on a switched point-to-point line. The primary station, that is the host system, transmits an exchange identification command (XID) and the 5280 sends a response.

The specific ID of XID is a number which uniquely identifies a specific station in a network. It should match the IDNUM parameter of the PU(SWITCHED) macro of the Network Control Program (NCP). Enter the specific ID for the 5280 as five hex digits. This is a mandatory parameter.

```
S4  Enter SDLC station address (in hex):

Enter next question ID:

                                  Press ENTER                    61-25
```

Enter the station address assigned to the 5280 in the network. Enter two hex digits for the station address. This is a mandatory parameter which must match the station address generated in the NCP.

X'00' is reserved as the null (no station) address and X'FF' is reserved as the broadcast address; these are not valid entries. The valid range is X'01' to X'FE'.

```
S5  Enter receive pacing count:

Enter next question ID:

                                        Press ENTER                    61-26
```

In SNA, pacing is a technique that permits a receiving connection point manager (CPM) to control the data transfer rate (the rate at which it receives request units) on the normal flow. It is used to prevent overloading a receiver with unprocessed requests when the sender can generate requests faster than either the receiver or the network can process them.

The receive pacing count is the maximum number of request units (RUs) that the 5280 can receive for each session before it sends a pacing response to the host. This response to the host indicates that the the 5280 LU is capable of receiving the number of RUs specified as the receive pacing count from the host.

The valid range of values is 1–8. This number must match the receive pacing count generated by the NCP LU macro statement.

Note: The receive pacing count for each LU-LU session must be the same.

```
S6  Enter send pacing count:

Enter next question ID:

                                        Press ENTER                    61-27
```

The send pacing count is the maximum number of request units that the 5280 can send to the host before receiving a pacing response from the host. The pacing response received by the 5280 indicates that the host is capable of receiving additional RUs from the 5280.

The valid range of values is 0–8. This number must match the send pacing count generated by the NCP LU macro statement. A value of zero implies no pacing on request units sent to the host.

Note: The send pacing count for each LU-LU session must be the same.

```
S7  Which 5280 application program do you want?

      Options are

        1.  SYSSRJE

        2.  SYSSDCU

        3.  User program

    Select option:

Enter next question ID:

                                        Press ENTER                    61-28
```

Select 1 if you are creating a configuration record for SRJE to communicate with DOS VSE/POWER, OS/VS1 RES, or OS/VS2 JES2. The CAM name (prompt C17) must be "SYSSNAR". If you select this option, SYSCCU presets prompt S8, maximum number of users, to 1.

Select 2 if you are creating a configuration record for SYSSDCU. The CAM name (prompt C17) must be "SYSSNAD".

Select 3 if you are creating a configuration record for a program you have written. The CAM name (prompt C17) must be "SYSSNAU".

```
S8  Enter maximum number of users:

Enter next question ID:

                                        Press ENTER                    61-29
```

This prompt appears only if the application program (prompt S7) is SYSSDCU or user program (option 2 or 3).

Enter the maximum number of LU–LU sessions which can be concurrently active between the 5280 and the host system at any given time. The valid range is 1–4.

Note: This number should be less than or equal to the number of logical units generated in the NCP.

```
S9  Do you want each utility or application to issue logon?

      Options are

        1.  Yes

        2.  No

    Select option:

Enter next question ID:

                                        Press ENTER                    61-30
```

Logon is a procedure required by some SNA host systems to establish a session.

Select 1 if the host system requires logon. The Data Communications Description Utility and RJE Description Utility allow you to enter the logon data to be saved on diskette, or you can furnish it each time a communications job is executed.

Select 2 if the host system does not require logon.

```
S10  Do you want NRZI used?

       Options are

         1.  Yes

         2.  No

     Select option:

Enter next question ID:

                                    Press ENTER                    61-31
```

This prompt appears only if the line interface (prompt C2) is integrated modem or EIA-external modem (option 1 or 2).

Select 1 if non-return-to-zero change-on-ones recording (NRZI) is to be used; this is the preferred option.

Select 2 if NRZI is not to be used.

Note: If NRZI is specified to be used on the 5280, it must also be used at the host.

```
S11  Enter communications program timeout:

Enter next question ID:

                                    Press ENTER                    61-32
```

This timeout is used to:

- Prevent host system resources from being indefinitely tied up if the 5280 communications program, either IBM-supplied or your own, is unable to process data sent from the host subsystem application program
- Prevent the 5280 system from being indefinitely tied up when the logon is not accepted because the host subsystem is inactive

This might happen when a device error occurs, such as a printer running out of paper while the 5280 is receiving data to be written to the printer. If the

device is not made operational within the time specified, then the communications program timeout occurs. When this timeout occurs, the 5280 sends a negative response to the host, and the host performs error recovery.

Enter the number of minutes that the 5280 communications program will wait before the communications program timeout occurs. The valid range is 01–10 minutes.

```
S12  Enter inactivity timeout:

Enter next question ID:

                                    Press ENTER                    61-33
```

For a switched line, the inactivity timeout is the maximum length of time the line remains up and active when there is no successful exchange of data or commands on the line.

Enter the number of seconds the 5280 will hold the switched data link connection before disconnecting from the line. The valid range is 01–27 seconds.

```
S13  Enter blocksize:

Enter next question ID:

                                    Press ENTER                    61-66
```

This prompt appears only if the application program (prompt S7) is user program (option 3).

Enter the block size for data to be transmitted using the SNA user interface CAM (SYSSNAU). The valid range is 0000–4096 bytes. If you enter 0000, the data will not be blocked.

Communications Load Utility (SYSCLU)

The Communications Load Utility (SYSCLU) loads a communications access method (CAM) into a partition if CAM has not already been loaded by SYSCLU. The execution utilities (except SYSBOLT) use this utility to automatically load the CAM into a background partition if CAM has not already been loaded by SYSCLU. You need to use this utility:

- To load the CAM for a communications program you have written
- To load the CAM for the BSC Online Test Utility
- If you want the CAM for a communications execution utility to be run in a *foreground* partition

The CAM and an application program, either IBM-supplied or your own, reside concurrently in main storage to perform data transfers. Each time you load a communications execution utility, the utility checks to see whether the proper version of CAM has been loaded. If CAM is not loaded, the utility will invoke SYSCLU to load CAM. If the wrong CAM is loaded, SYSCLU will display an error message.

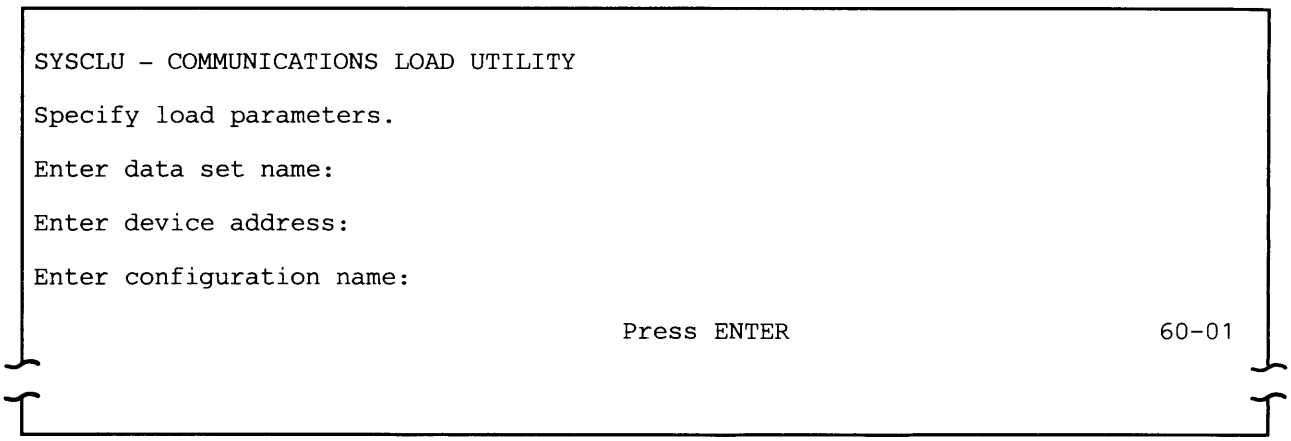
All of the CAMs can execute in a background partition, and do not require the use of the keyboard/display; therefore, running the CAM in a background partition is the normal mode of operation. For the execution utilities, the only instances in which you need to use SYSCLU are if the CAM is to execute in a *foreground* partition, or if the execution utility is the BSC Online Test.

For a communications program you have written, load SYSCLU and then identify the configuration record to be used. Based upon the CAM name in the record, SYSCLU loads the desired CAM. SYSCLU, the CAM to be loaded, and the configuration record to be used *must* all be on the same diskette.

Run this utility before you load your communications program into main storage. Load SYSCLU into the partition into which the CAM is to be loaded; the CAM overlays SYSCLU in the same partition.

The size of the partition required depends upon the version of CAM that your application program uses. For a program to be executed in a BSC network, use the CAM named SYSBSCEX; it requires a minimum partition size of 18K. For an SNA/SDLC program, use the CAM named SYSSNAU; it requires a minimum partition size of 22K (see "CAM Partition Sizes" in Chapter 8).

To run SYSCLU, first mount the diskette which contains the utility, the CAM to be loaded and the configuration record to be used. After you load SYSCLU into the partition into which the CAM is to be loaded, the following prompt appears.



Data set name: Enter the name of the data set that contains the communications configuration record to be used. SYSDCCR is the default name. You can specify another data set name by keying the name over the default.

Device address: Enter the address of the diskette drive on which you have mounted the diskette which contains the above-named data set.

Configuration name: Enter the name of the communications configuration record to be used. This record identifies the version of CAM to be loaded.

After you press ENTER, SYSCLU loads the CAM and then terminates. You should now load the communications program you want to execute into main storage.

Data Communications Description Utility (SYSDCDU)

The Data Communications Description Utility (SYSDCDU) allows you to describe communications jobs to be executed at a later time by the BSC Data Communications Utility, BSC Batch Transfer Utility or the SNA Data Communications Utility. A job must be described before it can be executed by an execution utility.

To describe a job, you respond to a series of prompts on the display. Each prompt is identified by a four-digit number in the lower right side of the display. The first two digits, 69, identify the program as SYSDCDU.

First you describe the execution environment of the job, including the execution utility. Then you describe the specific data transfer function to be performed, namely:

- Receive data
- Transmit data
- Send inquiries and receive replies

One or many functions can make up a job. Chaining functions together to be executed as a single job minimizes the amount of operator action required to perform many data transfer functions.

Your responses to the prompts are saved on a diskette data set, and are identified by a name you provide. To execute a job, you identify it to the execution utility by its name.

JOB DATA SET

Records in a Job Data Set

A job data set can contain three types of records:

- Job description—describes how the job will be run, including the execution utility, the communications configuration name, the CAM partition number, and whether the job will execute in attended or unattended mode. It also contains the name of the first function to be executed. All functions in a job must be in the same data set as the job description record.
- Function definition—describes one data transfer function, either transmit, receive or inquiry. It identifies devices and data sets which will be used when the execution utility executes the function. If the job consists of more than one function, the record contains the name of the next function to be executed as part of the job; this is how chaining is accomplished. All function definition records which make up a chain must be in the same data set. The function definition record can also contain the name of a printer format record.

- Printer format—describes the page layout for data to be printed, including number of lines, margins and tabs. Many function definitions can point to the same printer format record. If a function definition record names a printer format record, the two records must be in the same job data set.

The first eight bytes of each of these records contain the name of the record; you must specify a unique name for each record. Two records in the same job data set cannot have the same name. (See Appendix G for the layouts of these records.)

The three types of records in a job data set are related as follows:

- The job description record points to the first function definition record.

- A function definition record points to the next function to be executed, if any, or is identified as the last function in a job.

- A function definition record can also point to a printer format record. More than one function definition record can point to the same printer format record.

Figure 2-4 shows these relationships. The job named JOBS01 consists of four functions to be executed; each function is described in a different function definition record. The printer format record, PRTR01, is used by two functions, FUNC01 and FUNC03. FUNC04 is the last function in the chain. SYSDCDU wrote the job, function, and printer format records to diskette in the order in which they were created. However, the order of the records in the job data set does not affect the order in which they are executed.

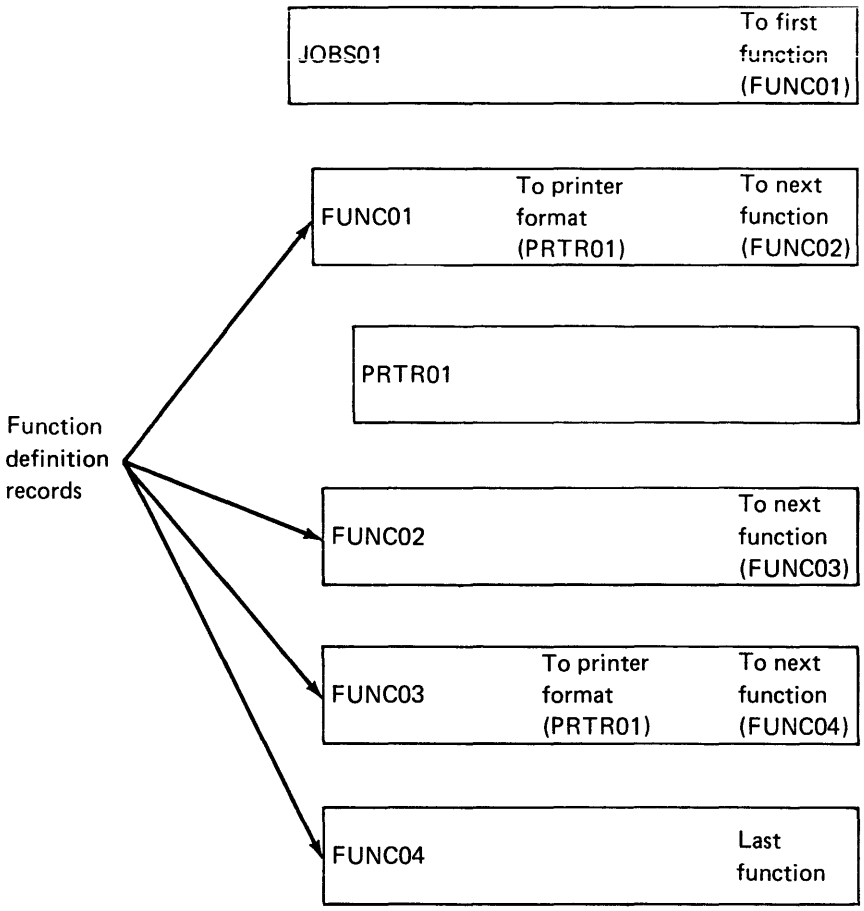


Figure 2-4. Records in a Job Data Set

When JOBS01 is executed, the execution utility reads the records in the job data set in the following sequence:

JOBS01
FUNC01
PRTR01
FUNC02
FUNC03
PRTR01
FUNC04

A function definition record in one job can point to a function in a different job. This is useful if you want to execute the same function(s) at the end of several different jobs. A function can be used for more than one job only if all the following functions to be executed in the jobs are the same for all the jobs. Because more than one job is involved, make sure that the job description records specify the same execution utility, communications configuration record, and mode of operation.

In Figure 2-5, function XFUNC01 (in job JOBS02) points to FUNC03 (in job JOBS01). When JOBS02 is executed, the execution utility reads the records in the following sequence:

JOBS02
XFUNC01
FUNC03
PRTR01
FUNC04

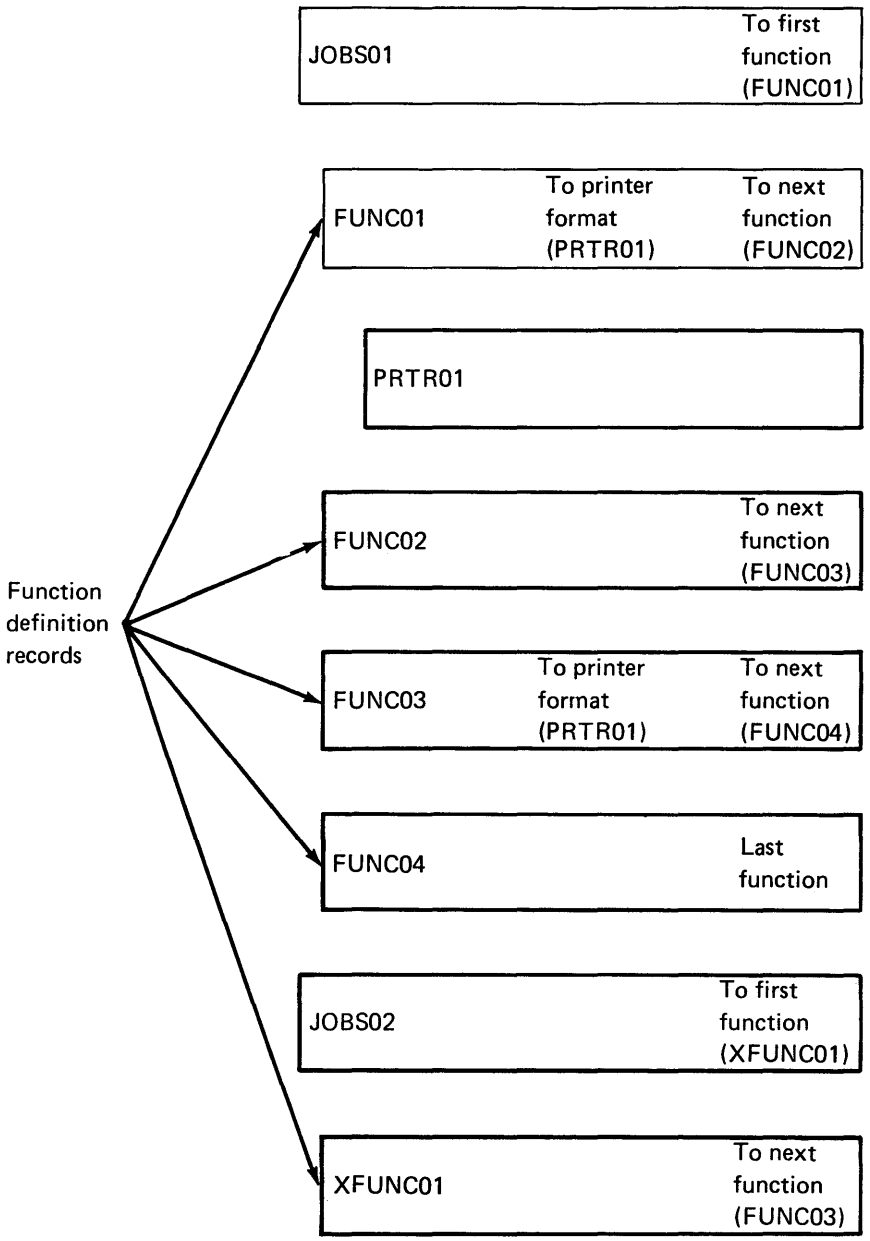


Figure 2-5. A Function Definition Chain using Functions from Two Jobs

Updating a Record

You can update all three record types in the job data set. When you are updating an existing record, the current values in the record are displayed as defaults. To change any value in the record, key over the displayed default.

When you update a job description or a printer format record, SYSDCDU changes the values in the existing record and saves the record under the same name. However, an existing function definition record can be used to create a new function without changing the values in or the name of the existing record. The result is two function definition records, the existing record and a new record with a new name. This capability to update and then save both an existing and a new record is provided only for function definition records. It allows you to easily create many similar function definitions to meet your needs.

When you are updating a function in a chain, make sure you keep the chain of functions in the proper order for execution. For example, to update the function definition record named FUNC01 in Figure 2-5, you may need to update other records: the job description record (JOBS01) points to FUNC01, and FUNC01 points to the function definition record named FUNC02 and the printer format record named PRTR01.

Note: To update a function definition record, you must first respond to the job description prompts. To update a printer format record, you must first respond to the job description prompts and some of the prompts for a function definition record which points to the printer format record.

REQUIREMENTS

This utility requires a partition size of 15K. A keyboard/display is required for the prompts. You also need a pre-allocated diskette data set (either ASCII or EBCDIC) with a record length of 256 bytes to save the records you create.

SYSDCDU asks you to provide information about the communications configuration to be used when your job is executed. Before running this utility, you should know the name and location of the communications configuration record (created using the Communications Configuration Utility) to be used and the partition number into which the CAM will be loaded.

SYSDCDU does not perform any data transfers with another system; therefore it can execute concurrently with any other communications utility program.

CREATING A JOB DESCRIPTION RECORD

This section describes how to create a job description record. The following three sections describe how to create a function definition record for the BSC Data Communications Utility (SYSBDCU), BSC Batch Transfer Utility (SYSBBTU), and SNA Data Communications Utility (SYSSDCU). Depending upon the execution utility, you only need to refer to one of the three sections on function definition records.

The following prompts can appear when you are running SYSDCDU to create a job description record.

```
SYSDCDU - DATA COMMUNICATIONS DESCRIPTION UTILITY
Specify job data set information.
Enter data set name:
Enter device address:
Enter job name:
                                        Press ENTER                    69-01
```

Data set name: Enter the name of the job data set.

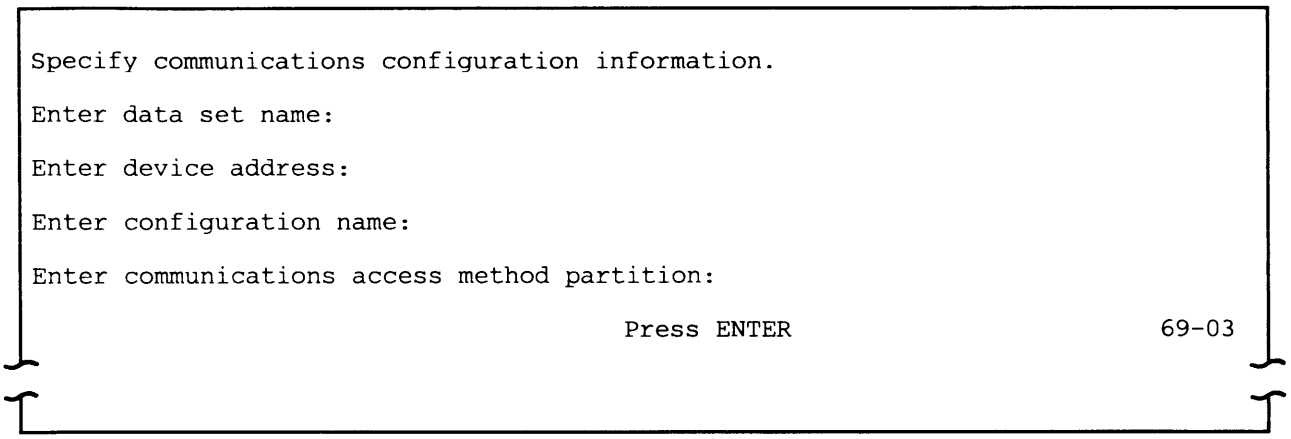
Device address: Enter the address of the diskette drive which contains the job data set. Enter two characters for a logical device address or four characters for a physical device address.

Job name: Enter the name of the job to be created or updated. It must be 1–8 alphanumeric characters with no embedded blanks and no special characters.

To create a new job, enter a name which does not match the name of any job description, function definition or printer format record on the specified data set. To update a job, enter the name of a job which currently exists. The values in the existing record will be displayed as defaults.

```
Which utility and protocol type do you want?
  Options are
    1. BSC Data Communications (3741)
    2. BSC Data Communications (3780)
    3. BSC Batch Transfer (3741)
    4. SNA/SDLC Data Communications (LU TYPE=1)
Select option:
                                        Press ENTER                    69-02
```

Select the execution utility for the job; the protocol type refers to how your 5280 system will look to the communications network. (Refer to Chapters 3 and 4 for descriptions of the functions and devices supported by the execution utilities.)



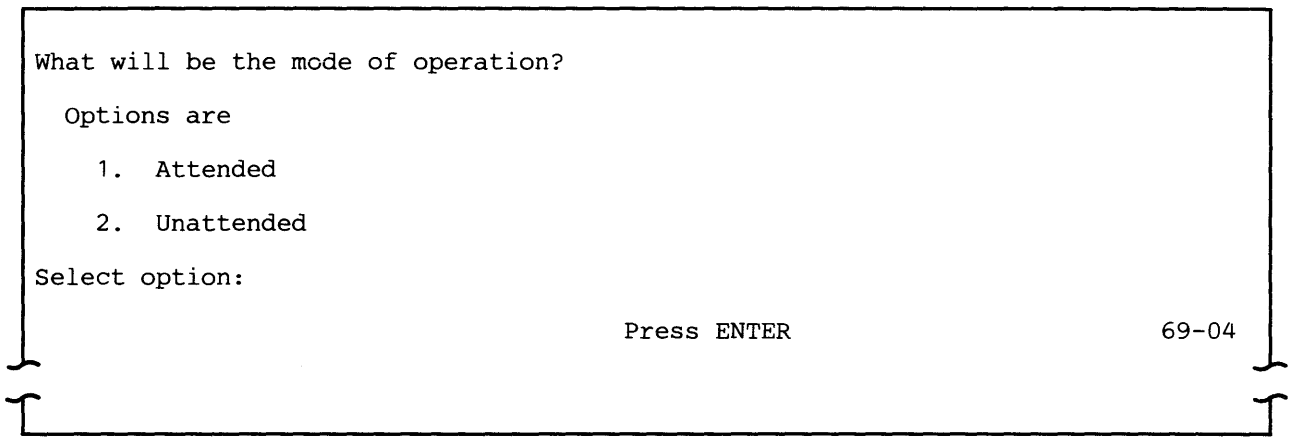
Data set name: Enter the name of the data set which contains the communications configuration record to be used when the job is executed.

Device address: Enter the address of the diskette drive on which you plan to mount the configuration data set at *execution* time. This can be either two characters for a logical device address or four characters for a physical device address.

Configuration name: Enter the name of the communications configuration record to be used when the job is executed. The name can be up to eight characters long. The Communications Configuration Utility is used to create this record.

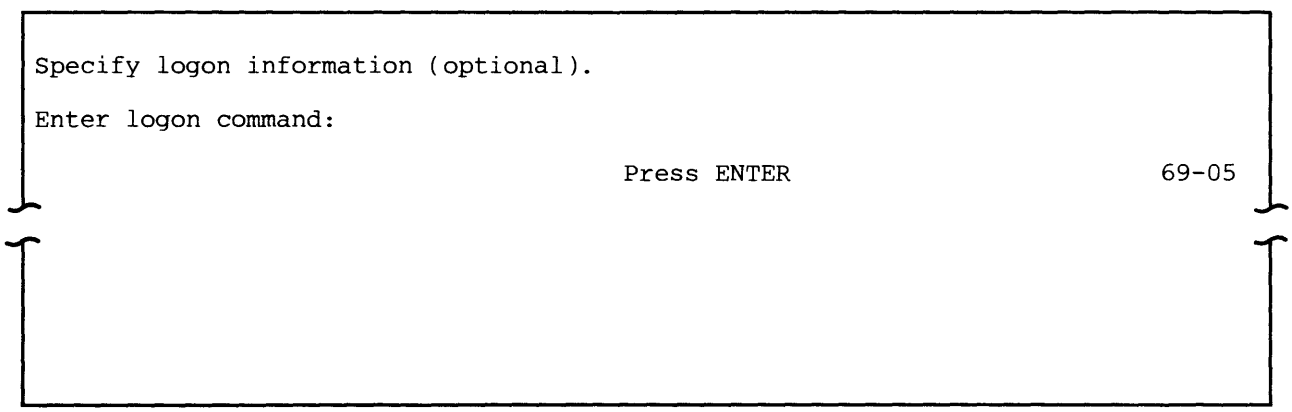
Communications access method partition: Enter the number of the partition into which the CAM is to be loaded at *execution* time. The valid range for a partition number is 0–7.

If you enter the number of a foreground partition, then at execution time you must use the Communications Load Utility (SYSCLU) to load the CAM into the foreground partition prior to executing the execution utility. The execution utilities invoke SYSCLU to load the CAM into a *background* partition only.



Select 1 if an operator will be present when this communications job is executed. Select this mode if the job will perform inquiries, if the keyboard/display will be used as an input/output device, or if the magnetic stripe reader will be used as an input device (SYSBDCU only).

Select 2 if an operator will *not* be present when this job is executed. Select this mode only if an operator will not be present at the keyboard/display to respond to errors or messages during job execution.



This prompt appears only if the execution utility (prompt 69-02) is the SNA Data Communications Utility (option 4).

Logon is a procedure required by some SNA host systems to begin a session between the host and a terminal. If you respond to this prompt, the logon data is saved in the job description record; it can be up to 80 characters in length.

If you do not want to enter logon data to be saved in the record, press ENTER. In this case, SYSSDCU will request you to furnish it at execution time.

SYSDCDU and SYSSDCU do not check the data you enter. For the format of the appropriate logon, see the applicable host manual and Appendix I in this manual.

```
Specify first function definition in this job.
Enter function name:
                                        Press ENTER                    69-06
```

Enter the name of the first function in this job. The name can be 1–8 alphanumeric characters with no embedded blanks and no special characters. It serves as a pointer from the job description to the function definition record.

Note: This prompt requests the name of the first function to be *executed* by the execution utility, *not* the name of the function you want to describe.

```
XXXXXXXX saved.
Specify function definition to be created or modified.
Enter function name:
                                        Press ENTER                    69-07
```

The first line of this prompt informs you that a job description record has been saved (written to a job data set on diskette). XXXXXXXX is the name of the job.

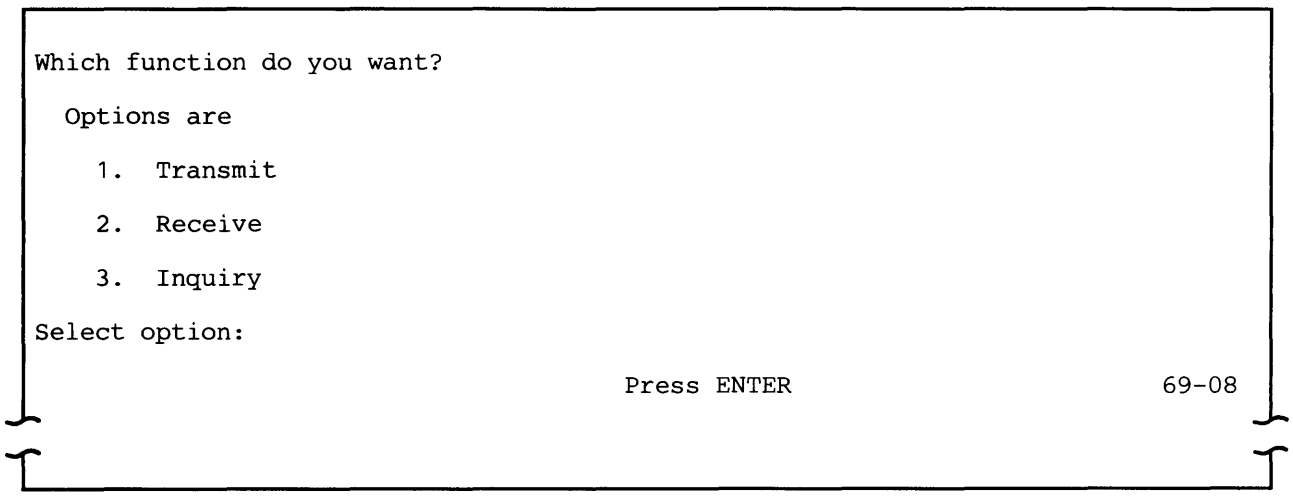
Enter the name of the function definition to be created or updated. It must be 1–8 alphanumeric characters with no embedded blanks and no special characters.

To create a new function definition, enter a name which does not match the name of an existing record in the data set. To update a function definition, enter a function name which already exists. The values in the existing record will be displayed as defaults.

The default, if any, is the function name for the first function definition in the job (see prompt 69-06), or the function name specified as next (see prompt 69-25).

CREATING A FUNCTION FOR SYSBDCU

The following prompts can appear when you are creating or updating a function to be executed by SYSBDCU. The differences between the protocol types, 3741 and 3780, are explained as needed.



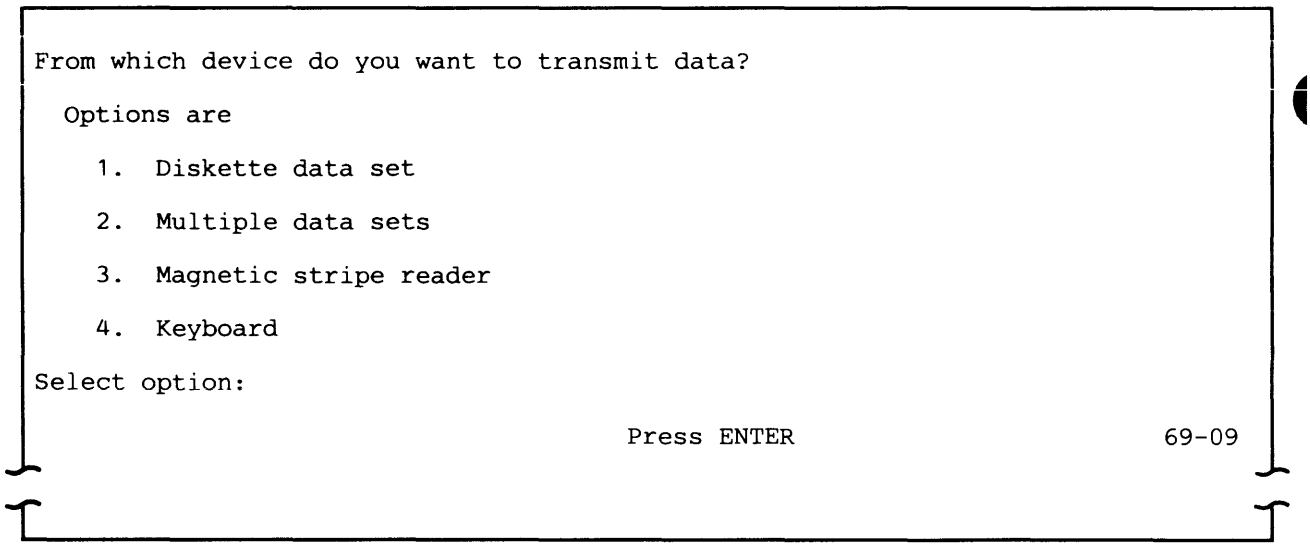
If the mode of operation for the job is unattended or the protocol type is 3780, only the transmit and receive options are displayed.

Select 1 to transmit (send) data from your 5280 system to another terminal or system.

Select 2 if your 5280 system is to receive data from another terminal or system.

Select 3 to send an inquiry from the 5280 to a host system.

Note: It is a user responsibility to relate input data to output data.



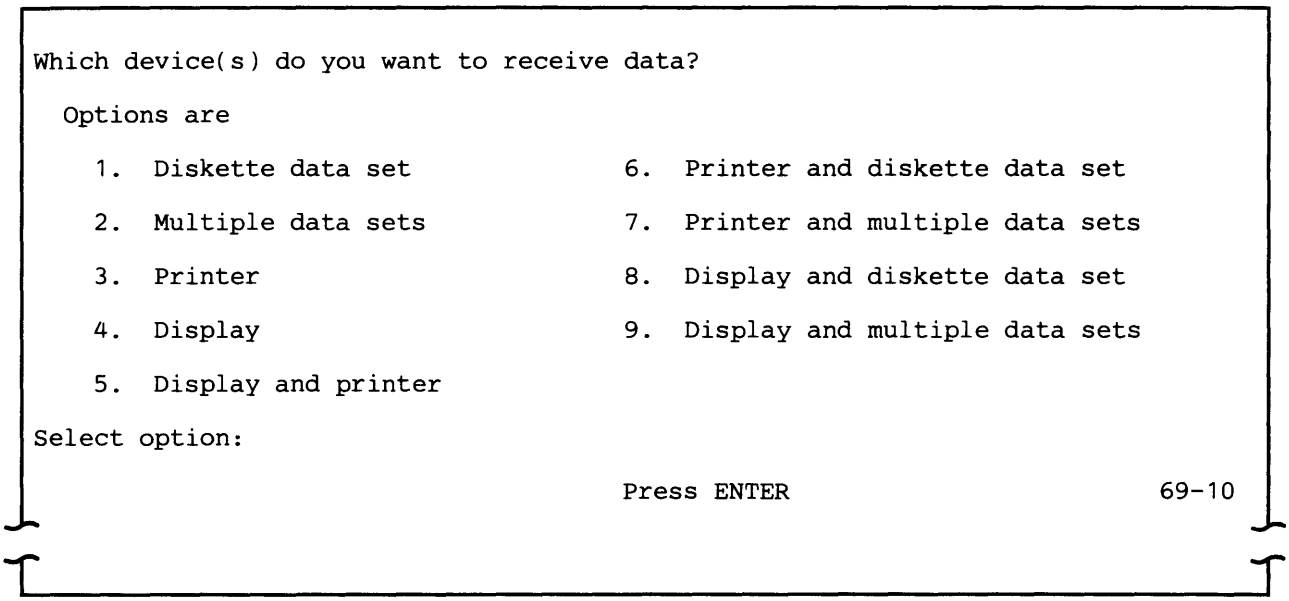
This prompt appears only if the function is transmit. If the mode of operation is unattended, only options 1 and 2 are displayed.

Select 1 to transmit the contents of one data set.

Select 2 to transmit multiple data sets.

Select 3 to transmit data from the magnetic stripe reader. This option is valid only if the utility/protocol type (prompt 69-02) is BSC Data Communications (3741) (option 1) and if, at execution time, SYSBDCU is executing in a foreground partition. (See Chapter 8 for details on the magnetic stripe data format.)

Select 4 to transmit data from the keyboard. If the protocol type is 3741, up to 128 bytes can be transmitted from the keyboard; for 3780, the maximum is 80 bytes.



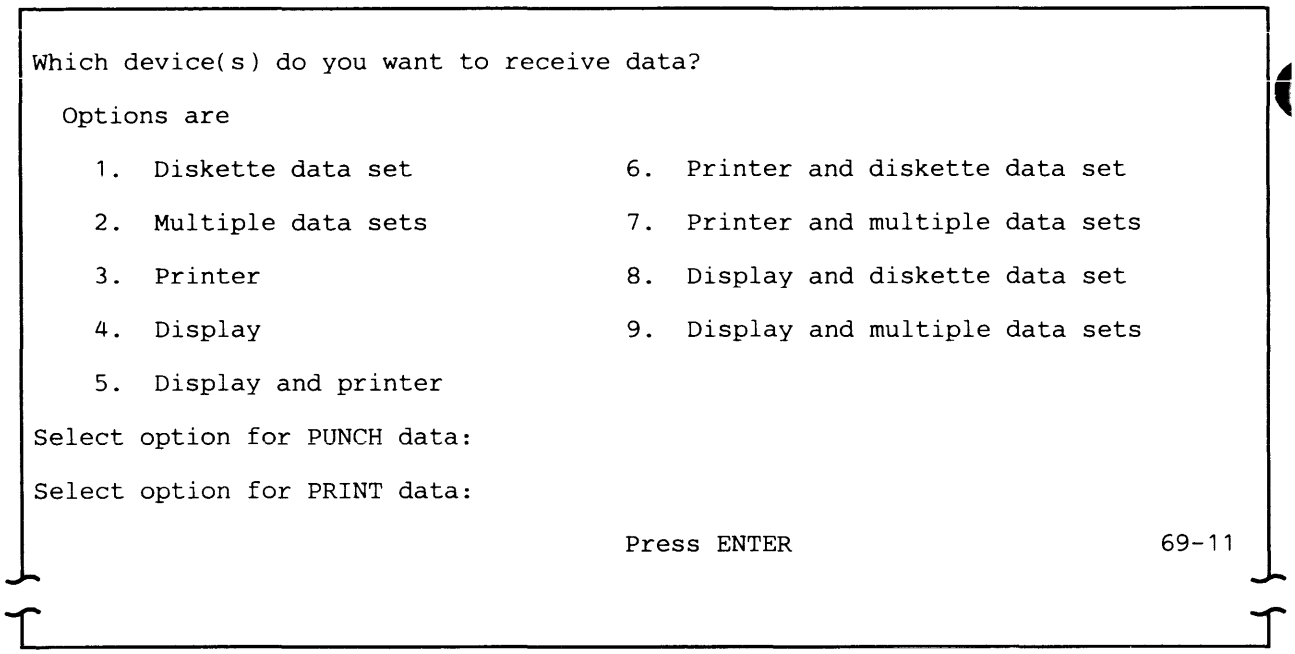
This prompt appears only if the function is receive or inquiry and if the protocol type is 3741.

The display cannot be used to receive data in unattended mode. Therefore, for a job to be run in unattended mode, options 4, 5, 8, and 9 are not valid.

Select 1 to receive one data set on diskette. Select 2 to receive multiple data sets on diskette. At execution time, SYSBDCU automatically allocates data sets which have not been allocated.

Options 5 through 9 allow you to receive the same data set on two output devices at the same time.

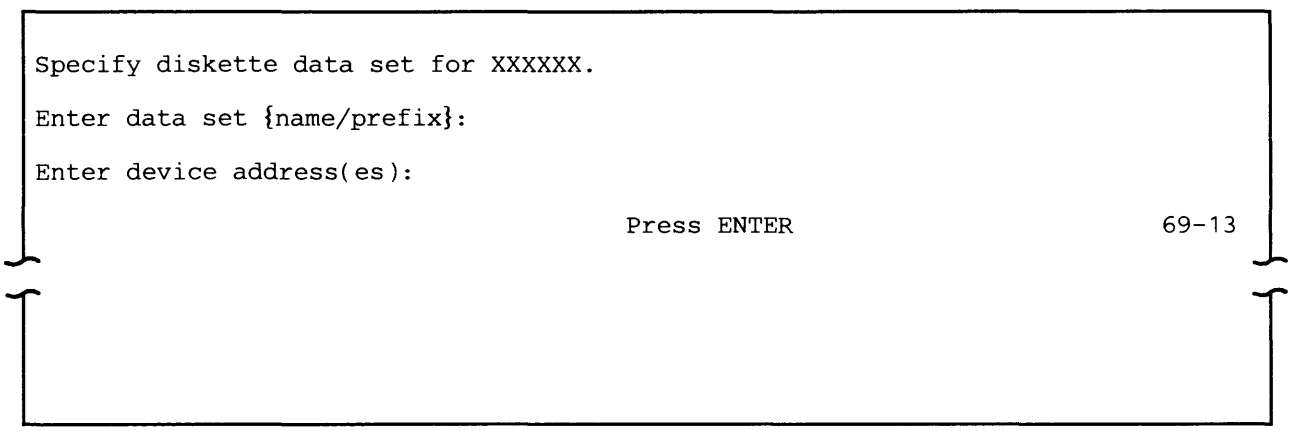
Note: Do not select diskette data set (options 1, 6 or 8) unless you are certain that the data to be received is only one data set. Print data routed to the display is not formatted.



This prompt appears only if the function is receive and the protocol type is 3780.

You can enter a device option for punch data, print data or both. The display cannot be used to receive data in unattended mode. Therefore, for a job to be run in unattended mode, options 4, 5, 8 and 9 are not valid. In addition, do not select the display to receive print data if the data stream contains printer control characters.

Options 5 through 9 allow you to receive the same data stream on two output devices at the same time.



This prompt appears only if you selected diskette data set or multiple data sets as a device option. It is displayed as many times as needed to identify the data set(s).

Based upon your responses to the device option prompts, SYSDCDU displays the appropriate value for XXXXXX, either "PRINT data," "PUNCH data" or "data." Either name (for a single data set) or prefix (for multiple data sets) is displayed to identify the information to be provided.

Transmitting Data

If the function is transmit, the value displayed for XXXXXX in prompt 69-13 is "data."

Data set {name/prefix}: To transmit a single data set, enter its name. To transmit multiple data sets, enter the prefix of the data sets. It must be six alphanumeric characters with no embedded blanks and the first character must be alphabetic.

If multiple data sets are to be transmitted, at execution time SYSBDCU transmits all data sets with the specified prefix and with suffixes in ascending order starting with 01. It continues transmitting until it cannot find a data set with the next sequential suffix. The maximum number of multiple data sets which can be transmitted is 99.

Device address(es): Enter two characters for a logical device address or four characters for a physical device address. To transmit multivolume data sets, you can enter up to eight unique device addresses. Enter them in the order in which SYSBDCU is to search for the continuation of a data set.

In attended mode, SYSBDCU reads from each successive diskette drive in the order in which the diskette drive addresses are entered; after the last one, it returns to the first device address entered. This continues until SYSBDCU encounters the end of the data set on the last diskette.

To transmit a multivolume data set in unattended mode, enter as many device addresses as the number of volumes which the data set spans.

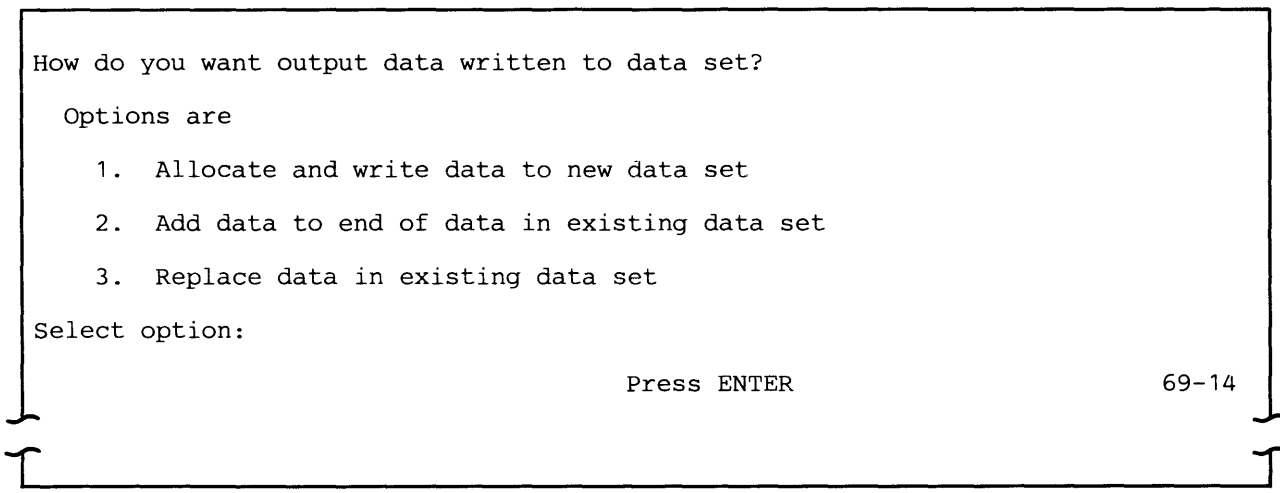
Receiving Data

If the function is to receive data using 3741 protocol, the value displayed for XXXXXX in prompt 69-13 is "data." For 3780 protocol, the value of XXXXXX is "PUNCH data" to receive a punch data stream on diskette, or "PRINT data" to receive a print data stream on diskette.

A single data set can be pre-allocated before SYSBDCU execution, or can be allocated by SYSBDCU at execution time. Multiple data sets, however, cannot be pre-allocated; you must allow SYSBDCU to allocate them at execution time.

Data set {name/prefix}: To receive a single data set, enter its name. To receive multiple data sets, enter a prefix for the data sets. It must be six alphanumeric characters with no embedded blanks and the first character must be alphabetic. If the 5280 is to receive more than one data stream on multiple diskette data sets, SYSBDCU allocates a data set for each data stream at execution time.

Device address(es): Enter two characters for a logical device address or four characters for a physical device address. You can enter multiple device addresses to receive data sets which span more than one volume. You can specify a maximum of eight unique device addresses.

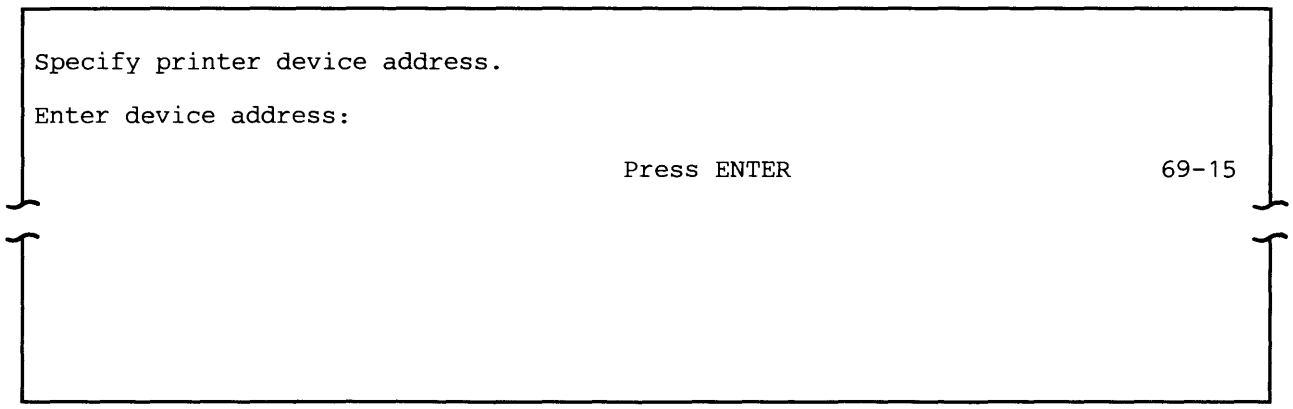


This prompt appears only if the function is receive or inquiry and the output device is a single diskette data set.

Select 1 if the data set does not already exist and you want SYSBDCU to allocate it at execution time. SYSBDCU will create the data set after the last data set that currently resides on the diskette, and will allocate all remaining space on the diskette to the new data set. After SYSBDCU receives all the data, it releases any unused space on the diskette, that is, the end of extent is set to one less than the end of data on the data set label. The name of the new data set will be the name you entered in prompt 69-13.

Select 2 to add the data to be received to an existing data set. The data will be added beginning at the current end of data.

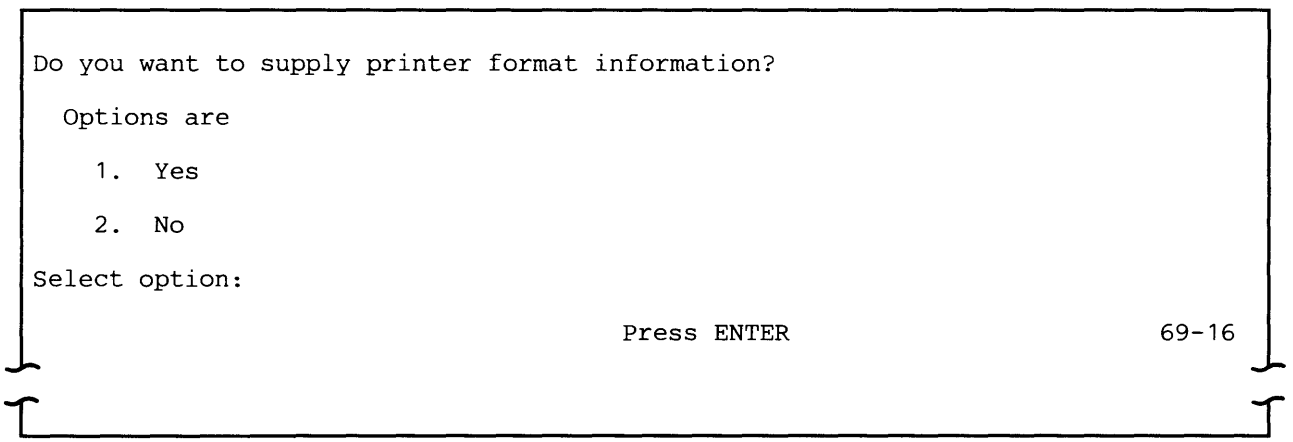
Select 3 to replace the contents of an existing data set with the data to be received. The data will be written starting at the beginning of extent of the data set. This option can also be used if a data set has been allocated but is empty (contains no records).



This prompt appears only if the output device is the printer.

Enter two characters for a logical device address or four characters for a physical device address.

Each function definition supports one printer. If the printer is to receive both punch and print data streams, the data will be printed in the order received.

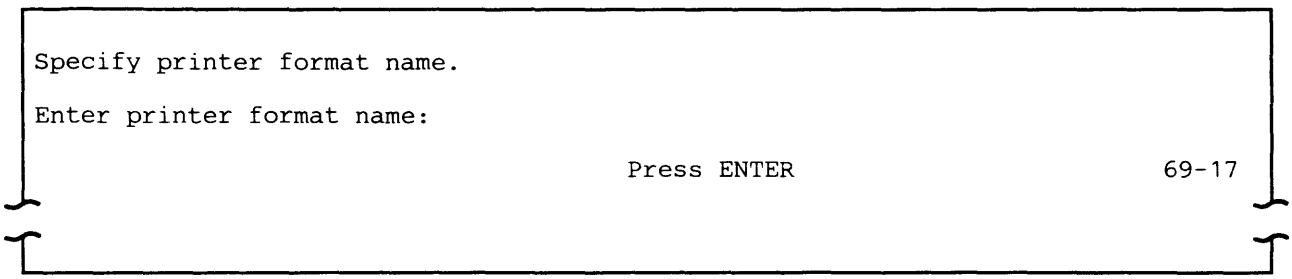


This prompt appears only if the protocol type is 3741 or if you specified a device option for print data for 3780 protocol.

This prompt is related to the conversion of print data, as it is received from the communications line, into the subset of standard character string (SCS) controls used by the 5256 and 5225 printers. The 5280 converts the data as it is received from the line. The prompt has different meanings for 3741 and 3780 protocol.

For 3741 protocol, select 1 if the data to be received contains printer control characters, *regardless of whether it is to be written to diskette or printed on the printer*. This tells the 5280 to convert the printer control characters received into the SCS subset. Select 2 if the data to be received does not contain printer control characters.

For 3780 protocol, select 1 if you want to create a printer format record. This record describes the page layout for data to be printed, such as lines, margins and tabs. Select 2 to use the defaults supplied by SYSBDCU for the page layout.



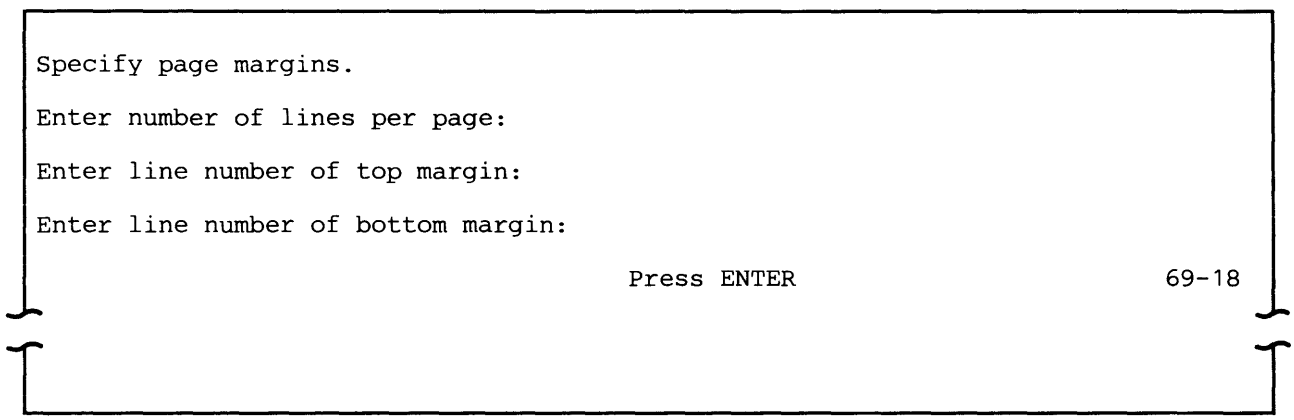
This prompt appears only if you responded yes to the previous prompt.

Enter the name of the printer format record to be created or updated. It must be 1–8 alphanumeric characters with no embedded blanks.

To create a new printer format record, enter a name which does not match an existing name on the job data set; commonly used values are displayed as defaults for each field.

To update a printer format record, enter the name of an existing printer format in the data set. Existing values in the record are displayed as defaults.

Note: When you update a printer format record, the changes apply to all functions which use the record.



Number of lines per page: Enter the total number of lines on a page of the printer forms to be used. The valid range is 001–255. The default is 066.

Line number of top margin: Enter the line number on which the first line should be printed. This number must be less than or equal to the bottom margin. The default is 001.

Line number of bottom margin: Enter the number of the last line to be printed on each page. This number must be greater than or equal to the top margin, and less than or equal to the number of lines per page. The default is 066.

```
Specify vertical tabs.

Enter line numbers for vertical tabs or channels.

TAB/CHAN  LINE   TAB/CHAN  LINE   TAB/CHAN  LINE   TAB/CHAN  LINE
   1      ---      2      ---      3      ---      4      ---
   5      ---      6      ---      7      ---      8      ---
   9      ---     10      ---     11      ---     12      ---

                                Press ENTER                    69-19
```

Enter the line number which corresponds to each channel number embedded in the data. The line numbers must be between the numbers previously entered for the top and bottom margins and must be entered in ascending sequence except for BSC 3780 protocol. To blank out a previous entry, use the FIELD EXIT key or enter 000.

The line number for channel 1 is set to the line number of the top margin (see prompt 69-18) and cannot be modified. Line number entries for the other channels are optional and, if left blank, default to 000, which causes the printer to space to a new line.

```
Specify line margins.

Enter number of print positions per line:

Enter print position of left margin:

Enter print position of right margin:

                                Press ENTER                    69-20
```

Number of print positions per line: Enter the width of the print line expressed as the number of print positions. The valid range is 001–132. The default is 132.

Print position of left margin: Enter the print position at which the first character on a line should be printed. This number must be less than or equal to the right margin. The default is 001.

Print position of right margin: Enter the print position at which the last character on a line should be printed. This number must be less than or equal to the number of print positions per line. The default is 132.

```
Specify horizontal tabs.

Enter horizontal tabs with a 'T' in corresponding print positions.

----+----1----+----2----+----3----+----4----+----5----+----6----+----7

----+----8----+----9----+----0----+----1----+----2----+----3--

                                    Press ENTER                    69-21
```

Each horizontal print position, from 001–132, is shown on the top line, with a grid line shown below. Enter a "T" on the grid line below each print position at which you want to set a horizontal tab. Set tabs only between print positions greater than the left margin and less than or equal to the right margin.

```
Do you want a transaction ID inserted?

  Options are

    1.  No

    2.  Transmit transaction ID as first record

    3.  Add transaction ID to each record

Select option:

Enter transaction ID:

                                    Press ENTER                    69-22
```

This prompt appears only if the function is transmit and the device is the keyboard or a single diskette data set.

A transaction ID should be used only if it is required by a host application program. It identifies the CICS/VS or IMS/VS application program to be used to process the data being transmitted.

Select 1 if a transaction ID is not required or if it is already contained in the data.

Select 2 if you want SYSBDCU, when it executes this function, to transmit a transaction ID as the first record.

Select 3 if you want SYSBDCU to transmit a transaction ID with each record. For BSC 3741 protocol, the length of the transaction ID plus one blank plus the data cannot exceed 512 bytes. For 3780 protocol, the length of the transaction ID plus one blank plus the data cannot exceed 80 bytes.

If you select option 2 or option 3, after you press ENTER the "Enter transaction ID" line appears on the display; enter the characters that make up the transaction ID. For CICS/VS application programs it can be 1–4 characters in length; for IMS/VS programs, it can be 1–8 characters.

```
XXXXXXXX saved.

Specify where to save this function definition.

Enter function name:

                                    Press ENTER                    69-23
```

This prompt appears only when you are updating an existing function definition.

The first line of this prompt, when it appears, informs you that a printer format record has been saved (written to a job data set on diskette). XXXXXXXX is the name of the printer format.

This prompt allows you to replace the function definition being updated or to save your responses as a new function definition. The default is the name of the function definition being updated. To replace the old with the new, press ENTER. To save both the function definition you were updating and the one you have just created, enter a new name for the new function definition. The name can be 1–8 alphanumeric characters with no embedded blanks and no special characters.

```
XXXXXXXX saved.
Do you want an alternate function definition for errors?
  Options are
    1.  Yes
    2.  No
Select option:
Enter function name:
                                        Press ENTER                    69-24
```

The first line of this prompt, when it appears, informs you that a printer format record has been saved (written to a job data set on diskette). XXXXXXXX is the name of the printer format.

Select 1 to specify an alternate function definition to be executed if an error or failure occurs while the function is executing. An alternate function might be to restart the function or job, to skip functions within the job, or to execute a special function for error recovery. Select this option if the job is to execute in unattended mode and you do not want it to terminate if an error occurs. If the job is to execute in attended mode and an error occurs, one of the error recovery options (see Chapter 8) is to execute the alternate function.

Select 2 if you do not want to specify an alternate function definition.

If you select option 1, after you press ENTER the "Enter function name" line appears on the display. Enter the name of the alternate function.

```
Is this function definition the last function in this job?
  Options are
    1.  Yes
    2.  No
Select option:
Enter next function name:
                                        Press ENTER                    69-25
```

Select 1 if this is the last or the only function in this job.

Select 2 if another function is to be executed after this one. This is how functions are chained together.

If you select option 2, enter the name of the next function to be executed. The function name may or may not already exist in the job data set. If it does not already exist, that is, the function definition record has not yet been created using SYSDCDU, it must be created before SYSBDCU executes this job.

Note: This prompt asks whether the function being described is the last one to be *executed* by SYSBDCU. Do *not* enter the name of another function to be described.

```
XXXXXXXX saved.
SYSDCDU completed.
Specify end option.
  Options are
    1.  Exit
    2.  Describe another job
    3.  Describe another function
Select option:
                                    Press ENTER                    69-26
```

The first two lines of this display inform you that a function definition record has been saved (written to a job data set on diskette). XXXXXXXX is the name of the function.

Select 1 to terminate SYSDCDU. If it was running in a foreground partition, the system load prompt is displayed. If SYSDCDU was running in a background partition, it exits the partition.

Select 2 to describe another job. The utility then displays prompt 69-01 which requests job data set information.

Select 3 to describe another function definition to be executed as part of the same job. The utility then displays prompt 69-07 which requests the name of the function definition to be created or updated.

Note: To create or update a function definition which does not belong to the same job, you must select option 2.

Prompt 69-26 also appears if you enter the End of Job command key sequence while running SYSDCDU. In this instance the first two lines are

"XXXXXXXX not updated" and "SYSDCDU terminated." XXXXXXXX is the name of the job, function, or printer format record you were creating or updating. If you were creating a new record, only the name of the record is saved; its contents are blanks. The options are the same as those shown above, except that if you were describing a job, option 3 is not displayed.

CREATING A FUNCTION FOR SYSBBTU

The following prompts can appear when you are creating or updating a function to be executed by SYSBBTU.

```
Which function do you want?
  Options are
    1.  Transmit
    2.  Receive
Select option:
                                    Press ENTER                    69-08
```

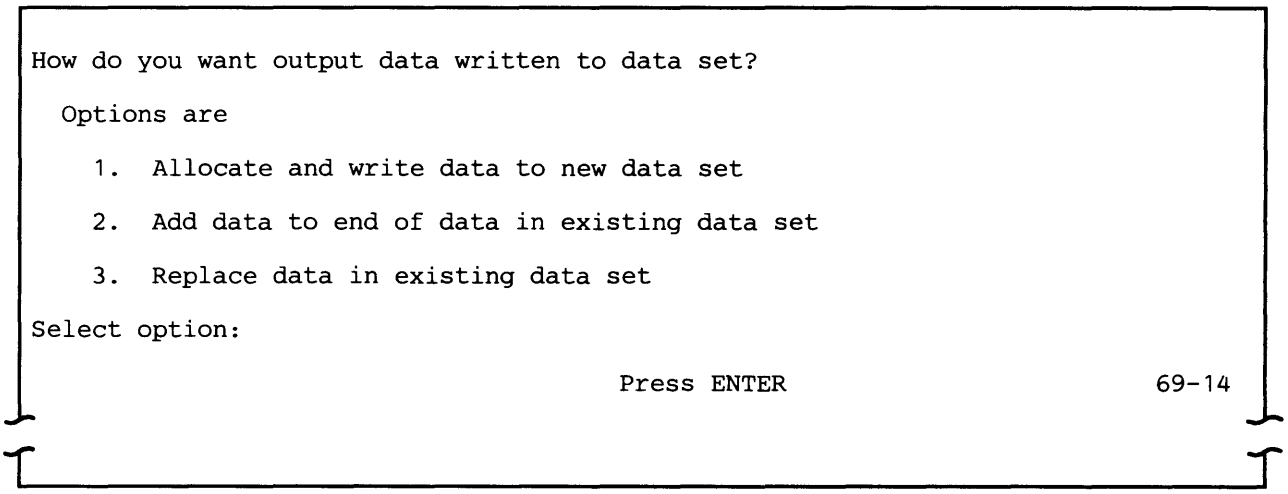
Select 1 to transmit (send) a data set from your 5280 system to another terminal or system.

Select 2 if your 5280 system is to receive a data set from another terminal or system.

```
Specify diskette data set for data.
Enter data set name:
Enter device address:
                                    Press ENTER                    69-13
```

Data set name: Enter the name of the data set to be transmitted or received.

Device address: Enter the address of the diskette drive which contains the above-named data set. The address can be two characters for a logical address or four characters for a physical address.



This prompt appears only if the function is receive.

Select 1 if the data set does not already exist and you want SYSBBTU to allocate it at execution time. SYSBBTU will create the data set after the last data set that currently resides on the diskette, and will allocate all remaining space on the diskette to the new data set. After SYSBBTU receives all the data, it releases any unused space on the diskette, that is, the end of extent is set to one less than the end of data on the data set label. The name of the new data set will be the name you entered in prompt 69-13.

Select 2 to add the data to be received to an existing data set. The data will be added beginning at the current end of data.

Select 3 to replace the contents of an existing data set with the data to be received. The data will be written starting at the beginning of extent of the data set. This option can also be used if a data set has been allocated but is empty (contains no records).

```
Specify where to save this function definition.

Enter function name:

                                        Press ENTER                    69-23
```

This prompt appears only when you are updating an existing function definition.

This prompt allows you to replace the function definition being updated or to save your responses as a new function definition. The default is the name of the function definition being updated. To replace the old with the new, press ENTER. To save both the function definition you were updating and the one just created, enter a new name for the new function definition. The name can be 1–8 alphanumeric characters with no embedded blanks and no special characters.

```
Is this function definition the last function in this job?

  Options are

    1.  Yes

    2.  No

Select option:

Enter function name:

                                        Press ENTER                    69-25
```

Select 1 if this is the last or the only function in this job.

Select 2 if another function is to be executed after this one. This is how functions are chained together.

If you select option 2, enter the name of the next function to be executed. The function name may or may not already exist in the job data set. If it does not already exist, that is, the function definition record has not yet been created using SYSDCDU, it must be created before SYSBBTU executes this job.

Note: This prompt asks whether the function being described is the last one which should be *executed* by SYSBBTU. Do *not* enter the name of another function to be described.

```
XXXXXXXX saved.
SYSDCDU completed.
Specify end option.
  Options are
    1.  Exit
    2.  Describe another job
    3.  Describe another function
Select option:
                                    Press ENTER                    69-26
```

The first two lines of this display inform you that a function definition record has been saved (written to a job data set on diskette). XXXXXXXX is the name of the function.

Select 1 to terminate SYSDCDU. If it was running in a foreground partition, the system load prompt is displayed. If it was running in a background partition, it exits the partition.

Select 2 to describe another job. The utility then displays prompt 69-01 which requests job data set information.

Select 3 to describe another function definition to be executed as part of the same job. The utility then displays prompt 69-07 which requests the name of the function definition to be created or updated.

Note: To create or update a function definition which does not belong to the same job, you must select option 2.

Prompt 69-26 also appears if you enter the End of Job command key sequence while running SYSDCDU. In this instance the first two lines are "XXXXXXXX not updated" and "SYSDCDU terminated." XXXXXXXX is the name of the job or function record you were creating or updating. If you were creating a new record, only the name of the record is saved; its contents are blanks. The options are the same as those shown above, except that if you were describing a job, option 3 is not displayed.

CREATING A FUNCTION FOR SYSSDCU

The following prompts can appear when you are creating or updating a function to be executed by SYSSDCU.

```
Which function do you want?
  Options are
    1.  Transmit
    2.  Receive
    3.  Inquiry
Select option:
                                    Press ENTER                    69-08
```

If the mode of operation for the job is unattended, only the transmit and receive options are displayed.

Select 1 to transmit (send) data from your 5280 system to another terminal or system.

Select 2 if your 5280 system is to receive data from another terminal or system.

Select 3 to send an inquiry from the 5280 to a host system.

```
From which device do you want to transmit data?
  Options are
    1.  Diskette data set
    2.  Multiple data sets
    3.  Magnetic stripe reader
    4.  Keyboard
Select option:
                                    Press ENTER                    69-09
```

This prompt appears only if the function is transmit. If the mode of operation is unattended, only options 1 and 2 are displayed.

Select 1 to transmit the contents of one data set.

Select 2 to transmit multiple data sets.

Select 4 to transmit data from the keyboard; up to 80 bytes can be transmitted. Do not select this option if the job will be run in a background partition.

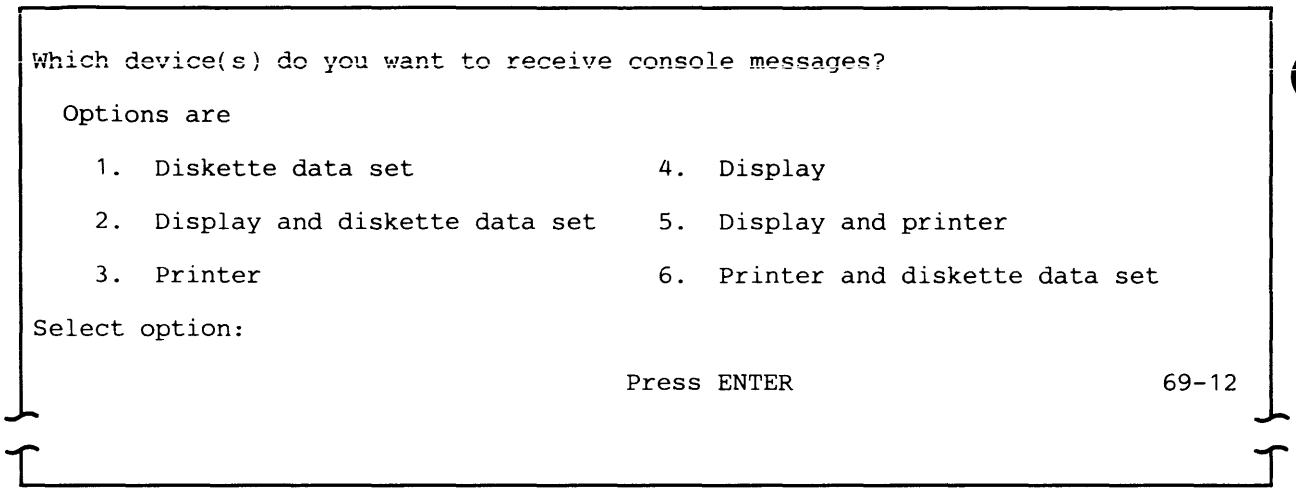
Note: Do not select option 3, magnetic stripe reader. It is *not* a valid device for SYSSDCU.

```
Which device(s) do you want to receive data?
  Options are
    1.  Diskette data set              6.  Printer and diskette data set
    2.  Multiple data sets             7.  Printer and multiple data sets
    3.  Printer                        8.  Display and diskette data set
    4.  Display                        9.  Display and multiple data sets
    5.  Display and printer
Select option for PUNCH data:
Select option for PRINT data:
                                       Press ENTER                    69-11
```

This prompt appears only if the function is receive or inquiry.

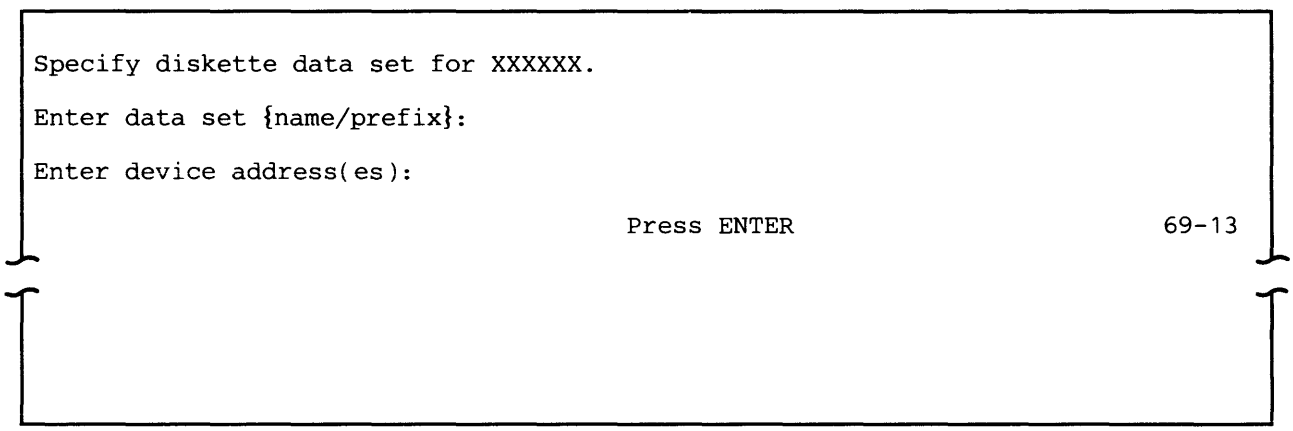
You can enter a device option for punch data, print data, neither or both. If only console data is to be received, leave both options blank and press ENTER. The display cannot be used to receive data in unattended mode. Therefore, for a job to be run in unattended mode, options 4, 5, 8 and 9 are not valid. In addition, do not select the display to receive print data if the data stream contains printer control characters.

Options 5 through 9 allow you to receive the same data stream on two output devices at the same time.



This prompt allows you to specify where to receive console messages and unsolicited messages from the host.

If the job is to execute in unattended mode, options 2, 4 and 5 are not valid.
If the printer is to receive punch or print data, options 3, 5, and 6 are not valid.
If a diskette is to receive punch or print data, options 1, 2 and 6 are not valid.



This prompt appears only if you selected diskette data set or multiple data sets as a device option. It is displayed as many times as needed to identify the data set(s).

Based upon your responses to the device option prompts, SYSDCDU displays the appropriate value for XXXXXX, either "PRINT data," "PUNCH data," "CONSOLE data" or "data." Either name (for a single data set) or prefix (for multiple data sets) is displayed to identify the information to be provided.

Transmitting Data

If the function is transmit, the value displayed for XXXXXX in prompt 69-13 is "data."

Data set {name/prefix}: To transmit a single data set, enter its name. To transmit multiple data sets, enter the prefix of the data sets. It must be six alphanumeric characters with no embedded blanks and the first character must be alphabetic.

If multiple data sets are to be transmitted, at execution time SYSSDCU transmits all data sets with the specified prefix and with suffixes in ascending order starting with 01. It continues transmitting until it cannot find a data set with the next sequential suffix. The maximum number of multiple data sets which can be transmitted is 99.

Device address(es): Enter two characters for a logical device address or four characters for a physical device address. To transmit multivolume data sets, you can enter up to eight unique device addresses. Enter them in the order in which SYSSDCU is to search for the continuation of a data set.

In attended mode, SYSSDCU reads from each successive diskette drive in the order in which the diskette drive addresses are entered; after the last one, it returns to the first device address entered. This continues until SYSSDCU encounters the end of the data set on the last diskette.

To transmit a multivolume data set in unattended mode, enter as many device addresses as the number of volumes which the data set spans.

Receiving Punch or Print Data

If the function is to receive a punch or print data stream and write it to diskette, the value displayed for XXXXXX in prompt 69-13 is "PUNCH data" or "PRINT data."

A single data set can be pre-allocated before SYSSDCU execution, or can be allocated by SYSSDCU at execution time. Multiple data sets, however, cannot be pre-allocated; you must allow SYSSDCU to allocate them at execution time.

Data set {name/prefix}: To receive a single data set, enter its name. To receive multiple data sets, enter a prefix for the data sets. It must be six alphanumeric characters with no embedded blanks and the first character must be alphabetic. If the 5280 is to receive more than one data stream on multiple diskette data sets, SYSSDCU allocates a data set for each data stream at execution time.

Device address(es): Enter two characters for a logical device address or four characters for a physical device address. You can enter multiple device addresses to receive data sets which span more than one volume. You can specify a maximum of eight unique device addresses.

Receiving Console Messages

If XXXXXX is "CONSOLE data", identify the data set on which console messages from the host are to be received.

Data set name: Enter the name of the data set on which console messages from the host are to be written.

Device address: Enter two characters for a logical device address or four characters for a physical device address. You can enter only one device address.

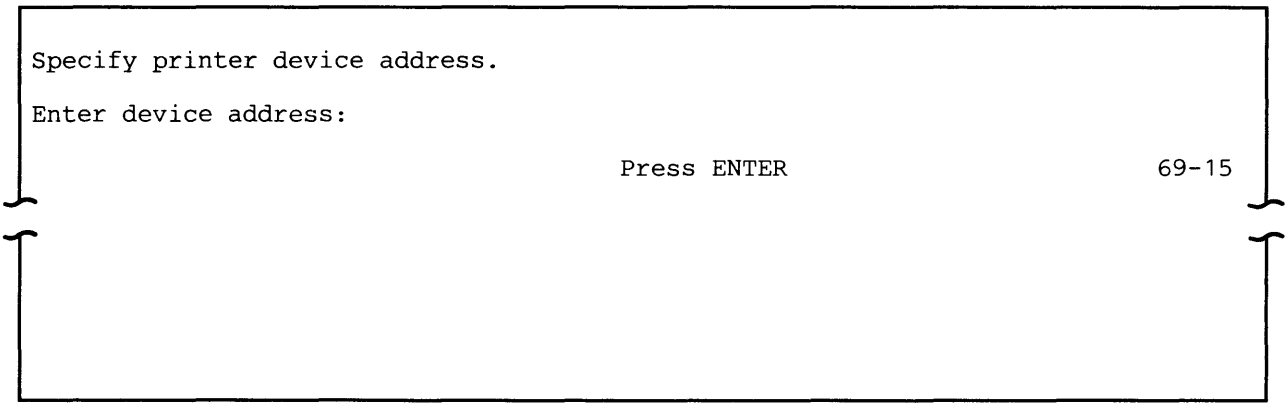
```
How do you want output data written to data set?

  Options are

    1.  Allocate and write data to new data set

    2.  Add data to end of data in existing data set

    3.  Replace data in existing data set

Select option:

                                    Press ENTER                    69-14
```

This prompt appears only if the function is receive or inquiry and the output device is a single diskette data set, or if a diskette data set is to receive console messages.

Select 1 if the data set does not already exist and you want SYSSDCU to allocate it at execution time. SYSSDCU will create the data set after the last data set that currently resides on the diskette, and will allocate all remaining space on the diskette to the new data set. After SYSSDCU receives all the data, it releases any unused space on the diskette, that is, the end of extent is set to one less than the end of data on the data set label. The name of the new data set will be the name you entered in prompt 69-13.

Select 2 to add the data to be received to an existing data set. The data will be added beginning at the current end of data.

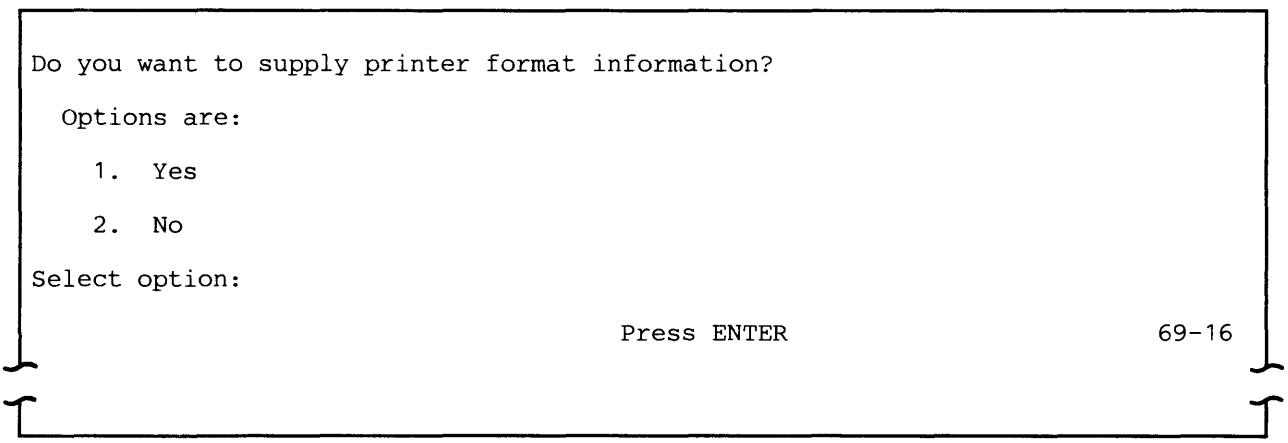
Select 3 to replace the contents of an existing data set with the data to be received. The data will be written starting at the beginning of extent of the data set. This option can also be used if a data set has been allocated but is empty (contains no records).



This prompt appears only if the output device is the printer.

Enter two characters for a logical device address or four characters for a physical device address.

Each function definition supports one printer. If the printer is to receive more than one type of data stream, the data will be printed in the order received.



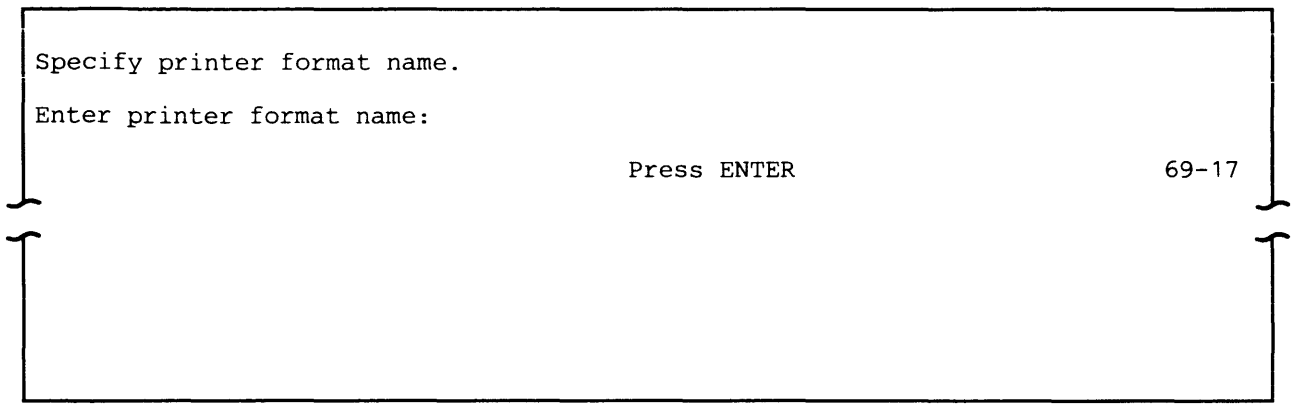
This prompt appears only if you specified a device option for print data.

This prompt is related to the conversion of print data, as it is received from the communications line, into the subset of standard character string (SCS) controls used by the 5256 or 5225 printers. The 5280 converts the data as it is received from the line.

Select 1 if you want to create a printer format record. This record describes the page layout for data to be printed, such as lines, margins, and tabs.

Select 2 if printer format data is included in the data stream sent by the host system, or to use the defaults supplied by SYSSDCU for the page layout.

Note: If printer format data is received in the data stream during SYSSDCU execution, it is used to format the print data, regardless of your response to the above prompt.



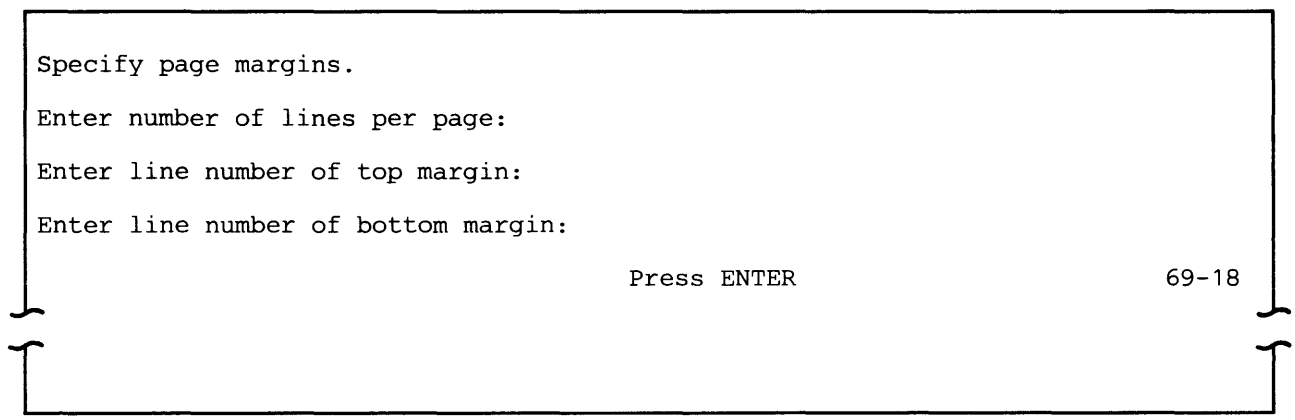
This prompt appears only if you responded yes to the previous prompt.

Enter the name of the printer format record to be created or updated. It must be 1–8 alphanumeric characters with no embedded blanks.

To create a new printer format record, enter a name which does not match an existing name on the job data set; commonly used values are displayed as defaults for each field.

To update a printer format record, enter the name of an existing printer format in the data set. Existing values in the record are displayed as defaults.

Note: When you update a printer format record, the changes apply to all functions which use the record.



Number of lines per page: Enter the total number of lines on a page of the printer forms to be used. The valid range is 001–255. The default is 066.

Line number of top margin: Enter the line number on which the first line should be printed. This number must be less than or equal to the bottom margin. The default is 001.

Line number of bottom margin: Enter the number of the last line to be printed on each page. This number must be greater than or equal to the top margin, and less than or equal to the number of lines per page. The default is 066.

```
Specify vertical tabs.

Enter line numbers for vertical tabs or channels.

TAB/CHAN  LINE   TAB/CHAN  LINE   TAB/CHAN  LINE   TAB/CHAN  LINE

   1      ---      2       ---      3       ---      4       ---

   5      ---      6       ---      7       ---      8       ---

   9      ---     10       ---     11       ---     12       ---

                                  Press ENTER                    69-19
```

Enter the line number which corresponds to each channel number embedded in the data. The line numbers must be between the numbers previously entered for the top and bottom margins and must be entered in ascending sequence. To blank out a previous entry, use the FIELD EXIT key or enter 000.

The line number for channel 1 is set to the line number of the top margin (see prompt 69-18) and cannot be modified. Line number entries for the other channels are optional and, if left blank, default to 000, which causes the printer to space to a new line.

```
Specify line margins.

Enter number of print positions per line:

Enter print position of left margin:

Enter print position of right margin:

                                  Press ENTER                    69-20
```

Number of print positions per line: Enter the width of the print line expressed as the number of print positions. The valid range is 001–132. The default is 132.

Print position of left margin: Enter the print position at which the first character on a line should be printed. This number must be less than or equal to the right margin. The default is 001.

Print position of right margin: Enter the print position at which the last character on a line should be printed. This number must be less than or equal to the number of print positions per line. The default is 132.

```
Specify horizontal tabs.

Enter horizontal tabs with a 'T' in corresponding print positions.

----+----1----+----2----+----3----+----4----+----5----+----6----+----7

----+----8----+----9----+----0----+----1----+----2----+----3--

                                    Press ENTER                    69-21
```

Each horizontal print position, from 001–132, is shown on the top line, with a grid line shown below. Enter a "T" on the grid line below each print position at which you want to set a horizontal tab. Set tabs only between print positions greater than the left margin and less than or equal to the right margin.

```
Do you want a transaction ID inserted?

  Options are

    1.  No

    2.  Transmit transaction ID as first record

    3.  Add transaction ID to each record

Select option:

Enter transaction ID:

                                    Press ENTER                    69-22
```

This prompt appears only if the function is transmit and the device is the keyboard or a single diskette data set.

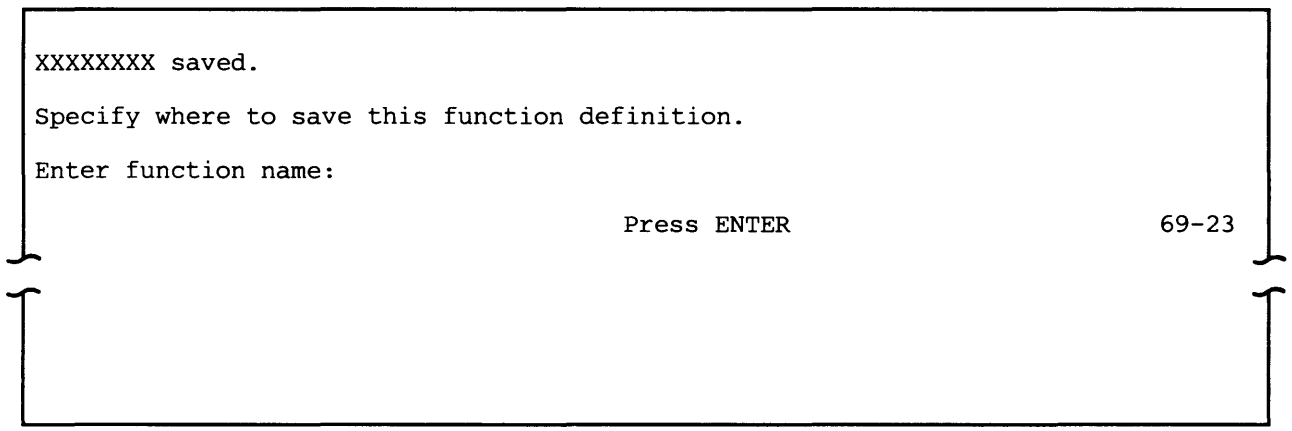
A transaction ID should be used only if it is required by a host application program. It identifies the CICS/VS or IMS/VS application program to be used to process the data being transmitted.

Select 1 if a transaction ID is not required or if it is already contained in the data.

Select 2 if you want SYSSDCU, when it executes this function, to transmit a transaction ID as the first record.

Select 3 if you want SYSSDCU to transmit a transaction ID with each record. The length of the transaction ID plus one blank plus the data cannot exceed 512 bytes.

If you select option 2 or option 3, after you press ENTER the "Enter transaction ID" line appears on the display; enter the characters that make up the transaction ID. For CICS/VS application programs it can be 1–4 characters in length; for IMS/VS programs, it can be 1–8 characters.



This prompt appears only when you are updating an existing function definition.

The first line of this prompt, when it appears, informs you that a printer format record has been saved (written to a job data set on diskette). XXXXXXXX is the name of the printer format.

This prompt allows you to replace the function definition being updated or to save your responses as a new function definition. The default is the name of the function definition being updated. To replace the old with the new, press ENTER. To save both the function definition you were updating and the one you have just created, enter a name for the new function definition. The name can be 1–8 alphanumeric characters with no embedded blanks and no special characters.

```
XXXXXXXX saved.
Do you want an alternate function definition for errors?
  Options are
    1.  Yes
    2.  No
Select option:
Enter function name:
                                        Press ENTER                    69-24
```

The first line of this prompt, when it appears, informs you that a printer format record has been saved (written to a job data set on diskette). XXXXXXXX is the name of the printer format.

Select 1 to specify an alternate function definition to be executed if an error or failure occurs while the function is executing. An alternate function might be to restart the function or job, to skip functions within the job, or to execute a special function for error recovery. Select this option if the job is to execute in unattended mode and you do not want it to terminate if an error occurs. If the job is to execute in attended mode and an error occurs, one of the error recovery options (see Chapter 8) is to execute the alternate function.

Select 2 if you do not want to specify an alternate function definition.

If you select option 1, after you press ENTER the "Enter function name" line appears on the display. Enter the name of the alternate function.

```
Is this function definition the last function in this job?
  Options are
    1.  Yes
    2.  No
Select option:
Enter function name:
                                        Press ENTER                    69-25
```

Select 1 if this is the last or the only function in this job.

Select 2 if another function is to be executed after this one. This is how functions are chained together.

If you select option 2, enter the name of the next function to be executed. The function name may or may not already exist in the job data set. If it does not already exist, that is, the function definition record has not yet been created using SYSDCDU, it must be created before SYSSDCU executes this job.

Note: This prompt asks whether the function being described is the last one to be *executed* by SYSSDCU. Do *not* enter the name of another function to be described.

```
XXXXXXXX saved.

SYSDCDU completed.

Specify end option.

  Options are

    1.  Exit

    2.  Describe another job

    3.  Describe another function

Select option:

                                        Press ENTER                    69-26
```

The first two lines of this display inform you that a function definition record has been saved (written to a job data set on diskette). XXXXXXXX is the name of the function.

Select 1 to terminate SYSDCDU. If it was running in a foreground partition, the system load prompt is displayed. If SYSDCDU was running in a background partition, it exits the partition.

Select 2 to describe another job. The utility then displays prompt 69-01 which requests job data set information.

Select 3 to describe another function definition to be executed as part of the same job. The utility then displays prompt 69-07 which requests the name of the function definition to be created or updated.

Note: To create or update a function definition which does not belong to the same job, you must select option 2.

Prompt 69-26 also appears if you enter the End of Job command key sequence while running SYSDCDU. In this instance the first two lines are

"XXXXXXXX not updated" and "SYSDCDU terminated". XXXXXXXX is the name of the job, function or printer format record you were creating or updating. If you were creating a new record, only the name of the record is saved; its contents are blanks. The options are the same as those shown above, except that if you were describing a job, option 3 is not displayed.

RJE Description Utility (SYSRJEDU)

The RJE Description Utility (SYSRJEDU) allows you to describe communications jobs to be executed at a later time by the MULTI-LEAVING Remote Job Entry Utility (MRJE) or the SNA Remote Job Entry Utility (SRJE). A job must be described using the RJE Description Utility before it can be executed by MRJE or SRJE.

To describe a job, you respond to a series of prompts on the display. Each prompt is identified by a four-digit number in the lower right corner of the display. The first two digits, 68, identify the program as SYSRJEDU.

Your responses to the prompts are saved on a diskette data set, and are identified by a name you provide. To execute a job, you identify it to MRJE or SRJE by its name. (For the layout of the RJE job description record, see Appendix G.)

REQUIREMENTS

This utility requires a partition size of 7K. A keyboard/display is required for the prompts. You also need a pre-allocated EBCDIC diskette data set with a record length of 256 bytes to save the job description records you create.

SYSRJEDU asks you to provide information about the communications configuration to be used when your job is executed. Before running this utility, you should know the name and location of the communications configuration record (created using the Communications Configuration Utility) to be used.

SYSRJEDU does not perform any data transfers with another system; therefore it can execute concurrently with any other communications utility program.

CREATING A JOB DESCRIPTION RECORD

The following prompts can appear when you are running SYSRJEDU.

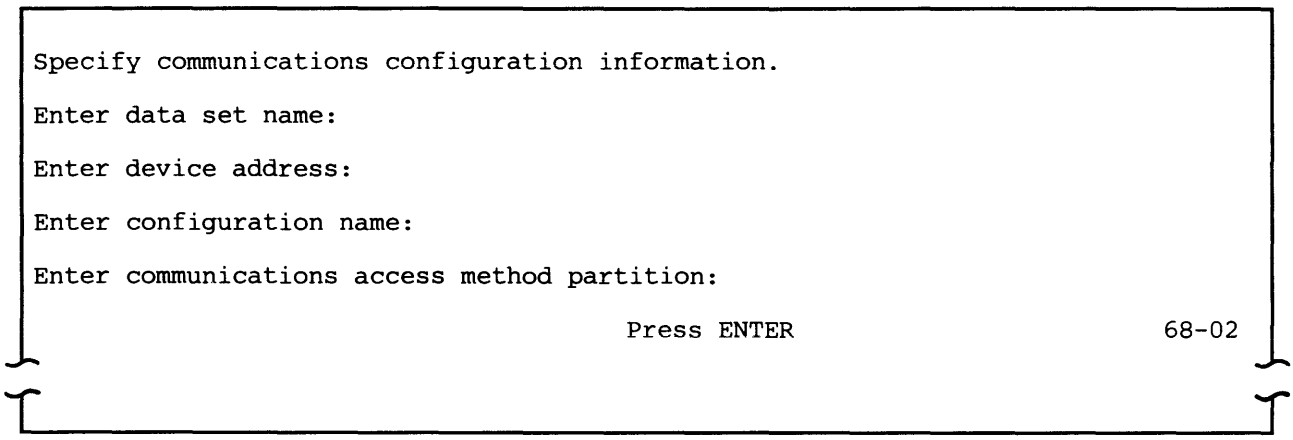
```
SYSRJEDU - RJE DESCRIPTION UTILITY

Specify job description information.

Enter data set name:

Enter device address:

Enter job name:

                                    Press ENTER                    68-01
```

Data set name: Enter the name of the data set in which the job description record is to be saved.

Device address: Enter the address of the diskette drive which contains the job description data set. Enter two characters for a logical device address or four characters for a physical device address.

Job name: Enter the name of the job to be described. It must be one to eight alphanumeric characters with no embedded blanks.

To create a new job, enter a name which does not match the name of any record on the specified data set. To update a job, enter the name of a job which currently exists; the values in the existing record are displayed as defaults. To change any value in the record, key over the displayed default. At the end of the series of prompts, the record you updated replaces the existing record. You cannot update a job description record and save both the existing and updated records.



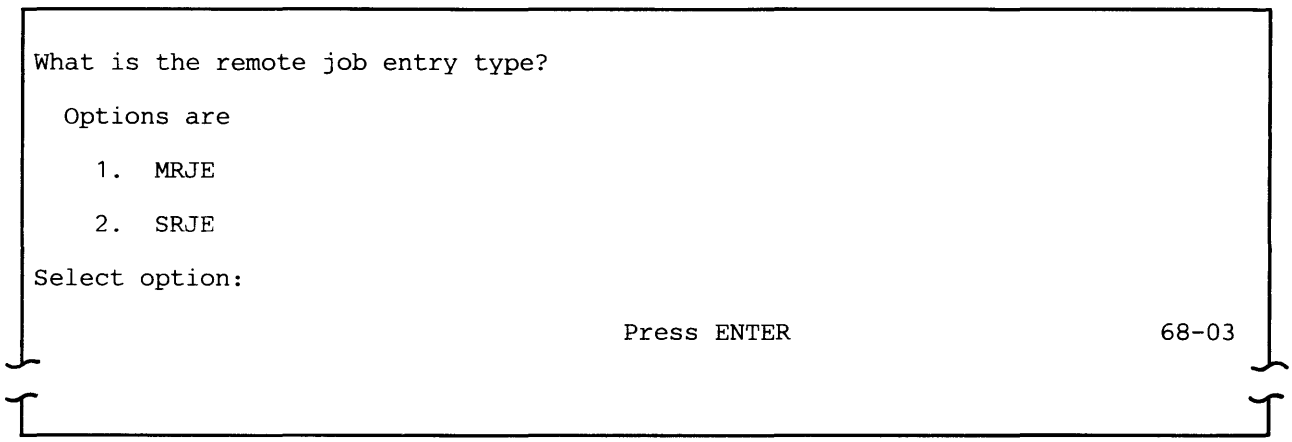
Data set name: Enter the name of the data set which contains the communications configuration record to be used when the job is executed.

Device address: Enter the address of the diskette drive on which you plan to mount the configuration data set at *execution* time. This can be either two characters for a logical device address or four characters for a physical device address.

Configuration name: Enter the name of the communications configuration record to be used when the job is executed. The name can be up to eight characters long. The Communications Configuration Utility is used to create this record.

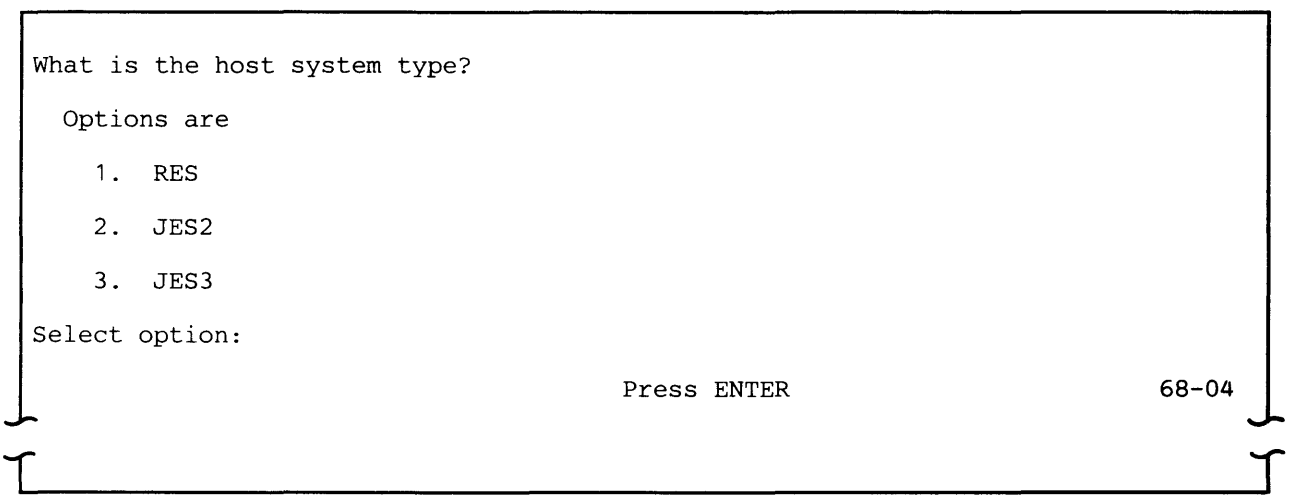
Communications access method partition: Enter the number of the partition into which the CAM is to be loaded at *execution* time. The valid range for a partition number is 0–7.

If you enter the number of a foreground partition, then at execution time you must use the Communications Load Utility (SYSCLU) to load the CAM into the foreground partition. MRJE and SRJE invoke SYSCLU to load the CAM into a *background* partition only.



Select 1 if the job is to be executed by MRJE. MRJE supports BSC communications with RES, JES2 and JES3.

Select 2 if the job is to be executed by SRJE. SRJE supports SNA/SDLC communications with RES, JES2 and DOS VSE/POWER.



This prompt appears only if MRJE is the execution utility.

Select 1 if the host subsystem is OS/VS1 RES.

Select 2 if the host subsystem is OS/VS2 JES2.

Select 3 if the host subsystem is OS/VS2 JES3.

```
What is the host system type?
  Options are
    1.  RES
    2.  JES2
    3.  DOS
Select option:
                                    Press ENTER                    68-04
```

This prompt appears only if SRJE is the execution utility.

Select 1 if the host subsystem is OS/VS1 RES.

Select 2 if the host subsystem is OS/VS2 JES2.

Select 3 if the host subsystem is DOS VSE/POWER.

```
Specify logon information (optional).
Enter logon command:
                                    Press ENTER                    68-05
```

Logon (or signon) is a procedure required by most host subsystems to establish a session between the host and a terminal. If you respond to this prompt, the logon data is saved in the job description record; it can be up to 80 characters in length.

If you do not want to enter logon data to be saved in the record, press ENTER. In this case the RJE utility will request you to furnish it at execution time.

SYSRJEDU checks, for correct syntax, the values LOGON, SIGNON, and /*SIGNON. However, it does not check the variable logon data you enter. For the format of the appropriate logon, see the applicable host system manual.

```
What will be the mode of operation?

  Options are

    1.  Attended

    2.  Unattended

Select option:

                                    Press ENTER                    68-06
```

Select 1 if an operator will be present when this job is executed.

Select 2 if an operator will *not* be present when this job is executed. In unattended mode, host commands which require a response are routed to the host system console.

```
Specify information about first readfile.

Required only if unattended selected.

Enter data set name:

Enter device address:

                                    Press ENTER                    68-07
```

If the job is to be executed in unattended mode, you must respond to this prompt. If the job is to be executed in attended mode, you may respond to the prompt or skip it by pressing ENTER. If, for attended mode, you do not specify the first READFILE now, you must enter it at execution time.

Data set name: Enter the name of the diskette data set which contains the READFILE to be processed by MRJE or SRJE.

Device address: Enter the address of the diskette drive which contains the above-named data set. Enter two characters for a logical device address or four characters for a physical device address.

```
Specify auto allocation.

Enter device address(es):

                                    Press ENTER                    68-08
```

If any data or data streams sent to the 5280 from the host are directed to diskette, you must respond to this prompt. The device address(es) indicate on which diskette drive(s) you will mount diskettes to receive data from the host. MRJE or SRJE allocates the data sets at execution time.

Enter the address(es) of diskette drives which contain diskettes which can be searched for space. The address(es) can be two characters for a logical device address or four characters for a physical device address. Up to eight unique addresses can be entered.

```
Job description record written

Specify end option.

  Options are

    1.  Exit

    2.  Describe another job

Select option:

                                    Press ENTER                    68-09
```

The first line of this prompt informs you that the record you just created or updated has been written to diskette. If the record was not written, the first line is "Record not written."

Select 1 to terminate SYSRJEDU.

Select 2 to describe another job using the RJE Description Utility. The utility then displays prompt 68-01 which requests job description information.

Chapter 3. BSC Execution Utilities

The Communications Utilities licensed program includes three utilities which enable the 5280 system to transfer data in a BSC network: the BSC Data Communications Utility, the BSC Batch Transfer Utility and the MULTI-LEAVING Remote Job Entry Utility (MRJE). This chapter discusses the functions and requirements of these utilities and explains how to run them.

BSC Data Communications Utility (SYSBDCU)

The BSC Data Communications Utility (SYSBDCU) allows the 5280 to send and receive data using a BSC data link. It enables the 5280 system to:

- Transmit batch data to a computer or terminal
- Receive batch data from a computer or terminal
- Send inquiries to and receive replies from a host Data Base/Data Communications (DB/DC) subsystem

When SYSBDCU is executing, the 5280 can appear to the communications network as a 3741 Data Entry Station or 3780 Data Communications Terminal. The 3780 support enables the 5280 to serve as a Remote Job Entry (RJE) terminal to DOS VSE/POWER.

SYSBDCU can transmit data from the 5280 diskette, keyboard and magnetic stripe reader, and can receive data from the data link onto the diskette, printer and display. In conjunction with the full function BSC CAM, it executes jobs which you have described using the Data Communications Description Utility. If multiple transmit, receive and inquiry functions are chained together using this preparation utility, SYSBDCU executes them as a single job.

SYSTEMS SUPPORTED

SYSBDCU and the full function BSC CAM using 3741 protocol support communications with:

- System/3 RPG II and CCP
- System/32 RPG II
- System/34 RPG II and SSP-ICF
- 3741 Data Station Models 2 and 4
- 3747 Data Converter
- 5260 Retail System

- 5280 Distributed Data System
- Series/1 RPS Version 4
- System/370
  - DOS/VS CICS/VS
  - OS/VS1 CICS/VS
  - OS/VS2 CICS/VS
  - OS/VS1 IMS/VS
  - OS/VS2 IMS/VS

SYSBDCU and the full function BSC CAM using 3780 protocol enable the 5280 to function as an RJE terminal to DOS VSE/POWER.

SENDING AND RECEIVING DATA

Using BSC 3741 protocol, the utility can transmit batch data, receive batch data, and send inquiries and receive replies. Batch data to be transmitted can originate from the diskette, keyboard and magnetic stripe reader. Batch data and responses to inquiries can be received at the diskette, display and printer or a combination of two of these devices. Inquiries can be entered only at the keyboard.

The maximum logical record length for data transmitted from the keyboard and magnetic stripe reader is 128 bytes. Data transmitted from or received at the diskette, display and printer can be up to 512 bytes in length. When receiving data to diskette, the logical record length of the diskette data set must be the same as the logical record length of the data being received. The maximum sector size for a diskette is 1024 bytes; using diskettes for user data with a sector size greater than 256 bytes requires a larger partition for SYSBDCU (see "Requirements").

SYSBDCU supports the use of transaction IDs to CICS/VS. The transaction ID can be transmitted either as the first record in the function or with each record. For a transmit function, the utility can insert the transaction ID into each record; for an inquiry, you must rekey the transaction ID for each inquiry. For CICS/VS application programs, the transaction ID can be 1–4 characters in length.

Using BSC 3780 protocol, the utility serves as an RJE terminal to DOS VSE/POWER. Data can be transmitted from the diskette and keyboard. SYSBDCU sends all data to DOS VSE/POWER as 80 byte records.

Output from your RJE job is sent to the 5280 as either a punch or print data stream. A data stream is contiguous stream of data elements in character form; it can consist of one or many related records or data sets. A punch or print data stream can be received at the 5280 diskette, printer or display or a combination of two of these devices. A punch data stream consists of 80 byte records, and a print data stream consists of 128 byte records.

Note: For a receive operation to the printer, the utility does *not* automatically position the paper or forms at the top of a page. Check to ensure that the printer paper or forms is positioned at the top of the page before starting the job. For a receive operation to the display station the data will not be formatted.

At the end of the job, SYSBDCU displays job statistics, which include the number of records read from and written to 5280 input/output devices.

REQUIREMENTS

This utility operates in conjunction with the full function BSC CAM (SYSBSCEX) to perform data transfers. This CAM requires a minimum partition size of 18K; the utility requires a minimum partition size of 22K, either foreground or background. The partition size needed for SYSBDCU depends upon the sector size of the diskette(s) containing user data. If the sector size is 256 bytes or less, SYSBDCU can execute in a 22K partition. If it is greater than 256, SYSBDCU needs a 25K partition (see "Partition Considerations" in Chapter 8). If the job to be executed transmits data from the magnetic stripe reader, SYSBDCU *must* be loaded into a foreground partition.

To execute a job using this utility, you must first have defined your communications environment (using the Communications Configuration Utility) and described the job to be executed (using the Data Communications Description Utility). Before loading SYSBDCU into main storage, make sure that the following information is available:

- Communications programs (SYSBDCU, SYSCLU, and SYSBSCEX)
- Communications configuration record
- Job data set (including job description, function definition, and printer format records)
- Diskettes for your data

While SYSBDCU is executing, no other communications program that transfers data can be running.

HOW TO RUN SYSBDCU

The following prompts can appear while SYSBDCU is executing.

```
SYSBDCU - BSC DATA COMMUNICATIONS UTILITY

Specify job data set information.

Enter data set name:

Enter device address:

Enter job name:

                                    Press ENTER                    63-01
```

Data set name: Enter the name of the data set which contains the job description record to be used.

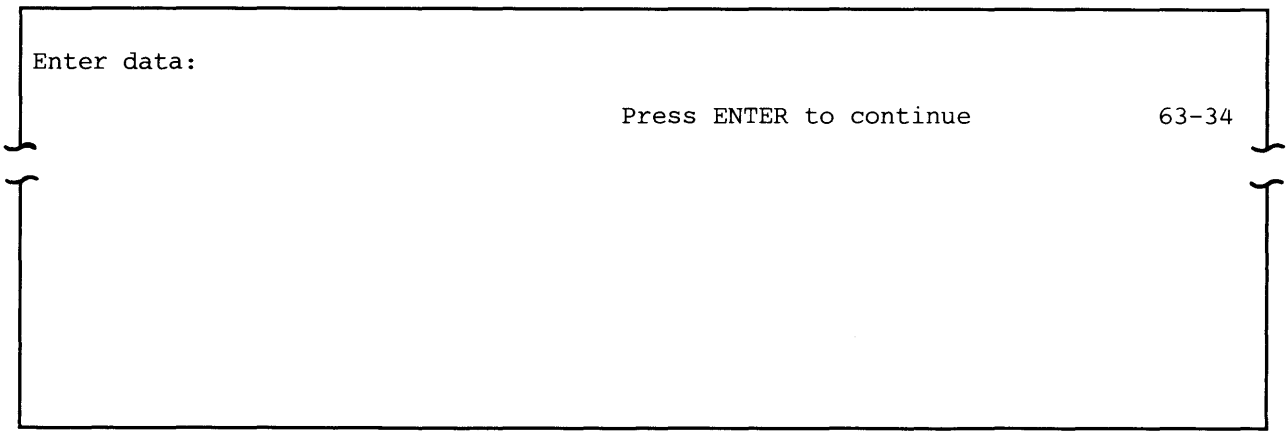
Device address: Enter the address of the diskette drive on which you have mounted the diskette containing the above-named data set. The address can be either two characters for a logical device address or four characters for a physical device address.

Job name: Enter the name of the job to be executed. This job must already have been described using the Data Communications Description Utility.

After you press ENTER, SYSBDCU reads the job description record, which identifies the communications configuration record to be used and the CAM partition number; the configuration record contains the name of the CAM to be loaded.

After the CAM is loaded, the message "Establish connection if necessary" appears on the display; this can occur after prompt 63-01, 63-34, 63-30 or 63-35. If the line is switched and the connection type is manual call, call the system with which the 5280 is to communicate, and place the modem in data mode. If the line is switched and the connection type is manual answer, check to ensure that the call has been received and that the modem is in data mode; if the connection type is auto answer, no action is necessary.

If the line is non-switched, no action is required, and this message appears only briefly.

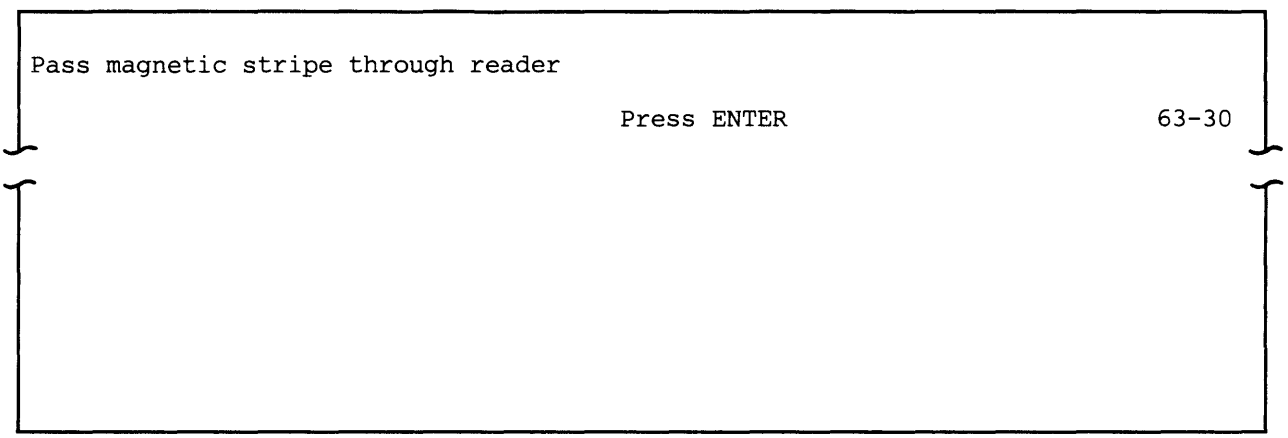


This prompt appears only if the function definition record specifies the keyboard as the input device for a transmit function.

For BSC 3741 protocol, you can enter a maximum of 128 characters from the keyboard; for BSC 3780 protocol, the maximum is 80 characters.

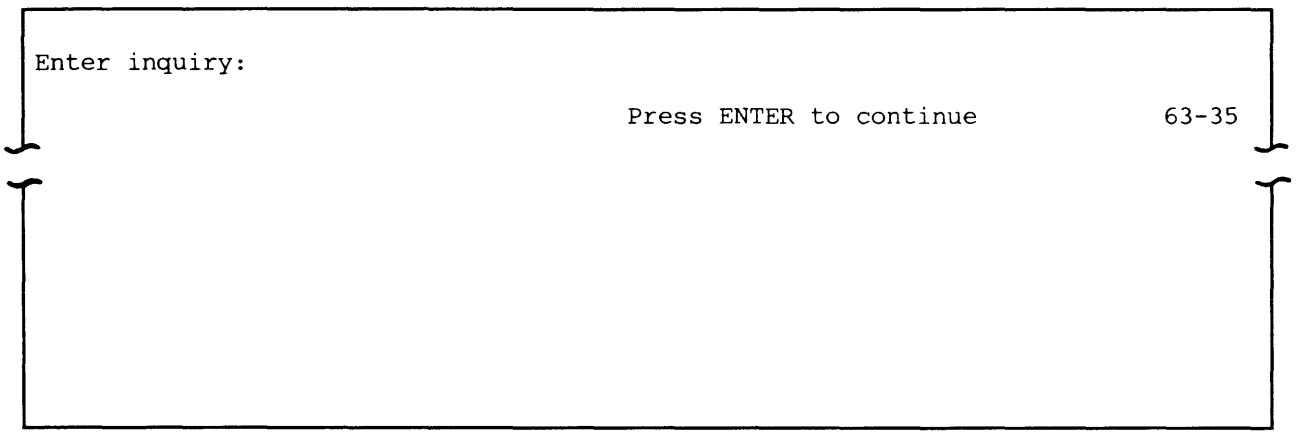
If a transaction ID is to be transmitted with each record, the ID is displayed as the first characters in the record, followed by one blank. The cursor is positioned after the blank. The length of the transaction ID plus one blank plus the data cannot exceed the above record lengths. If the function definition record specifies the transaction ID to be sent as the first record, the transaction ID is transmitted before this prompt appears.

After keying in your data, press ENTER; the data entered is scrolled up on the display and this prompt reappears. To end the transmit function, enter the End Input command key sequence. SYSBDCU then executes the next function in the job or, if this was the last or only function, it displays job statistics (see prompt 63-37).



This prompt appears only if the protocol type is 3741 and the function definition record specifies the magnetic stripe reader as the input device for a transmit function.

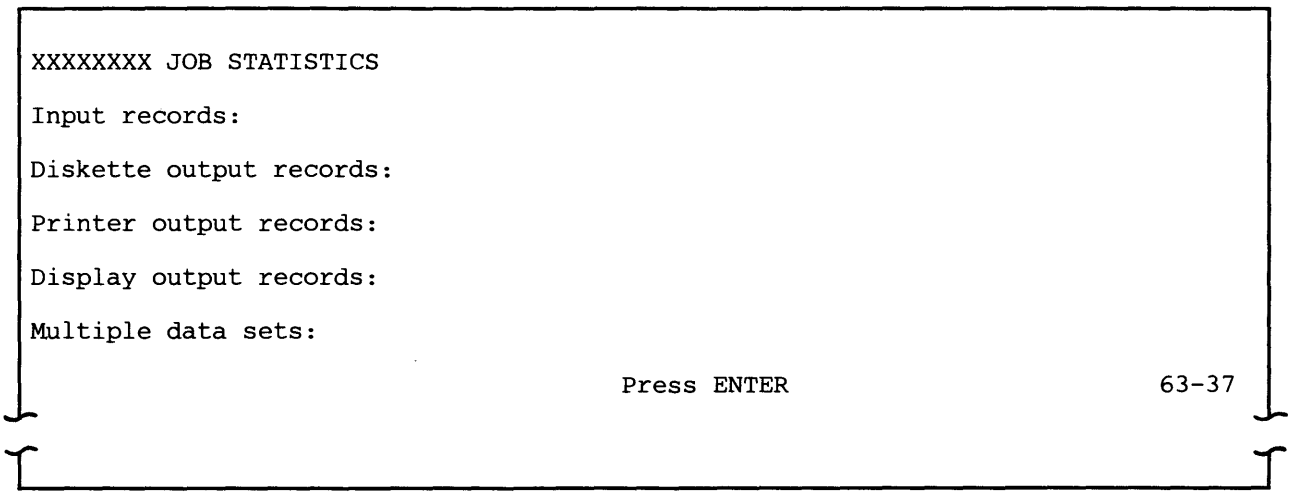
SYSBDCU reads and transmits up to 128 bytes from the badge. For the format of the data, see "Creating a Function for SYSBDCU" in Chapter 2.



This prompt appears only if the function definition record specifies an inquiry function.

The inquiry message can be up to 128 bytes long. If a transaction ID is to be transmitted, it must be followed by one blank. The length of the transaction ID plus one blank plus the inquiry data cannot exceed 128 bytes. You must rekey the transaction ID for each inquiry.

One or many records can be received in response to an inquiry. After all of the response data has been received, the above prompt reappears, and you can then enter another inquiry. To end the inquiry function, enter the End Input command key sequence.



This message appears:

- After the last function in the job has been executed
- When the End of Job command key sequence is entered during execution of a job
- If you select the exit or restart option to recover from an error for a job executing in attended mode (see "Error Recovery for SYSBBTU, SYSBDCU and SYSSDCU" in Chapter 8)
- After you press RESET when an error occurred during execution of an unattended mode job

XXXXXXXX is the name of the job; the statistics are:

- Input records is the total number of records read from the diskette, keyboard and magnetic stripe reader for all transmit functions in the job.
- Diskette and display output records are the total number of records written to these devices for all receive and inquiry functions in the job.
- Printer output records is the number of 128-byte records passed to the printer.
- Multiple data sets is the total number of multiple data sets allocated by SYSBDCU for all receive and inquiry functions in the job.

Note: These statistics represent the number of records read from or written to 5280 input/output devices, not necessarily the number of records transmitted or received.

If you want to save these statistics, write them down before pressing ENTER.

```
SYSBDCU completed.
Specify end option.
  Options are
    1.  Exit
    2.  Execute another job
Select option:
                                        Press ENTER                    63-26
```

This prompt appears after the last function in the job has been executed.

Select 1 to terminate SYSBDCU; the partition it occupied is now available. To terminate the CAM, you must perform certain steps to remove it from main storage; see "Removing CAM from a Partition" in Chapter 8.

Select 2 to execute another job using SYSBDCU. The prompt requesting job information (prompt 63-01) will reappear; the data set name and device address for the job just executed will appear as defaults.

Prompt 63-26 also appears if the End of Job command key sequence is entered during SYSBDCU execution. In this instance the first line of the prompt is "SYSBDCU terminated." The options are the same as those shown above.

```
XXXXXXXX FUNCTION STATISTICS     STATUS/COUNTERS    ERROR LOG INFORMATION
Input records:
Diskette output records:
Printer output records:
Display output records:
Multiple data set name:
```

This message appears if you enter the Comm Status command key sequence or if an error occurs while SYSBDCU is executing a job.

Note: SYSBDCU scrolls the function statistics on the display. To ensure that the statistics will be displayed long enough for you to review them, press the down cursor key before you enter the Comm Status command key sequence.

XXXXXXXX is the name of the function which is executing; the statistics are:

- Input records is the total number of records read from the diskette, keyboard, and magnetic stripe reader for the function.
- Diskette and display output records are the total number of records written to these devices for the function.
- Printer output records is the number of 128-byte records passed to the printer.
- Multiple data set name is the prefix of the multiple data sets being read from or written to, if the function uses multiple data sets.

Note: These statistics represent the number of records read from or written to 5280 input/output devices, not necessarily the number of records transmitted or received.

The information on the right side of the display concerning counters and errors is displayed only when a 5XXX error occurs. This data is taken from the communications control block (CCB) and provided primarily for use by an IBM Customer Engineer or system programmer. For more information on the CCB, see the *5280 Data Areas and Diagnostic Aids*. For more information on error recovery, see "Error Recovery for SYSBBTU, SYSBDCU and SYSSDCU" in Chapter 8.

After you have reviewed the statistics, press RESET.

BSC Batch Transfer Utility (SYSBBTU)

The BSC Batch Transfer Utility (SYSBBTU) enables the 5280 system to send and receive batch data using a BSC data link. It enables the 5280 to:

- Transmit batch data from diskette to a computer or terminal
- Receive batch data onto diskette from a computer or terminal

When SYSBBTU is executing a communications job, the 5280 appears as a 3741 to the communications network. SYSBBTU supports only batch data transfers to and from diskette. If you want inquiry capability or device support for the printer or keyboard/display, use the BSC Data Communications Utility.

SYSBBTU allows you to perform batch BSC communications in a small 5280 system. The functions provided by this utility can also be performed by the BSC Data Communications Utility, but the latter requires a larger 5280 system.

In conjunction with the minimum function BSC CAM, SYSBBTU executes jobs which you have described using the Data Communications Description Utility. If different transmit and receive functions are chained together using this preparation utility, SYSBBTU executes them as a single job.

SYSTEMS SUPPORTED

SYSBBTU and the minimum function BSC CAM support communications with:

- System/3 RPG II and CCP
- System/32 RPG II
- System/34 RPG II and SSP-ICF
- 3741 Data Station Models 2 and 4
- 3747 Data Converter
- 5260 Retail System
- 5280 Distributed Data System
- Series/1 RPS Version 4
- System/370
  - DOS/VS CICS/VS
  - OS/VS1 CICS/VS
  - OS/VS2 CICS/VS
  - OS/VS1 IMS/VS
  - OS/VS2 IMS/VS

SENDING AND RECEIVING DATA

SYSBBTU can transmit data from and receive data to diskette data sets. Each function can transmit or receive one data set. To transmit or receive more than one data set in the same job, functions must be chained. SYSBBTU does not support multiple data sets, that is, specifying a prefix for data sets to be transmitted or received using one function.

Records transmitted and received can be up to 128 bytes in length. When receiving data, the logical record length of the diskette data set must be the same as the logical record length of the data received. The maximum sector size for a diskette is 1024 bytes; using diskettes for user data with a sector size greater than 256 bytes requires a larger partition for SYSBBTU (see "Requirements"). Transaction IDs, if needed, must be included in the diskette data.

At the end of the job, SYSBBTU displays job statistics.

REQUIREMENTS

This utility operates in conjunction with the minimum function BSC CAM (SYSBSCBA) to perform data transfers. This CAM requires a minimum partition size of 15K; SYSBBTU can also execute with the full function BSC CAM (SYSBSCEX), which requires a minimum partition size of 18K. The utility requires a minimum partition size of 11K, either foreground or background. The partition size needed for SYSBBTU depends upon the sector size of the diskette(s) containing user data. If the sector size is 256 bytes or less, SYSBBTU can execute in a 11K partition. If it is greater than 256, SYSBBTU needs a 14K partition (see "Partition Considerations" in Chapter 8).

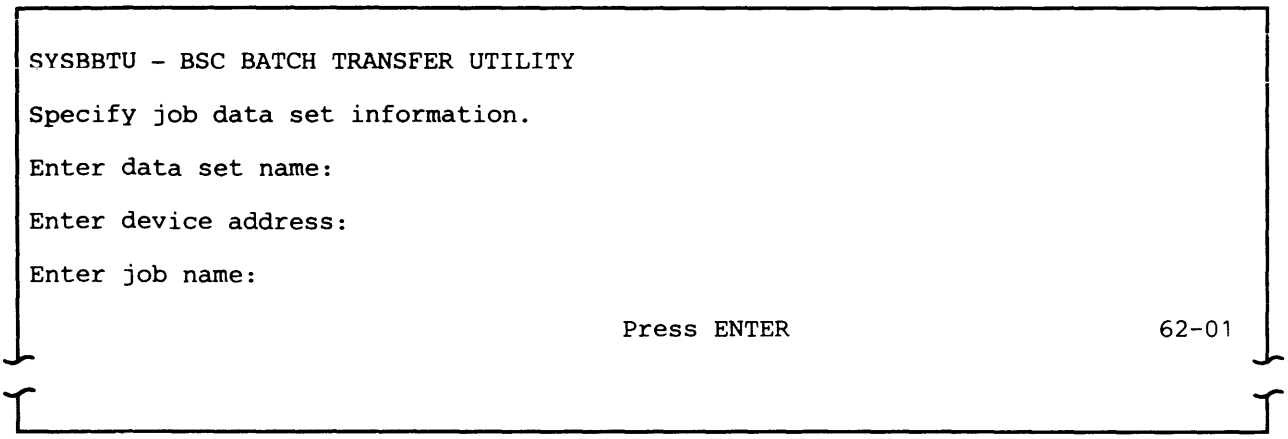
To execute a job using this utility, you must first have defined your communications environment (using the Communications Configuration Utility) and described the job to be executed (using the Data Communications Description Utility). Before loading SYSBBTU into main storage, make sure that the following information is available:

- Communications programs (SYSBBTU, SYSCLU, and SYSBSCBA or SYSBSCEX)
- Communications configuration record
- Job data set (including function definition records)
- Diskettes for your data

While SYSBBTU is executing, no other communications program that transfers data can be running.

HOW TO RUN SYSBBTU

The following prompts can appear while SYSBBTU is executing.



Data set name: Enter the name of the data set which contains the job description record to be used.

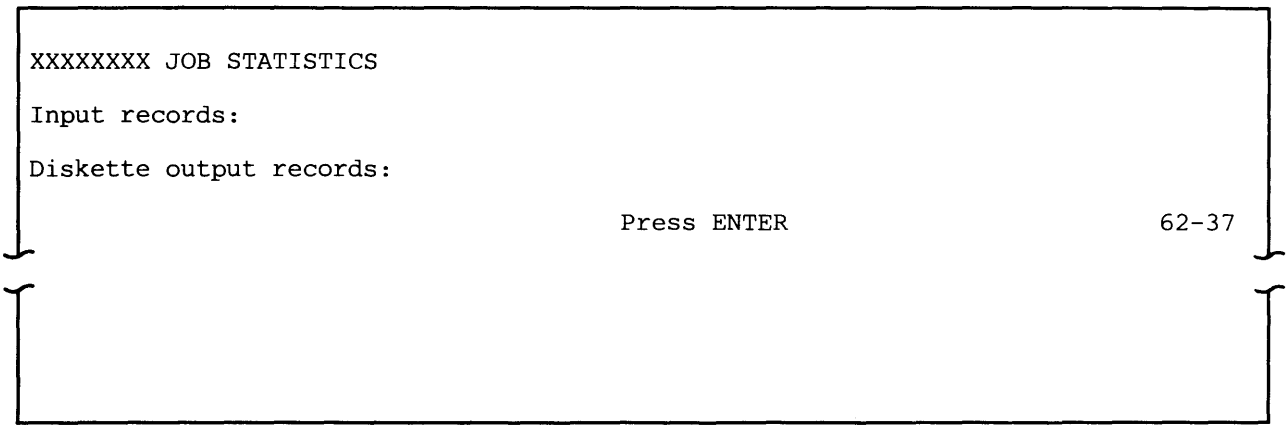
Device address: Enter the address of the diskette drive on which you have mounted the diskette containing the above-named data set. The address can be two characters for a logical device address or four characters for a physical device address.

Job name: Enter the name of the job to be executed. This job must already have been described using the Data Communications Description Utility.

After you press ENTER, SYSBBTU reads the job description record, which identifies the communications configuration record to be used and the CAM partition number; the configuration record contains the name of the CAM to be loaded.

After the CAM is loaded and SYSBBTU processes the first record, the message "Establish connection if necessary" appears on the display. If the line is switched and the connection type is manual call, call the system with which the 5280 is to communicate, and place the modem in data mode. If the line is switched and the connection type is manual answer, check to ensure that the call has been received and that the modem is in data mode; if the connection type is auto answer, no action is necessary.

If the line is non-switched, no action is required, and this message appears only briefly.



This message appears:

- After the last function in the job has been executed
- When the End of Job command key sequence is entered during execution of a job
- If you select the exit or restart option to recover from an error for a job executing in attended mode (see "Error Recovery for SYSBBTU, SYSBDCU and SYSSDCU" in Chapter 8)
- After you press RESET when an error occurred during execution of an unattended mode job

XXXXXXXX is the name of the job; the statistics are:

- Input records is the total number of records read from diskette for all transmit functions in the job.
- Diskette output records is the total number of records written to diskette for all receive functions in the job.

Note: These statistics represent the number of records read from or written to diskette, not necessarily the number of records transmitted or received.

If you want to save these statistics, write them down before pressing ENTER.

```
SYSBBTU completed.

Specify end option.

  Options are

    1.  Exit

    2.  Execute another job

Select option:

                                    Press ENTER                    62-26
```

This prompt appears after the last function in the job has been executed.

Select 1 to terminate SYSBBTU; the partition it occupied is now available. To terminate the CAM, you must perform certain steps to remove it from main storage; see "Removing CAM from a Partition" in Chapter 8.

Select 2 to execute another job using SYSBBTU. The prompt requesting job information (prompt 62-01) will reappear; the data set name and device address for the job just executed will appear as defaults.

Prompt 62-26 also appears if the End of Job command key sequence is entered during SYSBBTU execution. In this instance the first line of the prompt is "SYSBBTU terminated." The options are the same as those shown above.

MULTI-LEAVING Remote Job Entry (SYSMRJE)

The MULTI-LEAVING Remote Job Entry (MRJE) utility enables the 5280 system to submit jobs to an IBM host processor using a BSC data link. The 5280 serves as an MRJE work station in the network. Your jobs are processed by the host system, and the job output can be directed to your 5280 system, another RJE terminal in the communications network, or host system input/output devices.

MRJE supports communications with the following host subsystems:

- OS/VS1 Remote Entry Services (RES)
- OS/VS2 Job Entry Subsystem 2 (JES2)
- OS/VS2 Job Entry Subsystem 3 (JES3)

These host subsystems support a line discipline called MULTI-LEAVING. MULTI-LEAVING is fully synchronized, two-directional transmission of a variable number of data streams between two computers using BSC facilities. MULTI-LEAVING permits maximum overlapping of input and output operations at the RJE work station and the host system. Overlapping is achieved by intermixing input and output data streams on the data link.

MRJE does not conform to the conventional BSC line protocol. Many of the standard BSC control character functions are replaced by unique MRJE end-to-end control fields. For a description of MRJE usage of BSC control characters, see the *5280 Communications Support Logic Manual*. For more information on MRJE line protocol, see Appendix D.

MRJE communicates with the host system using EBCDIC code and supports text transparency. Text transparency allows MRJE to send and receive data which contains all of the 256 characters in the EBCDIC code.

MRJE OPERATION

MRJE establishes the data link connection with the host system, sends and receives data to and from the host, and terminates communications with the host system, including disconnecting the line. It can execute in either attended or unattended mode. In attended mode, an operator should be present at the 5280 system while MRJE is running; this is the normal mode of operation.

MRJE transmits and receives data streams. A data stream is a contiguous stream of data elements in character form; it can consist of one or many related records or data sets. A job stream is a data stream which contains jobs to be executed at the host; it can originate at the 5280 diskette or keyboard. Job output from the host is sent to the 5280 as a print or punch data stream. A punch data stream is written to diskette, while a print data stream can be directed to either the diskette or printer. MRJE does not receive print and punch data streams simultaneously. A console data stream is used to send and receive commands and operator messages between the 5280 and the host. A console data stream received from the host is directed to the display, and can also be directed to the diskette or printer. The keyboard/display is always the console device for MRJE.

Utility control statements are used to control MRJE execution. They are processed by MRJE and are not part of the job stream transmitted to the host. These statements allow you to:

- Assign input/output devices on the 5280
- Identify diskette data sets to be transmitted
- Control some printer operations
- Specify the end of a job stream

MRJE provides statistics at the end of each MRJE session, which include the number of input records processed and the number of print and punch records written to output devices.

REQUIREMENTS

5280 System

MRJE operates in conjunction with the MRJE CAM (SYSBSCR) to perform data transfers. This CAM requires a minimum partition size of 10K; MRJE requires a minimum partition size of 22K, either foreground or background, and a keyboard/display. The partition size needed for SYSMRJE depends upon the sector size of the diskette(s) containing user data. If the sector size is 256 bytes or less, MRJE can execute in a 22K partition. If it is greater than 256, MRJE needs a 30K partition (see "Partition Considerations" in Chapter 8). If you load MRJE into a background partition, it attaches the keyboard/display to the partition and it remains attached until MRJE terminates.

To execute a job using MRJE, you must first have defined your communications environment (using the Communications Configuration Utility) and described the job to be executed (using the RJE Description Utility). Before loading MRJE into main storage, make sure that the following information is available:

- Communications programs (SYSMRJE, SYSCLU and SYSBSCR)
- Communications configuration record
- Job description record
- Diskette(s) for your data

Host System

The host subsystems supported by MRJE are RES, JES2 and JES3. MRJE must be defined to the host as a System/3 MRJE work station with:

- One console
- One reader

- One printer
- Zero or one punch

If text transparency is to be used, it must be specified and active in both the host system and the 5280.

Network Control

When MRJE is executing, the 5280 is the remote station in the communications network and initiates communications with the host system by sending a signon/logon sequence. Communications with the host may be over a point-to-point switched or non-switched line. Once the line connection is established and the signon/logon sequence is sent, line control for a switched and non-switched line is identical.

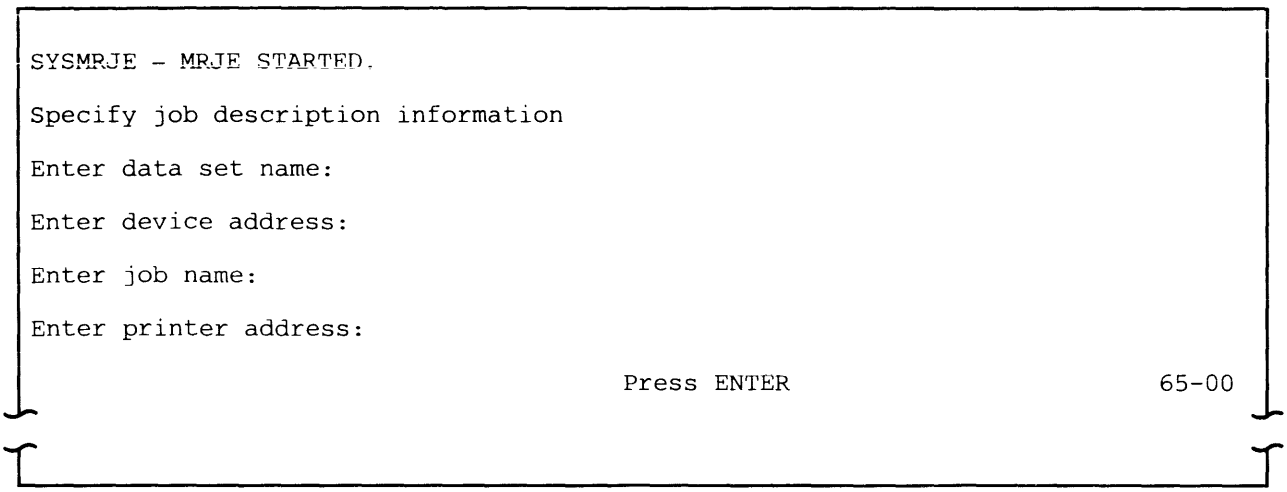
MRJE FUNCTIONS

MRJE consists of four functions:

- *Initialization* sets up communications characteristics of the 5280 and the host system, and establishes a line connection between the two.
- *Input processing* controls the MRJE session at the 5280 and sends jobs, data and host commands to the host system for processing.
- *Output processing* routes data streams and messages received from the host system to 5280 devices.
- *Termination* ends the line connection with the host system and terminates MRJE.

Initialization

This function consists of the preparation necessary to set up communications between the 5280 and the host, including establishing the line connection. After you load MRJE into main storage, you identify the job to be executed.



Data set name: Enter the name of the data set which contains the job description record to be used.

Device address: Enter the address of the diskette drive on which you have mounted the diskette which contains the above-named data set. The address can be either two characters for a logical device address or four characters for a physical device address.

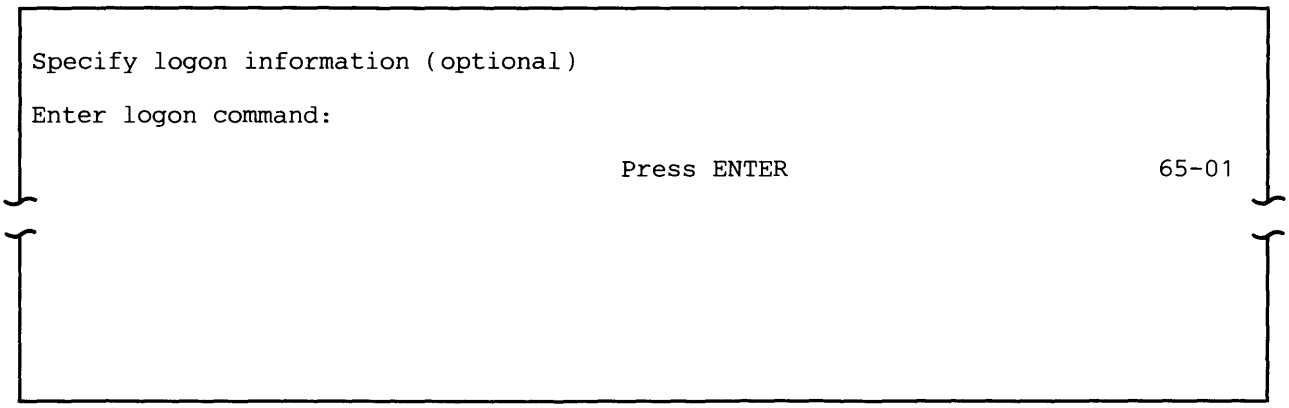
Job name: Enter the name of the job description record to be executed. This job description record must already have been described using the RJE Description Utility.

Printer address: Enter the address of the printer to be used to receive job output or to serve as a syslog device. Enter two characters for a logical device address or four characters for a physical device address. If a printer address is specified, this printer is assigned to MRJE exclusively for the duration of the MRJE session. If no printer is available, or if you do not wish to use a printer during the MRJE session, enter 0000 or blanks.

Note: If you enter a printer device address, turn on the printer before you press ENTER.

MRJE supports only one printer. Therefore for any job the printer can *either* receive a print data stream from the host, *or* can be a syslog device. The MODIFY utility control statement controls the use of the printer; see "MRJE Utility Control Statements" later in this chapter.

MRJE reads the job description record, which identifies the communications configuration record to be used and the CAM partition number; the configuration record contains the name of the CAM to be loaded.



This prompt appears only if signon/logon information is not contained in the job description record.

Some hosts do not require logon for MRJE work stations which communicate over a point-to-point non-switched line. If the host system does not require logon, press ENTER.

If the host system requires logon, enter the appropriate command, which can be up to 80 characters in length. MRJE checks, for correct syntax, the values LOGON, SIGNON and /*SIGNON. However, it does not check the variable logon data you enter.

For the format of the appropriate command, see:

- For JES2, *Operator's Library: OS/VS2 MVS JES2 Commands* (GC23-0007) and *System Programming Library: Network Job Entry Facility for JES2* (SC23-0003)
- For JES3, *Operator's Library: OS/VS2 MVS JES3 Commands* (GC23-0008) and *OS/VS2 MVS System Programming Library JES3* (GC28-0608)
- For RES, *OS/VS1 RES Workstation User's Guide* (GC28-6879)

If the logon is invalid, a message is sent to the host system operator. The 5280 does not receive a message because it is not in two-way communication with the host until the host accepts the logon. MRJE displays an error message indicating that the host rejected the logon. If you cannot determine why the logon was not accepted, contact the host system operator for assistance.

For a point-to-point non-switched line, entering the logon command completes the initialization process. The message "Establish connection if necessary" appears briefly on the display; no action is required.

For a point-to-point switched line, after you enter the logon command, the line connection with the host must be established. The message "Establish connection if necessary" appears on the display. If the connection type is manual call, call the system with which the 5280 is to communicate, and place the modem in data mode. If the connection type is manual answer, answer the call and place the modem in data mode. If the connection type is auto answer, no action is necessary. After the line connection is made, MRJE sends the

logon command and communication between the 5280 and the host system is established.

Input Processing

The three types of input to MRJE are:

- MRJE utility control statements
- OS/VS jobs (JCL and data) for submission to the host system
- Host system commands

MRJE processes utility control statements in the 5280. It transmits OS jobs (JCL and data) and host commands to the host system for processing. Input to MRJE can originate from a diskette data set or at the keyboard.

Diskette Data Set Input

MRJE transmits all records, regardless of their logical length, as 80 byte records. For example, a data set containing four 60-byte logical records is transmitted as three 80-byte records. If the last record to be transmitted has fewer than 80 bytes, it is padded with blanks. The host system user program, not RES, JES2, or JES3, is responsible for reassembling the data into the desired representation.

An input data set for MRJE is either a data file or a command file, as identified by the CMD parameter in the READFILE utility control statement.

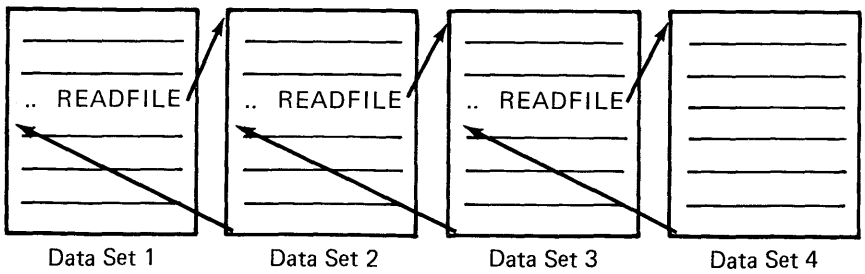
MRJE transmits all records in a data file to the host system, and does not examine them before transmission. Therefore, a data file should contain only data to be sent to the host, namely JCL and data for the job. Do not include MRJE utility control statements in a data file; if you do, an error may occur when the host system attempts to process them.

MRJE examines the contents of a command file to determine whether a record is to be sent to the host or processed by MRJE. A command file can contain JCL and data and host commands, which are transmitted to the host system, and MRJE utility control statements, which are processed by MRJE in the 5280.

MRJE looks at the first three bytes of each record in a command file. If the record does not begin with "..␣" (two periods and one blank), that is, it is not a utility control statement, MRJE sends it to the host. A command file must have a logical record length of 80 bytes, and must be contained on a single diskette volume.

The READFILE utility control statement identifies a diskette data set to be transmitted. It tells MRJE to retrieve a data set and insert it into the job stream to be sent to the host system. A data set identified by a READFILE statement may itself contain READFILE statements that direct MRJE to retrieve other data sets; this is called nesting. A nested READFILE is a READFILE encountered in a data set that was pointed to by another READFILE statement.

When MRJE encounters a nested READFILE, it stops reading from the data set containing the original READFILE, closes it, and begins reading the nested READFILE data set. After the nested READFILE data set is read, the original READFILE data set is reopened and read. MRJE supports seven levels of nested READFILEs; an example is shown below.



MRJE reads the data in the above four data sets in the following sequence: the beginning of data set 1, the beginning of data set 2, the beginning of data set 3, all of data set 4, the rest of data set 3, the rest of data set 2, and the rest of data set 1.

The maximum number of data sets that can be open at any given time is three: one READFILE data set, one output data set (to receive punch or print data) and one syslog data set. A diskette which contains an open data set must remain mounted on the diskette drive.

Keyboard Input

The keyboard from which MRJE accepts input is the keyboard of the keyboard/display used to load MRJE. This keyboard/display is the console device for MRJE. When the keyboard is the console (RDR-N), you can enter MRJE utility control statements and host commands at any time; this is the normal mode of operation.

To enter JCL and data, that is, a reader data stream, from the keyboard, use the MODIFY utility control statement to specify the keyboard as the reader (RDR-K). MRJE then reads data you enter at the keyboard as a command file; it checks the first three bytes of every record. If a record begins with "..ъ" MRJE processes it; if it does not, MRJE sends it to the host on the reader stream.

To use the keyboard for input, regardless of whether it is being used as a reader or console, you must first press the CMD key, and then hold down the shift key while you press Comm Attention. This key sequence must be used each time you want to enter any input from the keyboard. To make multiple successive entries from the keyboard, you must repeat the key sequence after you press ENTER for each new entry.

Reader and Console Data Streams

MRJE transmits data to the host RJE subsystem as either a reader or console data stream. A reader stream contains JCL and data, and some hosts also accept and process host commands received on the reader stream. A reader data stream can originate from either the 5280 diskette or keyboard (MODIFY RDR-K). A console data stream usually contains host commands and host operator messages, and can originate only from the console. Because host subsystems distinguish between reader and console data streams, you should determine and meet host subsystem requirements regarding the type of input that is expected on each data stream and how it is handled.

Output Processing

MRJE output can consist of one, all, or a combination of:

- Print data stream from the host system
- Punch data stream from the host system
- Console message from the host system
- Operator message generated by MRJE

Job output from the host can also be directed to another terminal in the network or to input/output devices at the host system.

Print and Punch Data Streams

A print data stream can be directed to the 5280 diskette or printer, or can be specified to not be accepted from the host. The device default for a print data stream is the printer. This can be changed to the diskette or to do not accept using the MODIFY utility control statement.

A print data stream directed to the printer or diskette is written in the subset of standard character string (SCS) controls used by the 5280 system printers. Printer control characters in the print data stream are automatically converted as they are received from the line. When a print data stream which was stored on diskette is printed, the data is already in SCS form.

A punch data stream can be directed to the diskette or can be specified as do not accept; the default is do not accept. This can be changed to diskette using the MODIFY utility control statement. A punch data stream directed to diskette is written in decompressed form, that is, blanks are expanded. The data is written as 80-byte logical records.

If the host has a punch or print data stream ready to send to the 5280 and do not accept has been specified for that type of data stream, the host is not granted permission to transmit it. SYSMRJE informs you of this condition by displaying the message "OUTPUT DEVICE FOR XXXXX NOT ASSIGNED" and posting an error. You must provide for the disposition of the data stream before the host will accept signoff or logoff from the 5280. You can either:

- Enter a MODIFY statement to assign a device to receive the data stream at the 5280

Using diskette data sets to receive job output allows the data to be processed after MRJE terminates. MRJE has no special provisions for handling output which requires special forms.

Messages

All messages to the 5280 operator, whether from the host system or MRJE, are shown on the display. Optionally, they can be logged on the diskette or printer. The log device is specified using the MODIFY utility control statement. Messages can be a maximum of 120 characters in length; those longer than 80 characters are shown on two lines on the display. For a description of the messages generated by MRJE, see "MRJE and SRJE Messages" in Chapter 8.

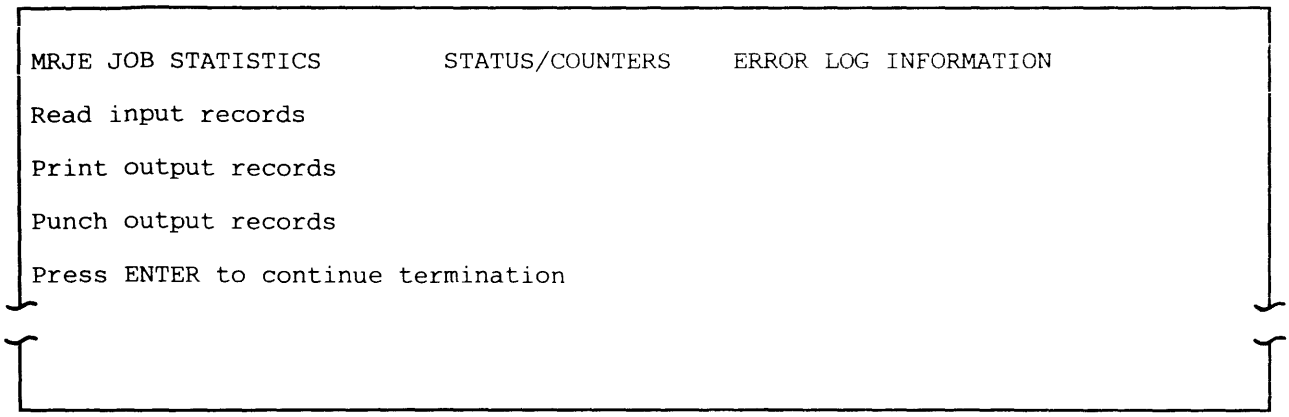
Termination

A signoff/logoff command which conforms to host system requirements indicates to the host that the 5280 wants to terminate the MRJE session. For the format of the appropriate command, see the applicable host system manual.

When MRJE terminates, whether normally or abnormally, it closes all data sets and displays statistics for the session.

```
MRJE JOB STATISTICS
Read input records
Print output records
Punch output records
Press ENTER to continue termination
```

This message appears when MRJE terminates normally.



This message appears if you enter the Comm Status command key sequence or if a non-recoverable error which does not permit MRJE to continue processing occurs.

The statistics for the above two messages reflect totals for all jobs in the session and are:

- Input records is the total number of 80-byte records read by the reader stream. This includes data records and JCL sent to the host.
- Print output records is the total number of 128-byte records passed to the printer or diskette.
- Punch output records is the total number of punch records written to diskette.

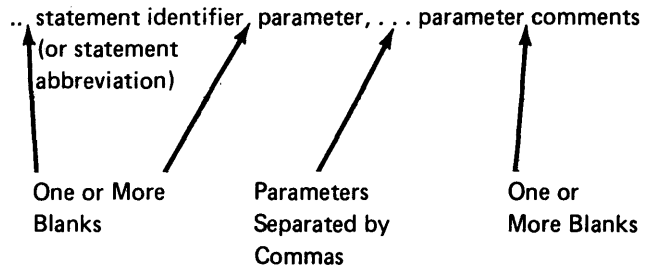
Note: These statistics represent the number of records read from or written to 5280 input/output devices, not necessarily the number of records transmitted or received.

The information on the right side of the display concerning counters and errors is displayed only when a 5XXX error occurs. This data is taken from the communications control block (CCB) and provided primarily for use by an IBM Customer Engineer or system programmer. For more information on the CCB, see the *5280 Data Areas and Diagnostic Aids*.

MRJE UTILITY CONTROL STATEMENTS

MRJE utility control statements control the MRJE session. They can be entered from the console or from a command file on diskette. Each utility control statement must begin with "..␣" (two periods and one blank).

A utility control statement is composed of a statement identifier and parameters. The parameters contain values you supply to the utility. The general format is:



The statement identifier (or its one character abbreviation) is always the first word of the statement. One or more blanks are required between the identifier and the first parameter.

Parameters can be entered in any order. A comma is required to separate one parameter from another. A hyphen is required within each parameter to separate the parameter name and its value.

Comments can be included in any statement which contains parameters. One or more blanks are required between the last parameter and the comment.

READFILE

The READFILE statement describes a diskette data set to be transmitted to the host system. A READFILE statement may be nested, that is, a data set identified by a READFILE statement may itself contain READFILE statements that direct MRJE to retrieve and insert other data sets in the job stream. Seven levels of nesting are supported.

A data set retrieved by a READFILE statement is inserted into the job stream at the point where the READFILE occurs. After MRJE reads all the records in the data set, that is, end of file is reached, MRJE continues reading input from the diskette data set which contained the READFILE, or from the keyboard. A command file referenced by a READFILE must be contained on a single diskette volume.

The format of the READFILE statement is:

```
.. R [EADFILE] DSN-name, DRV-X[/X. . ./X] [, CMD-{N}]
                                               {Y}
```

DSN: Enter the name of the data set to be read.

DRV: Enter the address of the diskette drive on which the diskette containing the above-named data set is mounted. If this data set is a data file which spans multiple volumes which will be mounted on different diskette drives, you can enter multiple device addresses separated by slashes. If the READFILE statement is entered from the keyboard, a maximum of eight device addresses

can be entered. If the READFILE statement is read from a diskette data set, a maximum of seven device addresses can be entered.

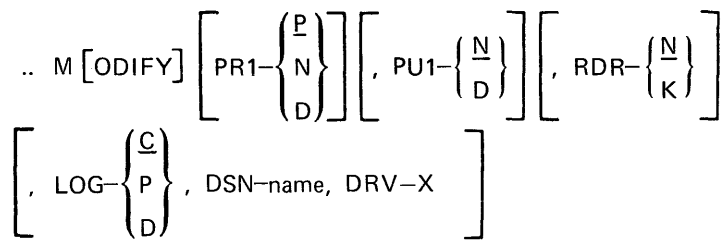
The format is DRV-X/X.../X where X is a two character logical or four character physical device address for a diskette drive. The addresses must be separated by slashes.

CMD: Specifies whether the data set is a data file or command file. Enter CMD-Y if the data set is a command file; this means MRJE will scan the file and process MRJE utility control statements when it encounters them. Enter CMD-N if the data set is a data file; MRJE transmits all records to the host, and does not process utility control statements. If you enter CMD-Y, enter only one device address for the DRV parameter. The default is CMD-N.

MODIFY

The MODIFY statement assigns and changes the devices to be used to transmit and receive data. If multiple changes are required, you can enter them using one MODIFY statement.

The format of the MODIFY statement is:



PR1: Specifies the destination of a print data stream sent to the 5280 by the host system. PR1-P assigns the printer to receive print data streams; this is the default. PR1-N indicates that the 5280 will not accept printer data from the host system.

PR1-D assigns the diskette to receive print data streams. MRJE allocates diskette data sets as they are needed during execution. The job description record identifies the device address(es) which contain diskettes to be searched for unused space (see prompt 68-08 of the RJE Description Utility). MRJE names the data set(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.

MRJE supports only one printer. It can be used either to receive a print data stream from the host (PR1-P) or as a syslog device (LOG-P). Therefore, if you specify PR1-P, you cannot specify LOG-P.

PU1: Specifies whether or not punch data streams will be accepted. PU1-N indicates that the 5280 will not accept punch data from the host; this is the default.

PU1-D assigns the diskette to receive punch data streams. A punch data stream directed to diskette is written in decompressed form, that is, blanks are expanded. MRJE allocates diskette data sets as they are needed during execution. The job description record identifies the device address(es) which contain diskettes to be searched for unused space (see prompt 68-08 of the RJE Description Utility). Punch data sets 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.

Note: If a MODIFY statement with the PR1 or PU1 parameter is entered while the 5280 is receiving a print or punch data stream, the device assignment is not changed until the data stream being received is completed.

RDR: Specifies the device from which the job data stream to be transmitted to the host is read. RDR-N is the normal mode of operation and is the default. When RDR-N is specified, only utility control statements and host commands can be entered from the keyboard.

RDR-K assigns the keyboard as the input device for the job stream to be transmitted. All data entered at the keyboard is treated as a command file when RDR-K is specified.

Note: When the EOF statement, MODIFY RDR-N, or a READFILE statement is encountered, RDR-K is reset to RDR-N, thus terminating the keyboard as the reader device.

LOG: Specifies the output device for MRJE utility control statements, host console messages, input entered at the keyboard and error/informational messages. LOG-C indicates that this information will be displayed; this is the default. LOG-P specifies that this information is also to be printed. If you specify LOG-P, you cannot specify PR1-P.

LOG-D specifies that the information is to be displayed and also written on a diskette data set. When LOG-D is specified, it must be accompanied by DSN and DRV parameters. DSN is the name of the log data set; DRV is its device address.

CARRIAGE

The CARRIAGE statement is used to:

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

The format of the CARRIAGE statement is:

.. C[ARRIAGE] [L–nnn] [, BM–nnn] [,Ccc–mmm]. . .[,Ccc–mmm]

L: Specifies the length of the forms, that is, the number of print lines per page. The maximum length is 112; the default is 66.

BM: Specifies the line number of the bottom margin. Valid values are less than or equal to the number of lines per page (L). The default 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 cc-mmm combination can be specified for all 12 channel control characters. If values are not entered for all 12 combinations, 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 cc-mmm combinations are entered, previously entered or default values are used.

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

Notes:

1. Leading zeros are not required on any CARRIAGE parameter.
2. Check the host system (using host system commands) for the status of the output queues before entering a CARRIAGE statement. See the appropriate host manual for the command to use.

EOF

The EOF (end-of-file) statement signals the end of the input stream to the host system; the host system then queues the job for execution. If the RDR parameter of the MODIFY statement is RDR-K, EOF causes it to be reset to RDR-N.

If MRJE is transmitting one job to the host system, the job must be followed by EOF. If MRJE is transmitting more than one job, only the last job can be followed by EOF. The host system recognizes // JOB statements in the input stream which cause jobs to be queued for execution.

The format of the EOF statement is:

.. E[OF]

There are no parameters for the EOF statement.

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

Chapter 4. SNA Execution Utilities

The Communications Utilities licensed program includes two utilities which enable the 5280 system to transfer data in an SNA/SDLC network: the SNA Data Communications Utility and the SNA Remote Job Entry Utility (SRJE). This chapter discusses the functions and requirements of these utilities and explains how to run them.

SNA Data Communications Utility (SYSSDCU)

The SNA Data Communications Utility (SYSSDCU) allows the 5280 to send and receive data using SDLC link protocol. It enables the 5280 system to:

- Transmit batch data to a host computer
- Receive batch data from a host computer
- Send inquiries to and receive replies from a host Data Base/Data Communications (DB/DC) subsystem

The 5280 system supports multiple LU-LU sessions with DB/DC subsystems. Up to four 5280 communications programs can communicate concurrently with the same DB/DC subsystem using SNA/SDLC. Therefore, up to four copies of SYSSDCU can be concurrently executing in main storage and communicating with the same DB/DC subsystem.

This utility can transmit data from the 5280 diskette and keyboard, and can receive data from the data link onto the diskette, printer and display. In conjunction with the SNA DB/DC CAM, SYSSDCU executes jobs you have described using the Data Communications Description Utility. If multiple transmit, receive and inquiry functions are chained together using this preparation utility, SYSSDCU executes them as a single job.

SYSTEMS SUPPORTED

SYSSDCU and the SNA DB/DC CAM support communications with the following host subsystems:

- DOS/VS CICS/VS
- OS/VS1 CICS/VS
- OS/VS2 CICS/VS
- OS/VS1 IMS/VS
- OS/VS2 IMS/VS

SENDING AND RECEIVING DATA

After the utility is loaded you respond to a prompt to identify the job to be executed. If logon data is not contained in the job description record, you are asked to provide it. The utility then begins executing the first function in the job.

SYSSDCU can transmit batch data, receive batch data, and send inquiries and receive replies. Batch data to be transmitted can originate from the keyboard and diskette. The utility accepts and transmits up to 80 bytes of data from the keyboard. The maximum logical record length permitted for a diskette data set to be transmitted is 512 bytes. However, all data is sent to the host as 80 byte records. It is the responsibility of the host system to reassemble the data into the desired representation.

Batch data received by SYSSDCU is sent from the host as a punch, print or console data stream. A data stream is a contiguous stream of data elements in character form; it can consist of one or many related records or data sets. A data stream can be received at the printer, diskette and display or a combination of two of these devices. In unattended mode, a data stream cannot be directed to the display.

SYSSDCU assumes the following record lengths for data streams received from the host: punch—80 bytes, console—120 bytes, print—128 bytes. For a data stream directed to diskette, the logical record length used depends on when the data set is allocated. If SYSSDCU automatically allocates the data set at execution time, it sets the logical record length equal to the length of the first record received. If the data set is pre-allocated, SYSSDCU writes the data using the logical record length specified in the data set header; the maximum is 512 bytes.

Note: For a receive operation to the printer, the utility does *not* automatically position the paper or forms at the top of a page. Check to ensure that the paper or forms is positioned at the top of the page before starting the job.

All inquiries sent to the host system by SYSSDCU must be entered from the keyboard; an inquiry can be up to 80 bytes in length. One or many records can be received in response to an inquiry. The response received can be directed to the display, printer and diskette or a combination of two of these devices. A response to an inquiry can be up to 128 bytes in length.

SYSSDCU supports the use of transaction IDs for transmit and inquiry functions into CICS/VS and IMS/VS. The transaction ID can be transmitted either as the first record in the function or with each record. For a transmit function, the utility can insert the transaction ID into each record; for an inquiry, you must rekey the transaction ID for each inquiry. For CICS/VS application programs, the transaction ID can be 1–4 characters in length; for IMS/VS, it can be 1–8 characters.

At the end of the job, SYSSDCU displays job statistics, which include the number of records read from and written to 5280 input/output devices.

REQUIREMENTS

This utility operates in conjunction with the SNA DB/DC CAM (SYSSNAD) to perform data transfers. This CAM requires a minimum partition size of 22K; the utility requires a minimum partition size of 22K, either foreground or background. The partition size needed for SYSSDCU depends upon the sector size of the diskette(s) containing user data. If the sector size is 256 bytes or less, SYSSDCU can execute in a 22K partition. If it is greater than 256, SYSSDCU needs a 25K partition (see "Partition Considerations" in Chapter 8).

If more than one user is to concurrently communicate with the same SNA DB/DC subsystem, each user must load a program for his own use. If two users want to run SYSSDCU at the same time, two copies of the utility must be executing in two different partitions. However, the SNA DB/DC CAM is shared by all programs. Only one CAM can be executing in main storage at any given time; it is loaded by the first SYSSDCU user. After communications between this first user and the host subsystem are established, up to three other copies of SYSSDCU can be loaded, and all will utilize the same CAM. When multiple 5280 SNA programs are communicating with the same SNA DB/DC subsystem, each must specify the use of the same CAM and the same communications configuration record.

To execute a job using this utility, you must first have defined your communications environment (using the Communications Configuration Utility) and described the job to be executed (using the Data Communications Description Utility). Before loading SYSSDCU into main storage, make sure that the following information is available:

- Communications programs (SYSSDCU, SYSCLU AND SYSSNAD)
- Communications configuration record
- Job data set (including job description, function definition and printer format records)
- Diskette(s) for your data

HOW TO RUN SYSSDCU

The following prompts can appear while SYSSDCU is executing.

```
SYSSDCU - SNA DATA COMMUNICATIONS UTILITY

Specify job data set information.

Enter data set name:

Enter device address:

Enter job name:

                                    Press ENTER                    64-01
```

Data set name: Enter the name of the data set which contains the job description record to be used.

Device address: Enter the address of the diskette drive on which you have mounted the diskette containing the above-named data set. The address can be either two characters for a logical device address or four characters for a physical device address.

Job name: Enter the name of the job to be executed. This job must already have been described using the Data Communications Description Utility.

After you press ENTER, SYSSDCU reads the job description record, which identifies the communications configuration record to be used and the CAM partition number; the configuration record contains the name of the CAM to be loaded.

```
Specify logon information.

Enter logon command:

                                    Press ENTER                    64-05
```

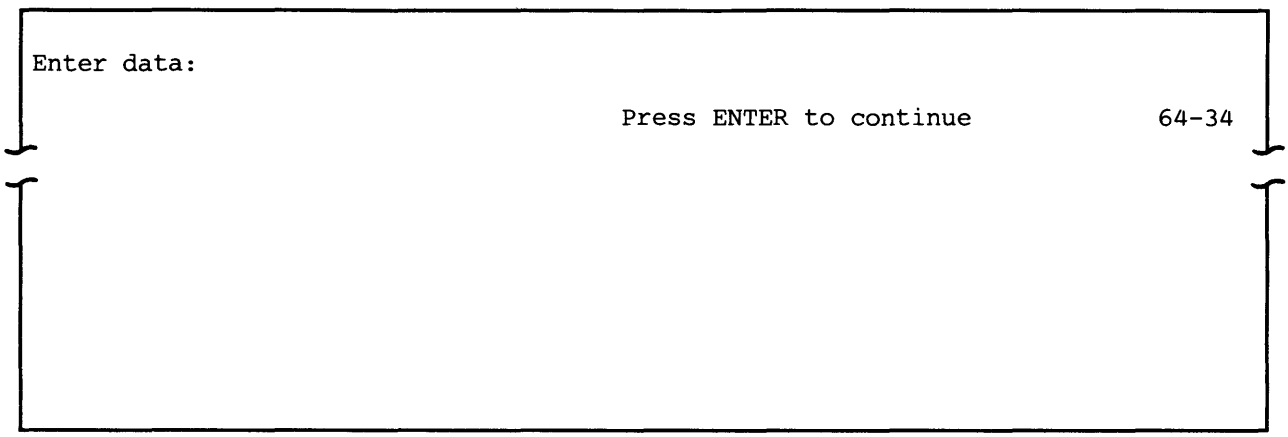
This prompt appears only if logon is required (see SYSCCU, prompt S9) and logon data is not included in the job description record.

Logon is a procedure required by some SNA host systems to begin a session. You can enter up to 80 characters; SYSSDCU does not check the logon data

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

After the CAM is loaded, the message "Establish connection if necessary" appears on the display. If the line is switched and the connection type is manual call, call the system with which the 5280 is to communicate, and place the modem in data mode. If the line is switched and the connection type is manual answer, answer the call and place the modem in data mode. if the connection type is auto-answer, no action is necessary.

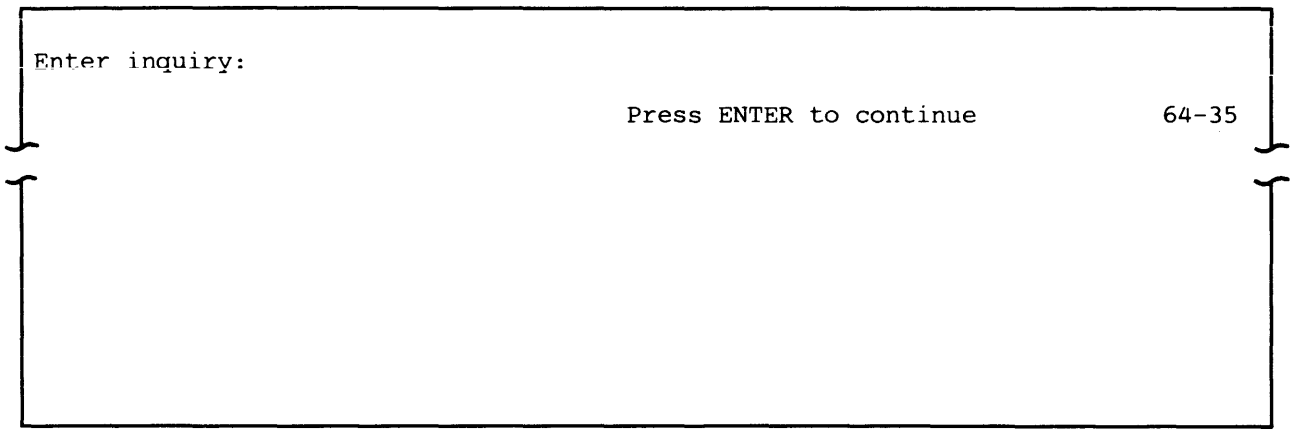
If the line is non-switched, no action is required, and this message appears only briefly.



This prompt appears only if the function definition record specifies the keyboard as the input device for a transmit function.

You can enter a maximum of 80 characters from the keyboard. If a transaction ID is to be transmitted with each record, the ID is displayed as the first characters in the record, followed by one blank. The cursor is positioned after the blank. The length of the transaction ID plus one blank plus the data cannot exceed 80 bytes. If the function definition record specifies the transaction ID to be sent as the first record, the transaction ID is transmitted before this prompt appears.

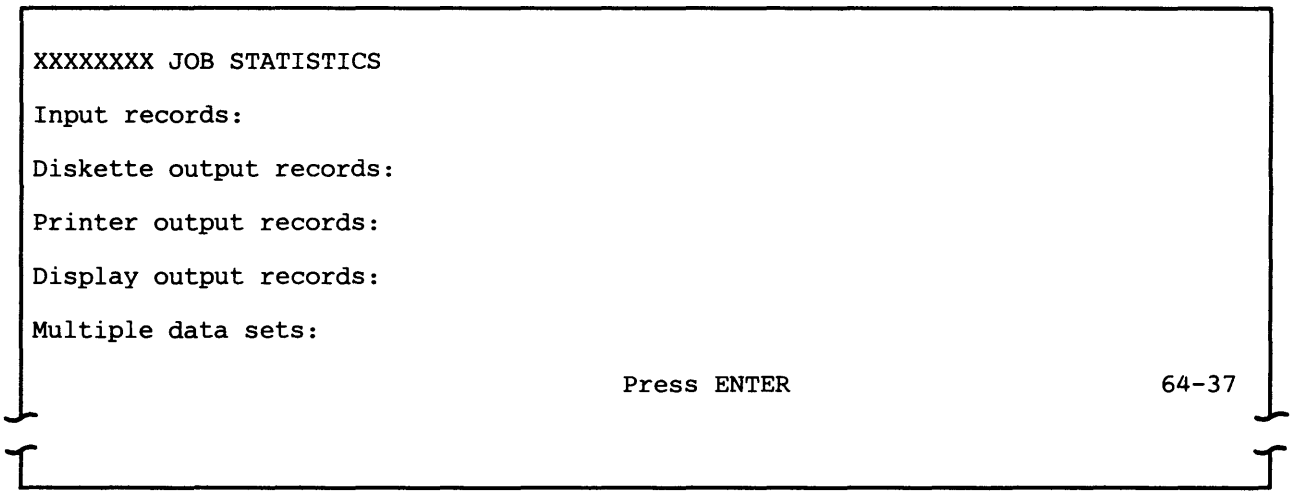
After keying in your data, press ENTER; the data entered is scrolled up on the display and this prompt reappears. To end the transmit function, enter the End Input command key sequence. SYSSDCU then executes the next function in the job or, if this was the last or only function, it displays job statistics (see prompt 64-37).



This prompt appears only if the function definition record specifies an inquiry function.

The inquiry message can be up to 80 bytes long. If you want to include a transaction ID for inquiries into CICS/VS, the ID must be the first four characters of the inquiry, followed by a blank. For IMS/VS, the transaction ID must be the first eight characters of the inquiry, followed by a blank. The length of the transaction ID plus one blank plus the inquiry data cannot exceed 80 bytes. You must rekey the transaction ID for each inquiry.

One or many records can be received in response to an inquiry. After all of the response data has been received, the above prompt reappears, and you can then enter another inquiry. To end the inquiry function, enter the End Input command key sequence.



This message appears:

- After the last function in the job has been executed
- When the End of Job command key sequence is entered during execution of a job
- If you select the exit or restart option (see prompt 64-29) to recover from an error for a job executing in attended mode (see "Error Recovery for SYSBBTU, SYSBDCU and SYSSDCU in Chapter 8)
- After you press RESET when an error occurred during execution of an unattended mode job

XXXXXXXX is the name of the job; the statistics are:

- Input records is the total number of records read from the diskette and keyboard for all transmit functions in the job.
- Diskette and display output records are the total number of records written to these devices for all receive and inquiry functions and console messages.
- Printer output records is the number of 128-byte records passed to the printer.
- Multiple data sets is the total number of multiple data sets allocated by SYSSDCU for all receive and inquiry functions in the job.

Note: These statistics represent the number of records read from or written to 5280 input/output devices, not necessarily the number of records transmitted or received.

If you want to save these statistics, write them down before pressing ENTER.

```
SYSSDCU completed.
Specify end option.
  Options are
    1.  Exit
    2.  Execute another job
Select option:
                                        Press ENTER                    64-26
```

This prompt appears after the last function in the job has been executed.

Select 1 to terminate SYSSDCU; the partition it occupied is now available. To terminate the CAM, you must perform certain steps to remove it from main storage; see "Removing CAM from a Partition" in Chapter 8.

Note: If multiple LU-LU sessions were active, do not terminate the CAM until all sessions have been completed.

Select 2 to execute another job using SYSSDCU. The prompt requesting job information (prompt 64-01) will reappear; the data set name and device address for the job just executed will appear as defaults.

Prompt 64-26 also appears if the End of Job command key sequence is entered during SYSSDCU execution. In this instance the first line of the prompt is "SYSSDCU terminated." The options are the same as those shown above.

```
XXXXXXXX FUNCTION STATISTICS   STATUS/COUNTERS   ERROR LOG INFORMATION
Input records:
Diskette output records:
Printer output records:
Display output records:
Multiple data set name:
```

This message appears if you enter the Comm Status command key sequence or if an error occurs while SYSSDCU is executing a job.

Note: SYSSDCU scrolls the function statistics on the display. To ensure that the statistics will be displayed long enough for you to review them, press the down cursor key before you enter the Comm Status command key sequence.

XXXXXXXX is the name of the function which is executing; the statistics are:

- Input records is the total number of records read from the diskette and keyboard for the function.
- Diskette and display output records are the total number of records written to these devices for the function.
- Printer output records is the number of 128-byte records passed to the printer.
- Multiple data set name is the prefix of the multiple data sets being read from or written to, if the function uses multiple data sets.

Note: These statistics represent the number of records read from or written to 5280 input/output devices, not necessarily the number of records transmitted or received.

The information on the right side of the display concerning counters and errors is displayed only when a 4XXX error occurs. This data is taken from the communications control block (CCB) and provided primarily for use by an IBM Customer Engineer or system programmer. For more information on the CCB, see the *5280 Data Areas and Diagnostic Aids*. For more information on error recovery, see "Error Recovery for SYSBBTU, SYSBDCU and SYSSDCU" in Chapter 8.

After you have reviewed the statistics, press RESET.

SNA Remote Job Entry (SYSSRJE)

The SNA Remote Job Entry (SRJE) utility enables the 5280 to submit jobs to an IBM host processor using SDLC link protocol. The 5280 serves as an RJE work station in the network. Your jobs are processed by the host system, and the job output can be directed to your 5280 system, another RJE terminal in the communications network, or host system input/output devices.

SRJE supports communications with the following host subsystems using VTAM (virtual telecommunications access method) and NCP/VS (network control program/virtual storage):

- OS/VS1 Remote Entry Services (RES)
- OS/VS2 Job Entry Subsystem 2 (JES2)
- DOS VSE/POWER

SRJE communicates with the host system using ASCII or EBCDIC code and supports text transparency. Text transparency allows SRJE to send and receive data which contains all of the 256 characters in the EBCDIC code.

The 5280 supports a single LU-LU session between SRJE and the host RJE subsystem. This means that only one copy of SRJE can be executing in main storage at any given time. While SRJE is executing, no other communications program that transfers data can be executing.

SRJE OPERATION

SRJE establishes the data link connection with the host system, sends and receives data to and from the host, and terminates communications with the host system, including disconnecting the line. It can execute in either attended or unattended mode. In attended mode, an operator should be present at the 5280 system while SRJE is running; this is the normal mode of operation.

SRJE transmits and receives data streams. A data stream is a contiguous stream of data elements in character form; it can consist of one or many related records or data sets. A job stream is a data stream which contains jobs to be executed at the host; it can originate at the 5280 diskette or keyboard. Job output from the host is sent to the 5280 as a print or punch data stream. A punch data stream is written to diskette, while a print data stream can be directed to either the diskette or printer. A console data stream is used to send and receive commands and operator messages between the 5280 and the host. A console data stream received from the host is directed to the display, and can also be directed to the diskette or printer. The keyboard/display is always the console device for SRJE.

Utility control statements are used to control SRJE execution. They are processed by SRJE and are not part of the job stream transmitted to the host. These statements allow you to:

- Assign input/output devices on the 5280
- Identify diskette data sets to be transmitted
- Control some printer operations
- Specify the end of a job stream

SRJE provides statistics at the end of each session, which include the number of input records processed and the number of print, punch, and exchange records written to 5280 devices.

REQUIREMENTS

5280 System

SRJE operates in conjunction with the SRJE CAM (SYSSNAR) to perform data transfers. This CAM requires a minimum partition size of 21K; SRJE requires a minimum partition size of 22K, either foreground or background, and a keyboard/display. The partition size needed for SYSSRJE depends upon the sector size of the diskette(s) containing user data. If the sector size is 256 bytes or less, SRJE can execute in a 22K partition. If it is greater than 256, SRJE needs a 30K partition (see "Partition Considerations" in Chapter 8). If you load SRJE into a background partition, it attaches the keyboard/display to the partition and it remains attached until SRJE terminates.

To execute a job using SRJE, you must first have defined your communications environment (using the Communications Configuration Utility) and described the job to be executed (using the RJE Description Utility). Before loading SRJE into main storage, make sure that the following information is available:

- Communications programs (SYSSRJE, SYSCLU and SYSSNAR)
- Communications configuration record
- Job description record
- Diskette(s) for your data

Host System

The host subsystems supported by SRJE are RES, JES2 and DOS VSE/POWER. SRJE has the following functions available to the host system:

- One reader
- Zero or one punch
- One printer
- One console

If text transparency is to be used, it must be specified and active in both the host system and the 5280.

Network Control

Communications with the host may be over a point-to-point non-switched, point-to-point switched or multipoint line. A logon/signon sequence must be sent from the 5280 and accepted by the host before the SRJE session can begin.

SRJE FUNCTIONS

SRJE consists of four functions:

- *Initialization* sets up communications characteristics of the 5280 and the host system, and establishes a line connection between the two.
- *Input processing* controls the SRJE session at the 5280 and sends jobs, data and host commands to the host system for processing.
- *Output processing* routes data streams and messages received from the host system to 5280 devices.
- *Termination* ends the line connection with the host system and terminates SRJE.

Initialization

This function consists of the preparation necessary to set up communications between the 5280 and the host, including establishing the line connection. After you load SRJE into main storage, you identify the job to be executed.

```
SYSSRJE - SRJE STARTED
Specify job description information
Enter data set name:
Enter device address:
Enter job name:
Enter printer address:
                                    Press ENTER                    66-00
```

Data set name: Enter the name of the data set which contains the job description record to be used.

Device address: Enter the address of the diskette drive on which you have mounted the diskette which contains the above-named data set. The address can be either two characters for a logical device address or four characters for a physical device address.

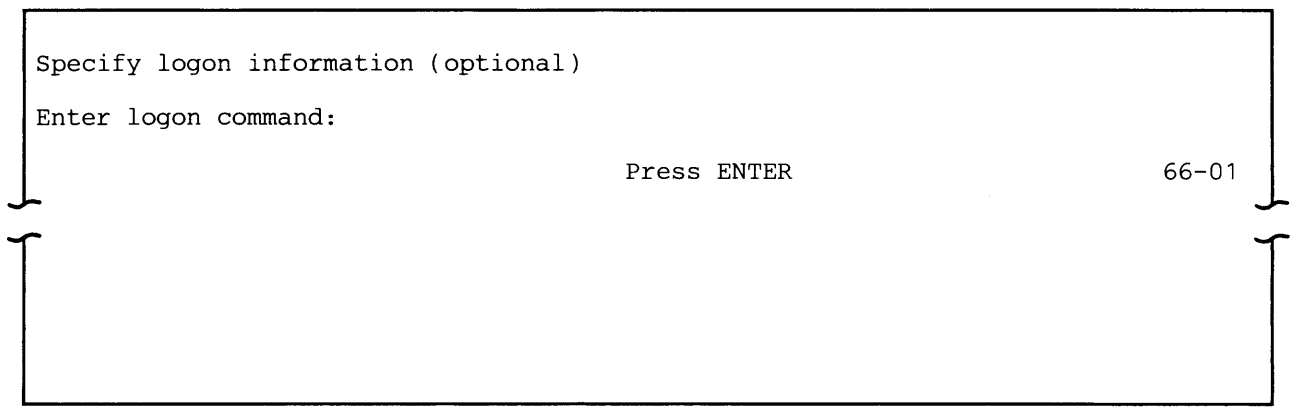
Job name: Enter the name of the job to be executed. This job must already have been described using the RJE Description Utility.

Printer address: Enter the address of the printer to be used to receive job output or to serve as a syslog device. Enter two characters for a logical or four characters for a physical device address. If a printer address is specified, this printer is assigned to SRJE exclusively for the duration of the SRJE session. If no printer is available or if you do not wish to use a printer during the SRJE session, enter 0000 or blanks.

Note: If you enter a printer device address, turn on the printer before you press ENTER.

SRJE supports only one printer. Therefore for any job the printer can *either* receive a print data stream from the host, *or* can be a syslog device. The MODIFY utility control statement controls the use of the printer; see "SRJE Utility Control Statements" later in this chapter.

SRJE reads the job description record, which identifies the communications configuration record to be used and the CAM partition number; the configuration record contains the name of the CAM to be loaded.



This prompt appears only if logon information is not contained in the job description record.

Logon is a procedure required by most SNA host systems to begin a session. If the host system does not require logon, press ENTER. If it requires logon, enter the appropriate command, which can be up to 80 characters in length.

SRJE checks, for correct syntax, the values LOGON, SIGNON and /*SIGNON. However, it does not check the variable logon data you enter.

For the format of the appropriate command, see:

- For JES2, *Operator's Library: OS/VS2 MVS JES2 Commands* (GC23-0007) and *System Programming Library: Network Job Entry Facility for JES2* (SC23-0003)
- For RES, *OS/VS1 RES Workstation User's Guide* (GC28-6879)
- For DOS VSE/POWER, *DOS/VSE/POWER Remote Job Entry User's Guide* (SH12-5328)

If the logon is invalid, a message is sent to the host system operator. The 5280 does not receive a message because it is not in two-way communication with the host until the host accepts the logon. SRJE displays an error message indicating that the host rejected the logon. If you cannot determine why the logon was not accepted, contact the host system operator for assistance.

For a point-to-point non-switched line, entering the logon command completes the initialization process. The message "Establish connection if necessary" appears briefly on the display; no action is required.

For a point-to-point switched line, after you enter the logon command, the line connection with the host must be established. The message "Establish connection if necessary" appears on the display. If the connection type is manual call, call the system with which the 5280 is to communicate, and place the modem in data mode. If the connection type is manual answer, check to ensure that the call has been received and that the modem is in data mode. If the connection type is auto answer, no action is necessary. After the line connection is made, SRJE sends the logon command and communications between the 5280 and the host system are established.

For a multipoint line, the host polls the 5280 to determine whether SRJE has any data to send. If it has data to transmit, the 5280 responds to the poll and then the logon command is sent. The message "Establish connection if necessary" does not require any action.

Input Processing

The three types of input to SRJE are:

- SRJE utility control statements
- OS/VS or DOS/VS jobs (JCL and data) for submission to the host system
- Host system commands

SRJE processes utility control statements in the 5280. It transmits jobs (JCL and data) and host commands to the host system for processing. Input to SRJE can originate from a diskette data set or at the keyboard.

Diskette Data Set Input

SRJE transmits all records, regardless of their logical length, as 80 byte records. For example, a data set containing four 60-byte logical records is transmitted as three 80-byte records. If the last record to be transmitted has fewer than 80 bytes, it is padded with blanks. The host system user program is responsible for reassembling the data into the desired representation.

An input data set for SRJE is either a data file or a command file, as identified by the CMD parameter in the READFILE utility control statement.

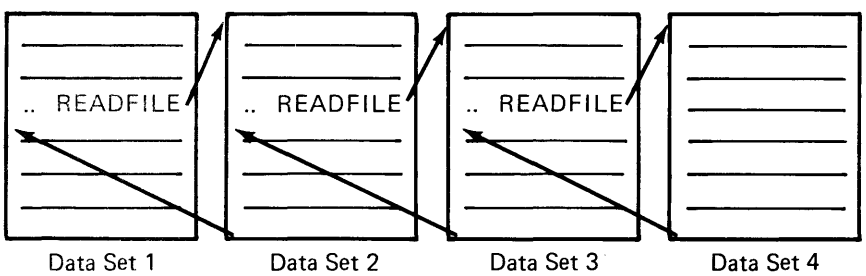
SRJE transmits all records in a data file to the host system, and does not examine them before transmission. Therefore, a data file should contain only data to be sent to the host, namely JCL and data for the job. Do not include SRJE utility control statements in a data file; if you do, an error may occur when the host system attempts to process them.

SRJE examines the contents of a command file to determine whether a record is to be sent to the host or processed by SRJE. A command file can contain JCL and data and host commands, which are transmitted to the host system, and SRJE utility control statements, which are processed by SRJE in the 5280.

SRJE looks at the first three bytes of each record in a command file. If the record does not begin with "..␣" (two periods and one blank), that is, it is not a utility control statement, SRJE sends it to the host. A command file must have a logical record length of 80 bytes, and must be contained on a single diskette volume.

The READFILE utility control statement identifies a diskette data set to be transmitted. It tells SRJE to retrieve a data set and insert it into the job stream to be sent to the host system. A data set identified by a READFILE statement may itself contain READFILE statements that direct SRJE to retrieve other data sets; this is called nesting. A nested READFILE is a READFILE encountered in a data set that was pointed to by another READFILE statement.

When SRJE encounters a nested READFILE, it stops reading from the data set containing the original READFILE, closes it, and begins reading the nested READFILE data set. After the nested READFILE data set is read, the original READFILE data set is reopened and read. SRJE supports seven levels of nested READFILEs; an example is shown below.



SRJE reads the data in the above four data sets in the following sequence: the beginning of data set 1, the beginning of data set 2, the beginning of data set 3, all of data set 4, the rest of data set 3, the rest of data set 2, and the rest of data set 1.

The maximum number of data sets that can be open at any given time is three: one READFILE data set, one output data set (to receive print or punch data), and one syslog data set. A diskette which contains an open data set must remain mounted on the diskette drive.

Keyboard Input

The keyboard from which SRJE accepts input is the keyboard of the keyboard/display used to load SRJE. This keyboard/display is the console device for SRJE. When the keyboard is the console (RDR-N), you can enter SRJE utility control statements and host commands at any time; this is the normal mode of operation.

To enter JCL and data, that is, a reader data stream, from the keyboard, use the MODIFY utility control statement to specify the keyboard as the reader (RDR-K). SRJE then reads data entered at the keyboard as a command file; it checks the first three bytes of every record. If a record begins with "..ь" SRJE processes it; if it does not, SRJE sends it to the host on the reader stream.

To use the keyboard for input, regardless of whether it is being used as a reader or console, you must first press the CMD key, and then hold down the shift key while you press Comm Attention. This key sequence must be used each time you want to enter any input from the keyboard. To make multiple successive entries from the keyboard, you must repeat the key sequence after you press ENTER for each new entry.

Reader and Console Data Streams

SRJE transmits data to the host RJE subsystem as either a reader or console data stream. A reader stream contains JCL and data, and some hosts also accept and process host commands received on the reader stream. A reader data stream can originate from either the 5280 diskette or keyboard (MODIFY RDR-K). A console data stream usually contains host commands and host operator messages, and can originate only from the console. Because host subsystems distinguish between reader and console data streams, you should determine and meet host subsystem requirements regarding the type of input that is expected on each data stream and how it is handled.

Output Processing

SRJE output can consist of one, all, or a combination of:

- Print data stream from the host system
- Punch data stream from the host system
- Exchange data stream from the host system (OS/VS1 RES only)
- Console message from the host system
- Operator message generated by SRJE

Job output from the host can also be directed to another terminal in the network or to input/output devices at the host system.

Print and Punch Data Streams

A print data stream can be directed to the 5280 diskette or printer, or can be specified to not be accepted from the host. The device default for a print data stream is the printer; it can be changed to the diskette or do not accept using the MODIFY utility control statement.

A print data stream directed to the printer or diskette is written in the subset of standard character string (SCS) controls used by the 5280 system printers. Printer control characters in the print data stream are automatically converted as they are received from the line. When a print data stream which was stored on diskette is printed, the data is already in SCS form.

A punch data stream can be directed to the diskette or can be specified as do not accept; the default is do not accept. This can be changed to diskette using the MODIFY utility control statement. A punch data stream directed to diskette is written in decompressed form, that is, blanks are expanded. The data is written as 80-byte logical records.

If the host has a punch or print data stream ready to send to the 5280 and do not accept has been specified for that type of data stream, the host is not granted permission to transmit it. SYSSRJE informs you of this condition by displaying the message "OUTPUT DEVICE FOR XXXXX NOT ASSIGNED" and posting an error. You must provide for the disposition of the data stream before the host will accept signoff or logoff from the 5280. You can either:

- Enter a MODIFY statement to assign a device to receive the data stream at the 5280
- Send a host system command to hold, cancel or redirect the data stream

Using diskette data sets to receive job output allows the data to be processed after SRJE terminates. SRJE has no special provisions for handling output which requires special forms.

Messages

All messages to the 5280 operator, whether from the host system or SRJE, are shown on the display. Optionally, they can be logged on the diskette or printer. The log device is specified using the MODIFY utility control statement. Messages can be a maximum of 120 characters in length; those longer than 80 characters are shown on two lines on the display. For descriptions of the messages generated by SRJE, see "MRJE and SRJE Messages" in Chapter 8.

Termination

A signoff/logoff command which conforms to host system requirements indicates to the host that the 5280 wants to terminate the session. For the format of the appropriate command, see the applicable host system manual.

When SRJE terminates, whether normally or abnormally, it closes all data sets and displays statistics for the session.

```
SRJE JOB STATISTICS
Read input records
Print output records
Punch output records
Exchange output records
Press ENTER to continue termination
```

This message appears when SRJE terminates normally.

```
SRJE JOB STATISTICS     STATUS/COUNTERS     ERROR LOG INFORMATION
Read input records
Print output records
Punch output records
Exchange output records
Press ENTER to continue termination
```

This message appears if you enter the Comm Status command key sequence or if a non-recoverable error which does not permit SRJE to continue processing occurs.

The statistics for the above two messages reflect totals for all jobs in the session and are:

- Input records is the total number of 80-byte records read by the reader stream. This includes data records and JCL sent to the host.
- Print output records is the total number of 128-byte records passed to the printer or diskette.
- Punch output records is the total number of punch records written to diskette.
- Exchange output records is the total number of exchange records written to diskette.

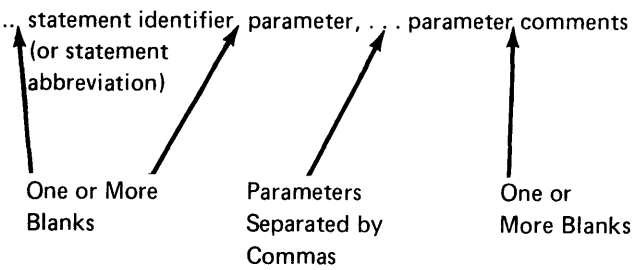
Note: These statistics represent the number of records read from or written to 5280 input/output devices, not necessarily the number of records transmitted or received.

The information on the right side of the display concerning counters and errors is displayed only when a 4XXX error occurs. This data is taken from the communications control block (CCB) and provided primarily for use by an IBM Customer Engineer or system programmer. For more information on the CCB, see the *5280 Data Areas and Diagnostic Aids*.

SRJE UTILITY CONTROL STATEMENTS

SRJE utility control statements control the SRJE session. They can be entered from the console or from a command file on diskette. Each utility control statement must begin with "..␣" (two periods and one blank).

A utility control statement is composed of a statement identifier and parameters. The parameters contain values you supply to the utility. The general format is:



The statement identifier (or its one character abbreviation) is always the first word of the statement. One or more blanks are required between the identifier and the first parameter.

Parameters can be entered in any order. A comma is required to separate one parameter from another. A hyphen is required within each parameter to separate the parameter name and its value.

Comments can be included in any statement which contains parameters. One or more blanks are required between the last parameter and the comment.

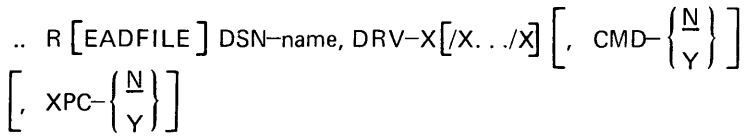
READFILE

The READFILE statement describes a diskette data set to be transmitted to the host system. A READFILE statement may be nested, that is, a data set identified by a READFILE statement may itself contain READFILE statements that direct SRJE to retrieve and insert other data sets in the job stream. Seven levels of nesting are supported.

A data set retrieved by a READFILE statement is inserted into the job stream at the point where the READFILE occurs. After SRJE reads all the records in the data set, that is, end of file is reached, SRJE continues reading input from the diskette data set which contained the READFILE, or from the keyboard. A

command file referenced by a READFILE must be contained on a single diskette volume.

The format of the READFILE statement is:



DSN: Enter the name of the data set to be read.

DRV: Enter the address of the diskette drive on which the diskette containing the above-named data set is mounted. If this data set is a data file which spans multiple volumes which will be mounted on different diskette drives, you can enter multiple device addresses separated by slashes. If the READFILE statement is entered from the keyboard, a maximum of eight device addresses can be entered. If the READFILE statement is read from a diskette data set, a maximum of seven device addresses can be entered.

The format is DRV-X/X.../X where X is a two character logical device address or four character physical device address for a diskette drive. The addresses must be separated by slashes.

CMD: Specifies whether the data set is a data file or command file. Enter CMD-Y if the data set is a command file; this means SRJE will scan the file and process SRJE utility control statements when it encounters them. Enter CMD-N if the data set is a data file; SRJE transmits all records to the host, and does not process utility control statements. If you enter CMD-Y, enter only one device address for the DRV parameter. The default is CMD-N.

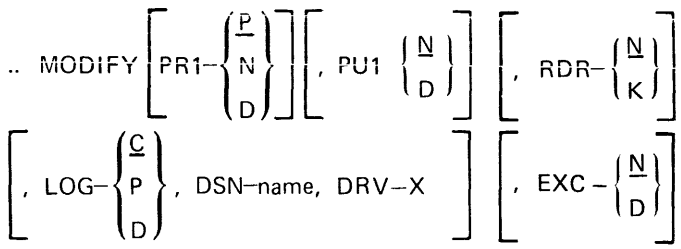
XPC: Specifies whether the data set to be read contains transparent data. Enter XPC-Y if the data set contains transparent data; enter XPC-N if it does not. XPC-N is the default.

Note: XPC-Y and CMD-Y cannot be specified in the same READFILE statement.

MODIFY

The MODIFY statement assigns and changes the devices to be used to transmit and receive data. If multiple changes are required, you can enter them using one MODIFY statement.

The format of the MODIFY statement is:



PR1: Specifies the destination of a print data stream sent to the 5280 by the host system. PR1-P assigns the printer to receive print data streams; this is the default. PR1-N indicates that the 5280 will not accept printer data from the host system.

PR1-D assigns the diskette to receive print data streams. SRJE allocates diskette data sets as they are needed during execution. The job description record identifies the device address(es) which contain diskettes to be searched for unused space (see prompt 68-08 of the RJE Description Utility). SRJE names the data set(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.

SRJE supports only one printer. It can be used either to receive a print data stream from the host (PR1-P) or as a syslog device (LOG-P). Therefore, if you specify PR1-P, you cannot specify LOG-P.

EXD-D: Specifies exchange data.

PU1: Specifies whether or not punch data streams will be accepted. PU1-N indicates that the 5280 will not accept punch data from the host; this is the default.

PU1-D assigns the diskette to receive punch data streams. A punch data stream directed to diskette is written in decompressed form, that is, blanks are expanded. SRJE allocates diskette data sets as they are needed during execution. The job description record identifies the device address(es) which contain diskettes to be searched for unused space (see prompt 68-08 of the RJE Description Utility). Punch data sets 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.

Note: If a MODIFY statement with the PR1 or PU1 parameter is entered while the 5280 is receiving a print or punch data stream, the device assignment is not changed until the data stream being received is completed.

RDR: Specifies the device from which the job data stream to be transmitted to the host is read. RDR-N is the normal mode of operation and is the default. When RDR-N is specified, only utility control statements and host commands can be entered from the keyboard.

RDR-K assigns the keyboard as the input device for the job stream to be transmitted. All data entered at the keyboard is treated as a command file when RDR-K is specified.

Note: When the EOF statement, MODIFY RDR-N, or a READFILE statement is encountered, RDR-K is reset to RDR-N, thus terminating the keyboard as the reader device.

LOG: Specifies the output device for SRJE utility control statements, host console messages, input entered at the keyboard and error/informational messages. LOG-C indicates that this information will be displayed; this is the default. LOG-P specifies that this information is also to be printed. If you specify LOG-P, you cannot specify PR1-P.

LOG-D specifies that the information is to be displayed and also written on a diskette data set. When LOG-D is specified, it must be accompanied by DSN and DRV parameters. DSN is the name of the log data set; DRV is its device address.

EXC: Specifies the destination of an exchange data stream sent to the 5280 by the host system. EXC-N indicates that the 5280 will not accept exchange data from the host system; this is the default.

EXC-D: Assigns the diskette to receive print data streams. SRJE allocates diskette data sets as they are needed during execution. The job description record identifies the device address(es) which contain diskettes to be searched for unused space (see prompt 68-08 of the RJE Description Utility). SRJE names the data set(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.

CARRIAGE

The CARRIAGE statement is used to:

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

The format of the CARRIAGE statement is:

.. C[ARRIAGE] [L—nnn] [, BM—nnn] [,Ccc—mmm] . . .[,Ccc—mmm]

L: Specifies the length of the form, that is, the number of print lines per page. The maximum length is 112; the default is 66.

BM: Specifies the line number of the bottom margin. Valid values are less than or equal to the number of lines per page (L). The default 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 cc-mmm combination can be specified for all 12 channel control characters. If values are not entered for all 12 combinations, 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 cc-mmm combinations are entered, previously entered or default values are used.

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

Notes:

1. Leading zeros are not required on any CARRIAGE parameter.
2. Check the host system (using host system commands) for the status of the output queues before entering a CARRIAGE statement. See the appropriate host manual for the command to use.

EOF

The EOF (end-of-file) statement signals the end of the job stream to the host system. The host system then queues the job for execution. If the RDR parameter of the MODIFY statement is RDR-K, EOF causes it to be reset to RDR-N.

If SRJE is transmitting one job to the host system, the job must be followed by EOF. If SRJE is transmitting more than one job, only the last job can be followed by EOF. The host system recognizes // JOB statements in the input stream which cause jobs to be queued for execution.

The format of the EOF statement is:

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

There are no parameters for the EOF statement.

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

SAMPLE OF AN SRJE SESSION

This sample of an SRJE session illustrates the actions performed by the 5280 operator and SRJE processing of a command file.

Before SRJE can execute any job, several preparatory steps are necessary. This sample assumes that the following tasks have been completed:

- The Communications Configuration Utility was used to create a communications configuration record. Some of the information contained in this record is:

  - Line type is switched point-to-point.
  - Connection type is manual call/answer.
  - CAM name is SYSSNAR.
  - Line code is EBCDIC.
  - Device type is SRJE.

- The RJE Description Utility was run to create a job description record. Some of the information contained in this record is:

  - The name of the job is SRJEEXMP. This job record is in a data set named JOBSSRJE.
  - Remote job entry type is SRJE.
  - Host system type is JES2.
  - Mode of operation is attended.
  - Diskette drives 4000 and 4400 are the drives to be searched for diskette space to be allocated.
  - Information about the first READFILE and logon information is *not* contained in the record.

- SYSSRJE has been loaded into a foreground partition.

The following activities take place in the sequence presented.

1. Because the job uses a printer, the operator turns on the printer, aligns the paper, and then responds as shown to the following prompts.

```
SYSSRJE - SRJE STARTED.
Specify job description information
Enter data set name:    JOBSSRJE
Enter device address:   4400
Enter job name:         SRJEEXMP
Enter printer address:  8000
                                    Press ENTER                    66-00
```

```
Specify logon information (optional)

Enter logon command:

LOGON APPLID(JES2) LOGMODE(T5280) DATA(RMT14)

                                        Press ENTER                    66-01
```

2. After ENTER is pressed, the message "Establish connection if necessary" appears on the display. The operator calls the host JES2 system. After the line connection is made, the logon command is sent and accepted by JES2. Communications between SRJE and JES2 are now established. At the bottom of the display the message "SRJE INITIALIZATION COMPLETE" appears.

3. To ready the keyboard for input, the operator enters the Comm Attention command key sequence; the message "READY FOR INPUT" appears. This message is always on the screen. When you enter the command key sequence, column separators appear. The operator then enters the READFILE utility control statement on the keyboard and it is displayed:

```
SRJE INITIALIZATION COMPLETE

READY FOR INPUT

.. READFILE  DSN-TRANFILE,DRV-4400,CMD-Y
```

4. SRJE now retrieves TRANFILE, a command file on diskette drive 4400, and transmits all records, other than utility control statements, to the host. During processing, the following information appears on the display. Each line is scrolled up when a new line appears.

```
.. READFILE  DSN-TRANFILE,DRV-4400,CMD-Y

UTILITY COMMAND ACCEPTED

TRANFILE OPENED

.. EOF

UTILITY COMMAND ACCEPTED

TRANFILE CLOSED

READER TERMINATED

READY FOR INPUT
```

The above information indicates that the operator is informed when:

a. An SRJE utility control statement is accepted for processing.

b. SRJE opens and closes a READFILE data set.

c. There is no more data to send to the host and therefore the reader is finished.

TRANFILE contains the following data:

```
//JOBNAME  JOB (accounting parameters)...
//S1              EXEC   PGM=IEBGENER
//SYSPRINT        DD     SYSOUT=A
//SYSIN           DD     DUMMY
//SYSUT2          DD     SYSOUT=A
//SYSUT1          DD     DATA
SAMPLE RECORD 1
SAMPLE RECORD 2
SAMPLE RECORD 3
/*
.. EOF
```

5. The operator can now enter another READFILE or LOGOFF. This can be done while the printer is receiving the job output.

Chapter 5. Data Communications Programming with Assembler Language

The 5280 communications support provides assembler language instructions which enable an assembler language program to send and receive data using a BSC or SDLC data link. You might want to write your own communications program using assembler language:

- When you want to process data online as it is received at the 5280.
- When you want to match your 5280 communications program to a particular host application program.
- When the BSC or SNA Data Communications Utility does not meet your unique communications needs. The functions provided by these utilities are sending batch data, receiving batch data and sending inquiries and receiving replies. For more complete descriptions, see Chapters 3 and 4.

You should already be familiar with BSC and/or SNA terminology; see Chapter 1 for a description of this support. For a complete description of how to write an assembler language program, see the *5280 Assembler Language Reference Manual*. For explanations of some of the communications external status and completion codes, see Appendix H. A completion codes can be found in the *5280 Messages Manual*.

BSC Programming with Assembler Language

You can write a BSC program using assembler language to communicate with the following systems and host subsystems:

- System/3 RPG II and CCP
- System/32 RPG II
- System/34 RPG II and SSP-ICF
- 3741 Data Station Models 2 and 4
- 3747 Data Converter
- 5260 Retail System
- Series/1 RPS Version 4
- Another 5280 Distributed Data System
- System/370
  - DOS/VS CICS/VS
  - OS/VS1 CICS/VS
  - OS/VS2 CICS/VS
  - OS/VS1 IMS/VS
  - OS/VS2 IMS/VS

The BSC support for your program includes:

- Establishing the data link connection
- Sending and receiving data
- Disconnecting the data link
- Providing most data link error recovery procedures

Your program interfaces with the full function BSC communications access method (CAM) to perform data transfers. The CAM enforces BSC protocol and performs network functions and error recovery. Your program interfaces to the CAM via communications instructions and one control statement. The functions supplied to your program are:

- Specify characteristics of the communications device
- Initialize communications
- Open an input/output control block (IOB) for communications read/write/control operations
- Read a logical record
- Write a logical record

- Wait on I/O completion
- Control certain communications operations
- Close an IOB
- Terminate communications

REQUIREMENTS

To write your own communications program using assembler language, you need both the Communications Utilities licensed program and the Assembler Language licensed program. The Communications Utilities licensed program provides the CAM; the Assembler Language licensed program provides the language compiler. The communications adapter must also be installed on your 5280 system.

Your program uses the full function BSC CAM, which is named "SYSBSCEX". You must use the Communications Load Utility to load the CAM into main storage; how to do this is explained in Chapter 2. The CAM requires a minimum partition size of at least 18K, and it should be loaded before your communications program.

To control execution of the CAM, a completed communications configuration record is required. This record is created using the Communications Configuration Utility, as explained in Chapter 2.

Your program must also meet any requirements unique to the system or subsystem with which it will communicate.

CODING YOUR PROGRAM

The .COMM control statement and assembler language communications instructions are used to write a program. The following overview of a BSC program shows the statements required to initiate the communications session, transmit or receive data, and terminate the session, in the order in which they should be executed.

```
        .
        .
        .
.COMM   CAM=BSC. . .
        .
        .
        .
      TINIT             BSC initialization
      TOPEN             Open an IOB for communications
        .               read/write operations
        .
        .
      TREAD             Receive data
       or                    or
      TWRT              Transmit data
        .
        .
        .
      TCLOZ             Close an IOB
      TTERM             Terminate communications between
                        your program and host program
```

Your program can include multiple .COMM statements (up to 15) to specify different input/output control blocks (IOBs). However, only one IOB can be open (using TINIT) at any given time; it must be closed (using TTERM) before a different IOB is opened. Once an IOB is open, your program can issue TOPEN, TCLOZ, TREAD, and TWRT instructions. Once a TREAD is issued, your program must continue reading (that is, receiving records) until an end-of-data (completion code 5609) or an error occurs. If the TYPE parameter is COM (read/write in any order), it is not necessary to close an IOB when switching from reading to writing (or writing to reading). If the TYPE parameter is on, it is not necessary to close IOB when switching from writing to reading. However, if the TYPE parameter is SR or SW (sequential read or sequential write), this is not true. Different record sizes can be read or written during a session by modifying the record size before issuing a TOPEN.

Each session starts with a TINIT and ends with TTERM. A TINIT must be followed by a TOPEN. The first TREAD, TWRT or TCTL instruction after the TINIT and TOPEN is the instruction which causes the line connection to be established.

TTERM terminates the line connection between your program and the host program. For a switched line, the physical line connection is dropped; for a non-switched point to point line, the logical connection between your program and the host program is terminated. For a multipoint line connection the line connection will be terminated by causing the CAM to exit its partition or on certain error conditions.

External Status Processing

Your user program must contain an external status routine or routines to receive completion information from the Communications Access Method (CAM). This is specified on your .COMM control statement by using either the ELAB or ETAB parameter. You must use the ETAB parameter if you code a .LABTAB control statement. Your external status routine is invoked whenever the CAM detects an exception condition or an error. For more information on

external error processing see *IBM 5280 Assembler Reference Manual*, SC21-7790 and *System Concepts*, GA21-9352.

Completion codes other than normal completion are reported by the CAM to the user program by external status to the routine specified on the ELAB parameter, or to the appropriate routine.

If the ELAB parameter on the .COMM was specified, the external status routine can check for the external status condition at displacement X'0F' and the specific completion code at displacement X'04' in the communications IOB generated by the .COMM statement.

If the ETAB parameter on the .COMM was specified, the external status condition is used as an index into the .LABTAB to inboke the appropriate external status routine. The external status routine can check the specific completion code at displacement X'04' in the communications IOB.

See the *5280 Data Areas and Diagnostic Handbook* for a complete layout of the communications IOB. Appendix H contains some of the external status conditions and completion codes returned by the CAMs and which you will need to know when coding your GAL program.

.COMM Control Statement

The .COMM control statement specifies the characteristics of the communications session to be established. It generates the communications IOB, which contains the information necessary for the CAM to perform I/O requests for your program.

The communications IOB resides in the same partition as your program; it can be addressed by the LABEL parameter of .COMM. The result of each communications I/O instruction is posted in the IOB. The external status code is byte 15 (displacement X'0F') and is only valid when the external status indicator (bit 3 of byte 0) is on; the completion code is bytes 4–5 (displacement X'04'). The status message error indicator, if any, is posted in bytes 76–77 (displacement X'4C'). For the complete layout of the communications IOB, see the *5280 Data Areas and Diagnostic Handbook*. The format of the .COMM control statement is:

```
.COMM    CAM=BSC    DSN=nn      RECL=nn    [RECFM={F|V|FB|VB}]
[BSIZ=nn]    LBUF=xx    TYPE={COM|SR|SW|CN}    [CB|'BT]
[LABEL=xx]    {ELAB=xx|ETAB=xx}    [SIDL=xx]    [SIDH=xx]
[HTAB=xx]    [VTAB=xx]
```

The .COMM statement must begin in column one with a period (.). The parameters may be entered in any order but must be separated by blanks. An equal sign is used to separate a parameter name from its value. In the above format, brackets ([ ]) indicate that the parameter is optional, and braces ({ }) indicate that you must use one of the parameters enclosed within the braces. Neither brackets nor braces are entered as part of the statement. Numeric values can be entered as decimal data or hexadecimal data; hexadecimal data is denoted by X' '. The parameters in the .COMM statement are explained below.

Parameter Name	Description
CAM	Defines the CAM as either SNA or BSC. This parameter must be entered as 'CAM=BSC'. The default is BSC.
DSN	Identifies the IOB being declared. This is a mandatory parameter. The valid range is 1–15.
RECL	Specifies the length (in bytes) of the logical I/O buffer (see LBUF parameter). When the 5280 is receiving data, the CAM uses the RECL value to determine the maximum record or block length that your program can accept. When transmitting, the RECL value is the number of bytes passed to the CAM for each TWRT. This is a mandatory parameter. The valid range is 1–512.
RECFM	Specifies the record format of data to be transmitted or received. The valid entries are: RECFM=F Fixed length unblocked RECFM=V Variable length unblocked RECFM=FB Fixed length blocked RECFM=VB Variable length blocked (transmit only) Variable length blocked implies that either IRS or ITB characters will be used to delimit the end of a record; this should be specified in the communications configuration record (see prompts B9 and B10 of SYSCCU). This is an optional parameter; the default is fixed length unblocked.
BSIZ	Specifies the block size of data to be transmitted or read with a read block command. If you specified FB or VB for the RECFM parameter, you should either include the BSIZ parameter or ensure that the block size is specified in the communications configuration record (see prompt B11 of SYSCCU). If the BSIZ parameter is included in the .COMM statement, it overrides the value in the configuration record. This parameter is optional. The valid range is 0–512; 0 is valid only for unblocked format. In this case, the value in the communications configuration record is used for the blocksize.

Parameter Name	Description
LBUF	Specifies the label of the logical I/O buffer. This is a mandatory parameter.
TYPE	Specifies attributes of the data to be processed. Two values for the TYPE parameter can be entered. The first value, which is mandatory, specifies the type of data to be processed; valid entries are: COM — Read and/or write in any order SR — Sequential read SW — Sequential write CN — Conversational (write one message, receive one or many replies) The second value, which is optional, involves blank compression and blank truncation. These attributes can also be specified in the communications configuration record (see prompts B13 and B14 of SYSCCU). If included in the TYPE parameter, they override the values in the configuration record. Valid entries are: CB — Expand blank-compressed data that is received (5280 BSC does not transmit compressed data) BT — Truncate trailing blanks in data to be sent (using IRS or ITB characters for blocked data) and insert trailing blanks in data received If you enter two values for the TYPE parameter, they must be separated by a comma, such as: TYPE=CN,BT.
LABEL	Specifies the label of the IOB. This is an optional parameter. If this parameter is not entered, the IOB is assumed to not have a label.
ELAB	Specifies the label of the routine set up to process external status codes. This is an optional parameter.
ETAB	Specifies the label of the table set up to process external status codes. If ETAB is used, the external status code is used as an index to go to the proper error handling routine. This is an optional parameter. *Note:* Either ELAB or ETAB *must* be included in the .COMM statement, but not both.
SIDL	Specifies the label of a hex character string which contains the length of and the terminal ID. This is an optional parameter. If specified, SIDL overrides the terminal ID included in the communications configuration record (see prompt B4 of SYSCCU).

Parameter Name	Description
SIDH	Specifies the label of a hex character string which contains the length of and the host ID. This is an optional paramater. If specified, SIDH overrides the host ID included in the communications configuration record (see prompt B5 of SYSCCU). *Note:* SIDL and SIDH are applicable only when the communications line is point-to-point switched. If included, SIDL and SIDH must be coded in the format XYYY...Y. X is a one byte binary number which specifies the length of the character string that follows; the valid range is X'01'–X'0F'. YYY...Y is the character string of the host ID or terminal ID.
HTAB	Specifies the label of the horizontal tab table to be used to process print data streams. This is an optional parameter.
VTAB	Specifies the label of the vertical tab table to be used to process print data streams. This is an optional parameter. *Note:* If the data stream to be received contains 3741 or 3780 print control characters, HTAB and VTAB should be specified. If these parameters are specified, conversion of printer control characters will be made.

Communications Instructions

The following are the assembler language communications instructions. The operands for all instructions must be enclosed in parentheses.

TINIT

This instruction establishes a link between your communications program and the CAM. The switched line ID is the only configuration parameter that is overriden at TINIT. TINIT must be the first communications instruction included in your program, and must be followed by a TOPEN instruction. The format of TINIT is:

Mnemonic	Operand
TINIT	(dsn)

The value entered for dsn must be the same as that entered for the DSN parameter of the appropriate .COMM statement. The valid range is 1–15.

TOPEN

This instruction establishes the beginning of transmit and/or receive operations and causes .COMM parameter overrides of communications configuration record values to be processed. All overrides of configuration record parameters

remain in effect until TTERM is issued; the contents of the configuration record are not changed. It must be issued before any TREAD, TWRT or TCTL instruction for each IOB. A TOPEN instruction must be followed at some later point in your program by a TCLOZ or TTERM instruction. The format of TOPEN is:

Mnemonic	Operand
TOPEN	(dsn)

The value entered for dsn must be the same as that entered for the DSN parameter of the appropriate .COMM statement. The valid range is 1–15.

TCLOZ

This instruction signifies the end normal of communications operations. Any IOB that is open (using TOPEN) must be closed using TCLOZ or TTERM (abnormal termination) before another TOPEN is issued. The format of TCLOZ is:

Mnemonic	Operand
TCLOZ	(dsn)

The value entered for dsn must be the same as that entered for the DSN parameter of the appropriate .COMM statement. The valid range is 1–15.

TREAD

The TREAD instruction causes the CAM to transfer data (a record or a block) received from the host into the logical I/O buffer (LBUF parameter of .COMM). Your program should continue to issue TREAD instructions until an end-of-data or other appropriate completion code is returned. The format of TREAD is:

Mnemonic	Operands
TREAD	(dsn,[fmt],[op3],[mode],[op5])

The operands are described below.

Operand	Description
dsn	Identifies the IOB to be used. This value must be the same as that entered for the DSN parameter of the appropriate .COMM statement. The valid range is 1–15. This operand is mandatory.
fmt	Specifies formatting of the input record. Either normal formatting, data-directed formatting or no formatting can be used. For normal formatting, enter the label of the format to be used. This label must correspond to the LABEL parameter of the .FMTST control statement that started the edit format definition. For data-directed formatting,

Operand	Description
	enter an asterisk (*). For no formatting, omit this operand by entering a comma; this is the default.
op3	Specifies that data (a record or a block) or status is to be read. To read data, omit this operand by entering a comma. If no data is available to be read, the program waits until data is available. To read status, enter a minus sign (–). If data to be read is not available, completion code 5601 will be posted, and the program will continue processing with the next sequential instruction.
mode	Specifies either overlapped or non-overlapped mode of operation. Enter '0' for overlapped; this causes successive instructions to be executed concurrently with the TREAD instruction. Overlapped mode is recommended because it prevents keyboard lockouts. If you specify overlapped, the TREAD instruction must be followed by TWAIT. Enter 'N' for non-overlapped; this causes the TREAD operation to be completed before successive instructions are executed. This is an optional operand, and non-overlapped is the default.
op5	Specifies whether to read a logical record or a block. To read the next logical record, omit this operand; this is the default. Read block and read record should not be inserted in the same operation. Enter a minus sign (–) to read the entire block. For IRS blocking the entire block, including the IRS characters, are returned. For ITB blocking, one ITB block is returned. This is an optional operand.

TWRT

This instruction causes a record to be transmitted from the logical I/O buffer (LBUF parameter of .COMM) to the host. The format of TWRT is:

Mnemonic	Operands
TWRT	(dsn,[fmt],op3,[mode],[op5])

The operands are described below.

Operand	Description
dsn	Identifies the IOB to be used. This value must be the same as that entered for the DSN parameter of the appropriate .COMM statement. The valid range is 1–15. This operand is mandatory.

fmt — Specifies formatting of the data prior to the write from registers to the logical I/O buffer. Either normal formatting or no formatting can be used.

To format the data, enter the label of the format to be used. This label must correspond to the LABEL parameter of the .FMTST that started the edit format definition. For no formatting, omit this operand by entering a comma; this is the default.

op3 — Not used in BSC. Enter a comma for this operand.

mode — Specifies either overlapped or non-overlapped mode of operation. Enter 'O' for overlapped; this causes successive instructions to be executed concurrently with the TWRT instruction. Overlapped mode is recommended because it prevents keyboard lockouts. If you specify overlapped, the TWRT instruction must be followed by TWAIT.

Enter 'N' for non-overlapped; this causes the TWRT operation to be completed before successive instructions are executed. This is an optional operand, and non-overlapped is the default.

op5 — Specifies whether or not the input/output buffer is blanked at the start of the operation; this operand is used in conjunction with a formatted TWRT. Enter 'B' to blank the buffer. Omit this operand if the buffer is not to be blanked; this is the default.

TWAIT

This instruction ensures that each communications I/O operation is completed before the next sequential instruction in your program is executed. This instruction is generally used in conjunction with overlapped instructions. The format of TWAIT is:

Mnemonic	**Operand**
TWAIT	(dsn)

The value entered for dsn must be the same as that entered for the DSN parameter of the appropriate .COMM statement. The valid range is 1–15.

TCTL

The TCTL instruction allows you to perform certain control operations. The format of TCTL is:

Mnemonic	**Operands**
TCTL	(dsn,op2,[mode])

The operands are described below.

Operand	Description
dsn	Identifies the IOB being used. This value must be the same as that entered for the DSN parameter of the appropriate .COMM statement. The valid range is 1–15. This operand is mandatory.
op2	Specifies the control operation to be performed. This operand is mandatory; valid entries are: X'0100' Write status X'0300' Transmit EOT (only used to initiate the premature termination of a transmit or receive operation) X'0400' Transmit RVI X'0500' Transmit header (SOH-heading-STX) (See Note) X'0600' Transmit header (SOH-heading-ETB) (See Note) X'0700' Transmit header (SOH-heading-ITB) (See Note) X'0800' Transmit header (SOH-heading-STX-ETX) (See Note) X'0900' Execute wrap test X'0A00' Transmit online test message X'0B00' Receive online test message X'0001' Set compression (expand blank-compressed data that is received) X'0002' Reset compression (do not expand blank-compressed data) X'0003' Set transparent mode (transmit in transparent mode) X'0004' Reset transparent mode (do not transmit in transparent mode) X'0005' Set trace (on) X'0006' Reset trace (off) *Note:* SOH should not be transmitted following a transmission block ending with ETB or ITB.
mode	Specifies either overlapped or non-overlapped mode of operation. Enter '0' for overlapped; this causes successive instructions to be executed concurrently with TCTL. Overlapped mode is recommended because it prevents keyboard lockouts. If you specify overlapped, the TCTL instruction must be followed by TWAIT. Enter 'N' for non-overlapped; this causes the TCTL operation to be completed before successive instructions are executed. This is an optional operand, and non-overlapped is the default.

TTERM

For point to point connections, this instruction terminates the logical connection between your 5280 communications program and the terminal or system with which your program was communicating. TTERM can be used instead of TCTL (transmit EOT) to abort an operation. For this purpose, a TCLOZ should not be issued first. The CAM remains in its background partition and is available for use by other programs. The format of TTERM is:

Mnemonic	Operand
TTERM	(dsn)

The value entered for dsn must be the same as that entered for the TINIT instruction. The valid range is 1–15.

SAMPLE BSC PROGRAM

```
.TITLE INIT='SAMPLE BSC USER INTERFACE PROGRAM';
*****************************************************************
*  THIS SAMPLE PROGRAM RECEIVES 128 BYTE RECORDS FROM A         *
*  HOST IN THE FOLLOWING FORMAT                                 *
*                                                               *
*  COL 1          5          8          13                     *
*       EMPLOYEE  DEPT       STOCK      PRICE                  *
*       NUMBER    NUMBER     NUMBER                            *
*                                                               *
*  EACH RECORD REPRESENTS A SALE AN EMPLOYEE HAS MADE. THE      *
*  PROGRAM SELECTS ONLY THE RECORDS THAT PERTAIN TO EMPLOYEE    *
*  NUMBER 100 AND WRITES THESE RECORDS TO A DISKETTE FILE.      *
*                                                               *
*  THE FOLLOWING DATA SHOULD BE SENT FROM THE HOST.             *
*                                                               *
*  EMP NO.      DEPT NO.      STOCK NO.      PRICE              *
*   100           31            3791         8.50              *
*   200           24            4286        13.75              *
*   100           31            3121         3.95              *
*   300           04            8070        14.50              *
*   300           08            7729         7.00              *
*   100           28            1377         2.99              *
*   200           21            5540        25.00              *
*                                                               *
*  THE SYSBSCEX CAM MUST BE LOADED INTO A BACKGROUND            *
*  PARTITION PRIOR TO EXECUTING THIS PROGRAM. THE PROGRAM       *
*  MAY BE EXECUTED IN A FOREGROUND OR BACKGROUND PARTITION.     *
*  A DISKETTE WITH DATA SET NAME = EMPSALES AND RECORD          *
*  LENGTH = 128, SHOULD BE MOUNTED ON DISKETTE DRIVE 4000       *
*  TO RECEIVE THE DATA. AFTER EXECUTING THIS PROGRAM, DSN =     *
*  EMPSALES SHOULD CONTAIN 3 RECORDS.                           *
*                                                               *
*****************************************************************
.START PNAM='SAMPLE'  ENTRY=ENTRYPT;
*****************************************************************
*  KEYBOARD/CRT IOB                                             *
*****************************************************************
.KBCRT  CRBA=CBUF  PRBA=CBUF  ELAB=KBEXST;
*****************************************************************
*  COMMON FUNCTION AREA INTERFACE TO DISPLAY SYSTEM             *
*  LOAD PROMPT                                                  *
*****************************************************************
.XTRN  LABEL=CFLOAD01;
*****************************************************************
```

```
*  BACKGROUND/FOREGROUND INDICATOR                              *
****************************************************************
.EQUATE IND=(I110,BACKGRND);
****************************************************************
*  DISKETTE INDICATORS                                         *
****************************************************************
.EQUATE IND=(I0,DSERRIND);          DISKETTE ERROR INDICATOR
.EQUATE IND=(I3,DSOPENED);          DISKETTE DATA SET OPENED
*                                   INDICATOR
****************************************************************
*  CAM INDICATORS                                              *
****************************************************************
.EQUATE IND=(I1,EOTIND);            END OF TRANSMISSION
*                                   INDICATOR
.EQUATE IND=(I2,EOFIND);            END OF FILE INDICATOR
.EQUATE IND=(I4,CMERRIND);          CAM ERROR INDICATOR
.EQUATE IND=(I5,INITISUE);          TINIT ISSUED INDICATOR
****************************************************************
*  ADDRESS REGISTER FOR 64 BYTE SAVE AREA FOR CFLOAD01 CALL    *
****************************************************************
.EQUATE REG=(BR32,CFSAVREG);
****************************************************************
*  NUMERIC EQUATES                                             *
****************************************************************
.EQUATE NUMB=(X'40',BLANK);         EBCDIC BLANK
.EQUATE NUMB=(X'04',ERCODFLD);      IOB OFFSET TO
*                                   COMPLETION CODE FIELD
.EQUATE NUMB=(x'11',CLEAROP);       CLEAR OPERATION FOR KEYOP
****************************************************************
*  BINARY REGISTERS                                            *
****************************************************************
.DC LABEL=BINCODE TYPE=BIN;         BINARY COMPLETION CODE
.DC LABEL=CAMIOBAD TYPE=BIN INIT=ADDR(CAMIOB); ADDRESS OF
*                                   CAMIOB
.DC LABEL=CAMBFADR TYPE=BIN INIT=ADDR(CAMBUF); ADDRESS OF CAM
*                                   CAM I/O BUFFER
.DC LABEL=DSKBFADR TYPE=BIN INIT=ADDR(DISKBUF); ADDRESS OF
*                                   DISKETTE BUFFER
.DC LABEL=DSKIOBAD TYPE=BIN INIT=ADDR(DISKIOB); ADDRESS OF
*                                   DISKETTE IOB
.DC LABEL=ESTMSGAD TYPE=BIN INIT=ADDR(ESTCONN) ; ADDRESS OF
                                    ESTABLISH CONNECTION MESSAGE
.DC LABEL=ESTMSGLN TYPE=BIN INIT=32; LENGTH MINUS ONE OF
                                    ESTABLISH CONNECTION MESSAGE
.DC LABEL=ROWCOL   TYPE=BIN INIT=X'0201'; ROW AND COLUMN WHERE
                                    ESTABLISH CONNECTION MESSAGE
                                    WILL BE DISPLAYED ON SCREEN
.DC LABEL=CLEARFUN TYPE=BIN INIT=X'0029'; CLEAR SCREEN KEYBOARD
                                    FUNCTION FOR KEYOP
****************************************************************
*  DECIMAL REGISTERS                                           *
****************************************************************
.DC LABEL=COMPCODE TYPE=DEC;        EBCDIC COMPLETION CODE
.DC LABEL=TESTREG TYPE=DEC;         TEST REGISTER
.DC LABEL=EMP#1 TYPE=DEC INIT='100';  EMPLOYEE NUMBER BEING
*                                   SELECTED
****************************************************************
*  STORAGE DEFINITIONS                                         *
****************************************************************
.DC LABEL=EBCDCODE TYPE=STOR LEN=4; EBCDIC COMPLETION CODE
.DC LABEL=CBUF     TYPE=STOR LEN=40 INIT=' '; CURRENT RECORD
*                                   BUFFER
.DC LABEL=DISKBUF  TYPE=STOR LEN=128 LEVL=1 BDY=128; LOGICAL
*                                   DISKETTE BUFFER
.DC LABEL=EMPNUM   LEN=3  LEVL=2;   EMPLOYEE NUMBER
.DC LABEL=PDISKBUF TYPE=STOR LEN=1024 BDY=128; PHYSICAL
```

```
*                                       DISKETTE BUFFER
.DC LABEL=CAMBUF  TYPE=STOR  LEN=128; CAM I/O BUFFER
.DC LABEL=DSNNAME TYPE=STOR LEN=9 INIT='EMPSALES '; DATASET
*                                       NAME
.DC LABEL=SAVEAREA TYPE=STOR LEN=64; REGISTER SAVE AREA FOR
                                        CALL TO CFLOAD01
*****************************************************************
*  PROMPT MESSAGE DEFINITIONS                                   *
*****************************************************************
.DC LABEL=ENDMSG TYPE=PRMT LEN=38 LEVL=1;
.DC LABEL=ENDMSG1 LEN=32 LEVL=2
   INIT='SAMPLE PROGRAM HAS COMPLETED EXE';
.DC LABEL=ENDMSG2 LEN=6 LEVL=2
   INIT='CUTION';
.DC LABEL=ERRMSG TYPE=PRMT LEN=41 LEVL=1
.DC LABEL=ERRMSG1 LEN=32 LEVL=2
   INIT='PROGRAM TERMINATED DUE TO ERROR ';
.DC LABEL=ERRMSG2 LEN=5 LEVL=2
   INIT='CODE ';
.DC LABEL=ERRMSG3 LEN=4 LEVL=2
.DC LABEL=PRESENTR TYPE=PRMT LEN=11
   INIT='PRESS ENTER';
.DC LABEL=ESTCONN  TYPE=PRMT LEN=33
   INIT='ESTABLISH CONNECTION IF NECESSARY';
*****************************************************************
*  SCREEN FORMAT DEFINITIONS                                    *
*****************************************************************
.SFMTST LABEL=ENDPRMT CNTL=CS,MV;
.SFMTPMT PRMT=SP,ENDMSG CSPS=NL;    SAMPLE PROGRAM HAS
*                                   COMPLETED EXECUTION
.SFMTFLD FLDF=A,1 CSPS=1;           DUMMY FIELD
.SFMTPMT PRMT=SP,PRESENTR CSPS=84; PRESS ENTER
.SFMTEND;
.SFMTST LABEL=ERRPRMT CNTL=CS,MV;
.SFMTPMT PRMT=SP,ERRMSG CSPS=NL;    PROGRAM TERMINATED DUE TO
*                                   ERROR CODE XXXX
.SFMTFLD FLDF=A,1 CSPS=1;           DUMMY FIELD
.SFMTPMT PRMT=SP,PRESENTR CSPS=84; PRESS ENTER
.SFMTEND'
*****************************************************************
*  DISKETTE DATASET DEFINITION                                  *
*****************************************************************
.DATASET DSN=1 NAME=DSNNAME RECL=128 BSIZ=0
    DEV=X'4000' LBUF=DISKBUF PB1=PDISKBUF
    TYPE=SW,ERS ELAB=DSKEXST LABEL=DISKIOB;
*****************************************************************
*  COMMUNICATION LINE DEFINITION                                *
*****************************************************************
.COMM CAM=BSC DSN=2 RECL=512 RECFM=F LBUF=CAMBUF
    TYPE=SR  ETAB=CAMEXSTB  LABEL=CAMIOB;
*****************************************************************
*  TABLE OF SUBROUTINES FOR CAM EXTERNAL STATUS                 *
*****************************************************************
.LABTAB  LABEL=CAMEXSTB  ENTRY=ENDCEXST,CAMERROR,EOFRCV,
  ENDCEXST,EOTRCVD,ENDCEXST,ENDCEXST,ENDCEXST,ENDCEXST,
  CAMERROR,CAMERROR,ENDCEXST,CAMERROR,CAMERROR,ENDCEXST;
ENTRYPT:;                           PROGRAM ENTRY POINT
    CFSAVREG=ADDR(SAVEAREA);        LOAD ADDREsS OF 64 BYTE
                                    REGISTER SAVE AREA FOR
                                    CALL TO CFLOAD01 ROUTINE
    SOFF(DSERRIND);                 TURN DISKETTE ERROR IND OFF
    SOFF(INITISUE);                 TURN TINIT ISSUED IND OFF
    SOFF(CMERRIND);                 TURN CAM ERROR IND OFF
    TINIT(2);                       INITIALIZE COMMUNICATIONS
*                                   IOB
    IFI CMERRIND IS ON GOTO DSERR; BRANCH IF CAM ERROR
```

```
    SON(INITISUE);                  TURN TINIT ISSUED IND ON
    SOFF(EOTIND);                   TURN END OF TRANSMISSION
*                                   IND OFF
    CRTMM(ROWCOL,ESTMSGAD,ESTMSGLN, ); DISPLAY ESTABLISH
                                    CONNECTION MESSAGE
UNTILEOT:;
    TOPEN(2);                       OPEN COMMUNICATIONS IOB
    IFI CMERRIND IS ON GOTO DSERR; BRANCH IF CAM ERROR
    TREAD(2);                       RECEIVE DATA INTO CAM I/O
*                                   BUFFER
    KEYOP(CLEAROP CLEARFUN);        CLEAR SCREEN AFTER TREAD
    IFI CMERRIND IS ON GOTO DSERR; BRANCH IF CAM ERROR
    IFI EOTIND IS ON GOTO EOTRCV;  BRANCH IF EOT RECEIVED
    SOFF(DSOPENED);                 TURN DATASET OPENED IND OFF
    OPEN(1);                        OPEN DISKETTE DATASET
    IFI DSERRIND IS ON GOTO DSERR; BRANCH IF DISKETTE ERROR
    SON(DSOPENED);                  TURN DATASET OPENED IND ON
UNTILEOF:;
    DISKBUF=BLANK;                  BLANK OUT FIRST BYTE OF
*                                   DISKETTE BUFFER
    DUP(0,DSKBFADR,127);            BLANK OUT REST OF DISKETTE
*                                   BUFFER
    MVC(DSKBFADR,CAMBFADR,128);     MOVE RECORD FROM CAM BUFFER
*                                   TO DISKETTE BUFFER
    TESTREG=EMPNUM;                 GET EMPLOYEE NUMBER
    IF TESTREG NE EMP#1 GOTO NOTEMP#1; BRANCH IF NOT EMPLOYEE
*                                   #1
    WRT(1,,0,N);                    WRITE RECORD TO DISKETTE
*                                   DATASET
    IFI DSERRIND IS ON GOTO DSERR; BRANCH IF DISKETTE ERROR
NOTEMP#1:;
    TREAD(2);                       RECEIVE DATA INTO CAM I/O
*                                   BUFFER
    IFI CMERRIND IS ON GOTO DSERR; BRANCH IF CAM ERROR
    IFI EOFIND NOT ON GOTO UNTILEOF; BRANCH IF END OF FILE
*                                   NOT RECEIVED
    CLOZ(1);                        CLOSE DISKETTE DATASET
    IFI DSERRIND IS ON GOTO DSERR; BRANCH IF DISKETTE ERROR
EOTRCV:;
    TCLOZ(2);                       CLOSE COMMUNICATIONS IOB
    IFI CMERRIND IS ON GOTO DSERR; BRANCH IF CAM ERROR
    IFI EOTIND NOT ON GOTO UNTILEOT; BRANCH IF END OF
*                                   TRANSMISSION NOT RECEIVED
    TTERM(2);                       TERMINATE COMMUNICATIONS
    ENTR(ENDPRMT);                  DISPLAY PGM EXECUTION
*                                   COMPLETED MESSAGE
    GOTO ENDPGM;                    BRANCH TO EXIT INSTRUCTION
DSERR:;
    ENTR(ERRPRMT);                  DISPLAY PGM TERMINATED DUE
*                                   TO ERROR MESSAGE
ENDPGM:;
    IFI BACKGRND IS ON GOTO EXITBACK; BRANCH IF IN BACKGROUND
*                                   PARTITION
FGPART:;
    CALL CFLOAD01;                  DISPLAY SYSTEM LOAD PROMPT
    GOTO FGPART;                    REPEAT UNTIL OVERLAID
EXITBACK:;
    EXIT;                           EXIT BACKGROUND PARTITION
CAMERROR:;
    SON(CMERRIND);                  TURN CAM ERROR IND ON
    BINCODE=ERCODFLD(2,CAMIOBAD);  GET CAM COMPLETION CODE
    BINHEX(EBCDCODE,BINCODE);       CONVERT FROM BINARY TO
*                                   EBCDIC
    COMPCODE=EBCDCODE;              LOAD COMPLETION CODE INTO
*                                   DECIMAL REGISTER
    ERRMSG3(4)=COMPCODE;            LOAD ERROR CODE INTO ERROR
```

```
*                                   MSG FIELD
    IFI INITISUE NOT ON GOTO ENDCEXST; BRANCH IF TINIT HAS NOT
*                                   BEEN ISSUED
    TTERM(2);                       TERMINATE COMMUNICATIONS
    GOTO ENDCEXST;                  BRANCH TO END OF ROUTINE
EOFRCV:;
    SON(EOFIND);                    TURN END OF FILE IND ON
    GOTO ENDCEXST;                  BRANCH TO END OF ROUTINE
EOTRCVD:;
    SON(EOTIND);                    TURN END OF TRANSMISSION
*                                   IND ON
ENDCEXST:;
    RETURN;                         RETURN
DSKEXST:;                           DISKETTE EXTERNAL STATUS
*                                   ROUTINE
    SON(DSERRIND);                  TURN DISKETTE ERROR IND ON
    BINCODE=ERCODFLD(2,DSKIOBAD);   GET DISKETTE ERROR CODE
    BINHEX(EBCDCODE,BINCODE);       CONVERT FROM BINARY TO
*                                   EBCDIC
    COMPCODE=EBCDCODE;              LOAD ERROR CODE INTO
*                                   DECIMAL REGISTER
    ERRMSG3(4)=COMPCODE;            LOAD ERROR CODE INTO ERROR
*                                   MSG FIELD
    IFI DSOPENED NOT ON GOTO DSCLOSED; BRANCH IF DISKETTE DS
*                                   NOT OPENED
    CLOZ(1);                        CLOSE DISKETTE DATASET
DSCLOSED:;
    TTERM(2);                       TERMINATE COMMUNICATIONS
    RETURN;                         RETURN
KBEXST:;                            KEYBOARD EXTERNAL STATUS
*                                   ROUTINE
    RETEXT;                         RESET EXTERNAL STATUS AND
*                                   RETURN
.END;                               END OF SAMPLE BSC USER
*                                   INTERFACE PROGRAM
```

SNA Programming with Assembler Language

You can write an SNA program using assembler language to communicate with the following host subsystems:

- DOS/VS CICS/VS
- OS/VS1 CICS/VS
- OS/VS2 CICS/VS
- OS/VS1 IMS/VS
- OS/VS2 IMS/VS

Up to four programs can communicate concurrently with the same host subsystem. Each program requires its own partition, and all programs share the same communications access method.

The SNA/SDLC support for your program includes:

- Establishing the data link connection
- Sending and receiving data
- Disconnecting the data link
- Providing most data link error recovery procedures

Your program interfaces with the SNA user interface communications access method (CAM) to perform data transfers. The CAM enforces SNA protocol and performs network functions and most error recovery. Your program interfaces to the CAM via communications instructions and one control statement. The functions supplied to your program are:

- Specify characteristics of the communications device
- Establish an LU-LU session
- Open an input/output control block (IOB) for communications read/write operations
- Read a logical record
- Write a logical record
- Wait on I/O completion
- Close an IOB
- Terminate the LU-LU session

REQUIREMENTS

To write your own communications program using assembler language, you need both the Communications Utilities licensed program and the Assembler Language licensed program. The Communications Utilities licensed program provides the CAM; the Assembler Language licensed program provides the language compiler. The communications adapter and the elapsed time counter features must also be installed on your 5280 system.

Your program uses the SNA user interface CAM, which is named "SYSSNAU". You must use the Communications Load Utility to load the CAM into main storage; how to do this is explained in Chapter 2. The CAM requires a partition size of at least 22K, and it should be loaded before your communications program.

To control execution of the CAM, a completed communications configuration record is required. This record is created using the Communications Configuration Utility, as explained in Chapter 2.

Your program must also meet any requirements unique to the host computer and host subsystem with which it will communicate. VTAM, NCP and host sysgen parameters must be coordinated to ensure that your 5280 system is properly defined to the host.

CODING YOUR PROGRAM

The .COMM control statement and assembler language communications instructions are used to write a program. The following overview of an SNA program illustrates the statements required to establish an LU-LU session, transmit or receive data, and terminate the LU-LU session, in the order in which they should be executed.

```
        .
        .
        .
.COMM CAM=SNA. . .
        .
        .
        .
      TINIT             Establish an LU-LU session
      TOPEN             Open an IOB for communications
        .               read/write operations
        .
        .
      TREAD             Receive data
       or                    or
      TWRT              Transmit data
        .
        .
        .
      TCLOZ             Close an IOB
      TTERM             Terminate LU-LU session
```

Your program can include multiple .COMM statements (up to 15) to specify different input/output control blocks (IOBs). However, only one IOB can be open (using TOPEN) at any given time; it must be closed (using TCLOZ) before a different IOB is opened. Once an IOB is open, your program can issue

TREAD and TWRT instructions. Once a TREAD is issued, your program must continue reading (that is, receiving records) until an end-of-data (completion code 4619 or 4620) or an error occurs. It is not necessary to close an IOB when switching from reading to writing (or writing to reading).

Your program should include only one TINIT and one TTERM instruction. The TINIT instruction causes the LU-LU session to be established; the line connection is also established, if necessary. A TINIT must be followed by a TOPEN; after TINIT is issued, any IOB defined in a .COMM statement, including the IOB specified for the TINIT, can be opened and used for processing.

TTERM terminates the LU-LU session. On a switched line, TTERM indicates to the host that it should terminate the line connection. If multiple LU-LU sessions have been established, the host does not bring down the line until the last 5280 program issues TTERM. To terminate the line connection on a non-switched line, attach the keyboard to the CAM partition, and then issue the End of Job command key sequence (see "Removing CAM from a Partition" in Chapter 8). If multiple LU-LU sessions have been established, do not terminate the line connection until the last program has issued TTERM.

External Status Processing

Your user program must contain an external status routine or routines to receive completion information from the Communications Access Method (CAM). This is specified on your .COMM control statement by using either the ELAB or ETAB parameter. You must use the ETAB parameter if you code a .LABTAB control statement. Your external status routine is invoked whenever the CAM detects an exception condition or an error. For more information on external error processing see *IBM 5280 Assembler Reference Manual*, SC21-7790 and *System Concepts*, GA21-9352.

Completion codes other than normal completion are reported by the CAM to the user program by external status to the routine specified on the ELAB parameter, or to the appropriate routine.

If the ELAB parameter on the .COMM was specified, the external status routine can check for the external status condition at displacement X'0F' and the specific completion code at displacement X'04' in the communications IOB generated by the .COMM statement.

If the ETAB parameter on the .COMM was specified, the external status condition is used as an index into the .LABTAB to invoke the appropriate external status routine. The external status routine can check the specific completion code at displacement X'04' in the communications IOB.

See the *5280 Data Areas and Diagnostic Handbook* for a complete layout of the communications IOB. Appendix H contains some of the external status conditions and completion codes returned by the CAMs and which you will need to know when coding your GAL program.

.COMM Control Statement

The .COMM control statement specifies the characteristics of the communications session to be established. It generates the communications IOB, which contains the information necessary for the CAM to perform I/O requests for your program.

The communications IOB resides in the same partition as your program; it can be addressed by the LABEL parameter of .COMM. The result of each communications I/O instruction is posted in the IOB. The external status code is byte 15 (displacement X'0F') and is valid only when the external status indicator (bit 3 of byte 0) is on; the completion code is bytes 4–5 (displacement X'04'). The sense code, if any, is posted in bytes 62–63 (displacement X'3E'). For the complete layout of the communications IOB, see the *5280 Data Areas and Diagnostic Handbook*. The format of the .COMM control statement is:

```
.COMM    CAM=SNA    DSN=nn      RECL=nn   [BSIZ=nn]
LBUF=xx  TYPE=COM   [LABEL=xx]  {ELAB=xx}
                                {ETAB=xx}
```

The .COMM statement must begin in column one with a period (.). The parameters may be entered in any order but must be separated by blanks. An equal sign is used to separate a parameter name from its value. In the above format, brackets ([ ]) indicate that the parameter is optional, and braces ({ }) indicate that you must use one of the parameters enclosed within the braces. Neither brackets nor braces are entered as part of the statement. Numeric values can be entered as decimal data or hexadecimal data; hexadecimal data is denoted by X' '. The parameters in the .COMM statement are explained below.

Parameter Name	Description
CAM	Defines the CAM as either BSC or SNA. This is a mandatory parameter which must be entered as 'CAM=SNA'.
DSN	Identifies the IOB being declared. This is a mandatory parameter. The valid range is 1–15.
RECL	Specifies the length (in bytes) of the logical I/O buffer (see LBUF parameter). This is a mandatory parameter. The valid range is 1–4096.
BSIZ	Specifies the block size of data to be transmitted to the host. This is an optional parameter; it can also be specified in the communications configuration record (see prompt S13 of SYSCCU). If the BSIZ parameter is included in the .COMM statement, it overrides the value in the configuration record. The valid range is 0–4096 bytes. To specify no blocking, enter a zero.

LBUF	Specifies the label of the logical I/O buffer. This is a mandatory parameter.
TYPE	Specifies attributes of the data to be processed. This parameter is mandatory and must be entered as TYPE=COM. This means that your program can read/write in any order, that is, transmit/receive in any order.
LABEL	Specifies the label of the IOB. This is an optional parameter. If this parameter is not entered, the IOB is assumed to not have a label.
ELAB	Specifies the label of the routine set up to process all external status codes. This is an optional parameter.
ETAB	Specifies the label of the table set up to process external status codes. If ETAB is used, the external status code is used as an index to go to the proper error handling routine. This is an optional parameter. *Note:* Either ELAB or ETAB *must* be included in the .COMM statement, but not both.

Communications Instructions

The following are the assembler language communications instructions. The operands for all instructions must be enclosed in parentheses.

TINIT

This instruction initializes communications, that is, it establishes the data link between the 5280 and the host system (if necessary) and establishes an LU-LU session. If logon is required by the host system, the logical buffer (LBUF parameter of .COMM) pointed to by the IOB must contain the logon data when TINIT is issued. TINIT must be the first communications instruction included in your program, and must be followed by a TOPEN instruction. The format of TINIT is:

Mnemonic	**Operand**
TINIT	(dsn)

The value entered for dsn must be the same as that entered for the DSN parameter of the appropriate .COMM statement. The valid range is 1–15.

TOPEN

This instruction establishes the beginning of transmit and/or receive operations. It must be issued before any TREAD or TWRT instruction for each IOB. A TOPEN instruction must be followed at some later point in your program by a TCLOZ instruction. The format of TOPEN is:

Mnemonic	Operand
TOPEN	(dsn)

The value entered for dsn must be the same as that entered for the DSN parameter of the appropriate .COMM statement. The valid range is 1–15.

TCLOZ

This instruction signifies the end of communications operations. Any IOB that is open (using TOPEN) must be closed (using TCLOZ) before another TOPEN for a different IOB is issued. The format of TCLOZ is:

Mnemonic	Operand
TCLOZ	(dsn)

The value entered for dsn must be the same as that entered for the DSN parameter of the appropriate .COMM statement. The valid range is 1–15.

TREAD

The TREAD instruction causes the CAM to transfer a record received from the host into the logical I/O buffer (LBUF parameter of .COMM). Your program should continue to issue TREAD instructions until an end-of-data or other appropriate completion code is returned. The format of TREAD is:

Mnemonic	Operands
TREAD	(dsn,[fmt],op3,[mode])

The operands are described below.

Operand	Description
dsn	Identifies the IOB to be used. This value must be the same as that entered for the DSN parameter of the appropriate .COMM statement. The valid range is 1–15. This operand is mandatory.
fmt	Specifies formatting of the input record. Either normal formatting, data-directed formatting or no formatting can be used. For normal formatting, enter the label of the format to be used. This label must correspond to the LABEL parameter of the .FMTST control statement that started the edit format definition. For data-directed formatting enter an asterisk (*). For no formatting, omit this operand by entering a comma; this is the default.
op3	Reserved. Enter a comma for this operand.
mode	Specifies either overlapped or non-overlapped mode of operation. Enter '0' for overlapped; this causes successive instructions to be executed concurrently with

Operand	Description
	the TREAD instruction. Overlapped mode is recommended because it prevents keyboard lockouts. If you specify overlapped, the TREAD instruction must be followed by TWAIT. Enter 'N' for non-overlapped; this causes the TREAD operation to be completed before successive instructions are executed. This is an optional operand, and non-overlapped is the default.

TWRT

This instruction causes a record to be transmitted from the logical I/O buffer (LBUF parameter of .COMM) to the host. The format of TWRT is:

Mnemonic	Operands
TWRT	(dsn,[fmt],[op3],[mode],[op5])

The operands are described below.

Operand	Description
dsn	Identifies the IOB to be used. This value must be the same as that entered for the DSN parameter of the appropriate .COMM statement. The valid range is 1–15. This operand is mandatory.
fmt	Specifies formatting of the data prior to the write from registers to the logical I/O buffer. Either normal formatting or no formatting can be used. To format the data, enter the label of the format to be used. This label must correspond to the LABEL parameter of the .FMTST that started the edit format definition. For no formatting, omit this operand by entering a comma; this is the default.
op3	Specifies the type of write. Enter 'F' for write final; this can be used to indicate the last write (that is, the last record to be transmitted) in a series of write operations. A write final causes the CAM to request positive notification from the host that the entire series of write operations has been successfully received by the host. For a normal write operation, omit this operand by entering a comma; this is the default.
mode	Specifies either overlapped or non-overlapped mode of operation. Enter 'O' for overlapped; this causes successive instructions to be executed concurrently with the TWRT instruction. Overlapped mode is recommended because it prevents keyboard lockouts. If you specify overlapped, the TWRT instruction must be followed by TWAIT.

Operand	Description
	Enter 'N' for non-overlapped; this causes the TWRT operation to be completed before successive instructions are executed. This is an optional operand and non-overlapped is the default.
op5	Specifies whether or not the input/output buffer is blanked at the start of the operation; this operand is used in conjunction with a formatted TWRT. Enter 'B' to blank the buffer. Omit this operand if the buffer is not to be blanked; this is the default.

TWAIT

This instruction ensures that each communications I/O operation is completed before the next sequential instruction in your program is executed. This instruction is generally used in conjunction with overlapped instructions. The format of TWAIT is:

Mnemonic	Operand
TWAIT	(dsn)

The value entered for dsn must be the same as that entered for the DSN parameter of the appropriate .COMM statement. The valid range is 1–15.

TTERM

This instruction terminates the LU-LU session between the 5280 and the host system. The CAM remains in its background partition and is available for use by other programs. The format of TTERM is:

Mnemonic	Operand
TTERM	(dsn)

The value entered for dsn must be the same as that entered for the TINIT instruction. The valid range is 1–15.

PROGRAMMING HINTS ON WRITING A GAL PROGRAM USING SNA

The SNA user interface CAM (SYSSNAU) provides a logical record level interface to allow transmission of data through a SNA network. This interface enables a user written 5280 GAL program to communicate with a host S/370 application program running under IMS or CICS. The protocol supported is the console stream of SNA LU type 1. Using this CAM, the 5280 user programs can transmit and receive messages up to 4096 bytes long.

Transmit Operations - Data Stream Support

5280 programs transmit data to the host applications by TWRT operations. Successive TWRT operations of variable lengths (1-4096 bytes) are supported. The SYSSNAU CAM inserts a new line (X'15') or forms feed (X'0C') character

at the end of each logical record as given to CAM by a TWRT.

The SNA character string (SCS) character inserted by SYSSNAU is determined as follows:

- A forms feed character is inserted if the logical record is the last one in a block as determined by the BLOCKSIZE parameter at TOPEN.
- A forms feed character is inserted if the logical record is the last one in a chain. A chain of records ends when a series of one or more TWRT operations ends with a TWRT(,,F), a TCLOZ, or a TREAD.
- A new line character is inserted if neither of the above conditions is applicable.

These SCS characters are used by IMS and CICS and their applications to delimit logical records. It's recommended that transmissions by 5280 programs not contain either of these characters embedded in the data. SYSSNAU does not check user data for any SCS characters. The user interface is intended only for graphic message transmission, and not for data such as object code.

Buffering

On a normal TWRT operation, without the FINAL parameter, the data from a user program is moved into a SYSSNAU buffer. Control is returned immediately to the user program. A SYSSNAU buffer is only transmitted on the data link because it is filled with data for normal TWRT.

If in a TWRT operation with the FINAL parameter, TWRT(,,F), is issued, the user data is moved to a SYSSNAU buffer and the buffer is transmitted, soliciting a response from the host. The TWRT(,,F) operation is suspended until the host responds. Once the host responds, the operation is posted with the appropriate return code.

If a TCLOZ is issued following one or more TWRT operations, the remaining data buffers are transmitted, soliciting a response from the host. The TCLOZ operation is suspended until the host responds. Once the host responds, the operation is posted with the appropriate return code.

If a TREAD is issued following one or more TWRT operations, the remaining data buffers are transmitted, soliciting a response from the host. The TREAD operation is suspended until the host actually sends data to satisfy the TREAD. If an error is detected, the appropriate return code is returned.

Error Recovery Considerations

Several errors can occur when attempting to transmit data to the host. Several errors (42XX) generally should be handled by terminating the session using TTERM. These errors include link down conditions and user program errors. The cause of the error should be determined before continuing.

Exception conditions (46XX) must be handled on an individual return code basis. See the individual return codes for those you may wish to handle.

Some of the more common recovery situations are discussed below:

4603, 4605, 4606

These return codes indicate that a non typical SNA command was received from the host. The important point to note is that the TWRT operation which received one of these return codes must be repeated. No data was written to the SYSSNAU buffer.

4604

This return code indicates a probable program mismatch with the host in that both ends attempted to transmit data. A 5280 program must be executed to read the data sent from the host.

4607

This return code indicates that the host sent a negative response to data sent to it from the 5280. This is commonly caused by an unknown transaction ID being sent to the host. Two points should be noted:

- The SNA sense code, containing the reason for the negative response, is located at offset X'3E-3F' in the IOB. See host subsystem documentation for its meaning.
- Often the host subsystem will send a message following the return code to describe the error. If the host subsystem does this, a program must be executed on the 5280 to read the message from SYSSNAU.

Receive Operations - Data Stream Support

Data is received from host subsystem applications at the 5280 by SYSSNAU into its data buffers. The data is transferred to user written programs by TREAD operations, one logical record per TREAD.

Logical records received from host applications are delimited by a new line (X'15') or a forms feed (X'0C') SCS character. SYSSNAU scans the input data for either of these characters. When a new line is encountered, a 4000 return code is generated with no external status. For a forms feed, a 4618 return code with external status is returned. In either case the new line or forms feed characters are stripped out and not placed in the user program's buffer. If not present, a new line character is assumed at the end of a chain.

Note that all other SCS characters in the input data from the host are ignored. The user interface is intended only for graphic message transmission, and not for data such as object code.

Deblocking

On each TREAD operation, a logical record (if available) is transferred from a SYSSNAU buffer to a user program buffer. The length of the data moved depends upon the length as specified in the user IOB on each TREAD, and the length of each logical record as received from the host. Several cases exist:

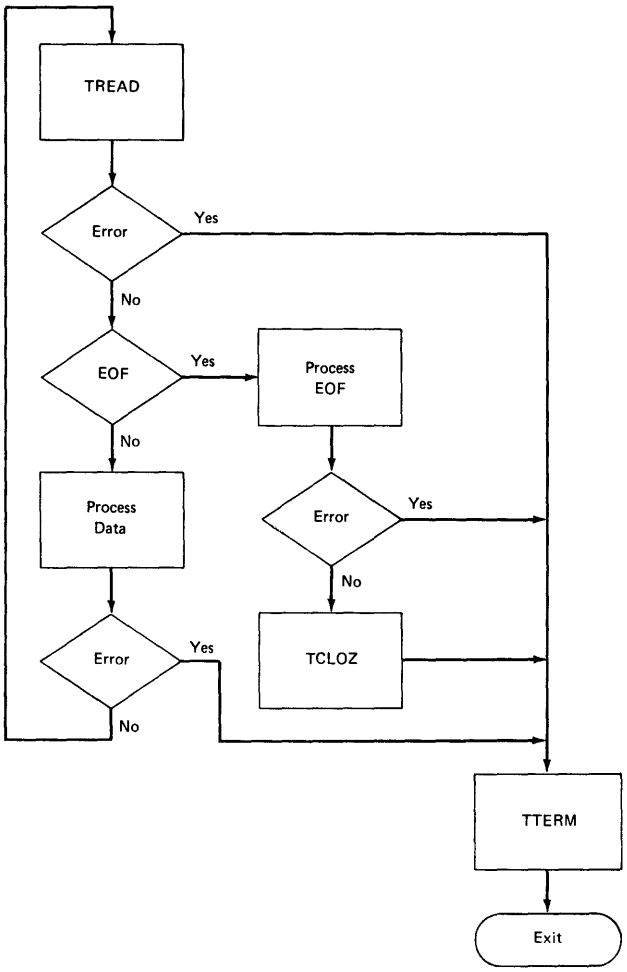
- If both lengths are equal, then that number of bytes are transferred to the user's buffer.
- If the length of the TREAD is greater than the received logical record, the entire logical record is transferred to the user's buffer, and the remainder of the buffer is blanked.
- If the length of the received logical record is greater than the length of the TREAD, the logical record is truncated to the length of the TREAD. This condition is reported to the user program by external status with a 4621 return code. The program can continue to receive truncated records by continuing to do TREAD operations. The next TREAD will retrieve data beginning with the next logical record in SYSSNAU buffer. The excess portion of the truncated logical record is lost.

Response Protocol

The user interface CAM sends responses to the host on behalf of user written programs. The type of response sent is determined by the instruction sequence issued by the user programs.

A positive response is sent by SYSSNAU after a normal instruction sequence. A normal instruction sequence is defined as continuous TREADs until the end of data condition is posted (4619 or 4620 return code), followed by any valid non-TTERM operation. Any deviation from this sequence results in a negative response being sent to the received data.

The following logic shows a typical receive sequence:



Note that in the above logic any error found results in a TTERM being issued before the end of data condition. This results in a negative response being sent to the host. The normal sequence shows that TREAD is issued until end of data, then a TCLOZ is issued. This results in a positive response being sent to the host.

Also note that in the above logic the TCLOZ could have been another TREAD or a TWRT operation. This would also have resulted in a positive response to the initial TREAD sequence, before processing the subsequent TREAD or TWRT. The positive response to the host is not sent until the next operation after the end of data return code is sent to the user program. This allows a negative response to be sent to the host by issuing a TTERM after the end of data is posted. If a positive response is desired, you must issue a TCLOZ, TREAD, or TWRT.

Error Recovery Considerations

Several errors can occur when attempting to transmit data to the host. Severe errors (42XX) generally should be handled by terminating the session using TTERM. These errors include link down conditions and user program errors. The cause of the error should be determined before continuing.

Exception conditions (46XX) must be handled on an individual return code basis. See the individual return codes for those you may wish to handle.

Some of the more common recovery situations are discussed below:

4602

The host cancelled the data stream before normal completion of the data. No data was transferred to the program's buffer.

4603, 4605, 4606

These return codes indicate that a non-typical SNA command was received from the host. The important point to note is that the TREAD operation which received one of these return codes must be repeated. No data was transferred to the user program's buffer.

4616

This return code indicates that SYSSNAU returned a negative response to the host to some invalid data received at the 5280. The sense code returned to the host is located at offset X'3E-3F' in the IOB. The probable reason for this is an application program mismatch. A transaction may have been invoked on the host which sent an invalid data stream containing a function management (FM) header. This is not supported in the SYSSNAU CAM.

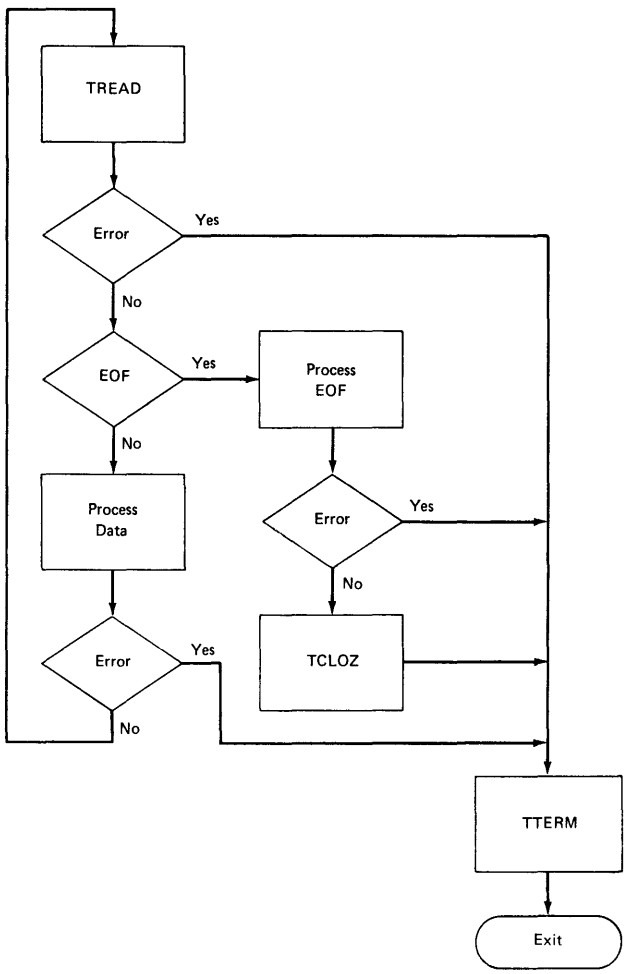
Miscellaneous Programming Considerations

Timeout Protection

Timeout protection is provided in the SNA user interface CAM. The timeout value (1-10 minutes) is specified using the communications configuration utility. This serves a dual purpose:

- Logon - The host subsystem may not be active or available during the logon process. The user interface CAM shuts down the session if logon is not successful within a specified timeout period. This protects against an indefinite wait.

- Receive operations - To ensure the integrity and availability of the host, the user interface CAM protects against indefinite delays while receiving host information by user programs. After each TREAD operation is posted complete by SYSSNAU, the user program must come back to SYSSNAU with a subsequent TREAD before the specified timeout has elapsed. Otherwise, a negative response is sent to the host. This timeout is also in effect after the end of data condition has been posted, because the response is not returned to the



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host until the next operation. The next operation must be issued before the time limit expires.

Function Management

The SNA user interface CAM does not support any function management(FM) headers, even if specified during the BIND operation. A negative response is sent to all data from the host that contains FM headers. If present, this data must be deleted from the host subsystem queues.

4700 Return Code

All user programs must handle a 4700 return code. It is handled in external status by issuing a RETURN. The instruction will automatically be repeated.

Overlapped Option

It is suggested that communications instructions TREAD and TWRT should be coded with the overlapping option followed by a TWAIT instruction. This is especially important if the user program is executing in a foreground partition and if the SYSSNAU CAM was started from the same data station. With the instructions overlapped, the keyboard remains unlocked even if an operation, such as TREAD, is outstanding to the CAM. This enables you to issue the end of job sequence to CAM to end possible delay conditions.

It is recommended that the host system operations be notified to alleviate delay conditions that may arise from user program mismatches, such as when both the 5280 application and the host subsystem application expect to receive data. As a last resort, the 5280 user can cancel the SYSSNAU CAM.

```
.TITLE INIT='SAMPLE SNA USER INTERFACE PROGRAM';
*****************************************************************
*  THIS SAMPLE PROGRAM RECEIVES 128 BYTE RECORDS FROM A         *
*  HOST IN THE FOLLOWING FORMAT                                 *
*                                                               *
*  COL 1          5          8          13                     *
*      EMPLOYEE   DEPT       STOCK      PRICE                  *
*      NUMBER     NUMBER     NUMBER                            *
*                                                               *
*  THESE RECORDS ARE SENT BY HOST TRANSACTION PROGRAM           *
*  TRANS16.                                                     *
*                                                               *
*  EACH RECORD REPRESENTS A SALE AN EMPLOYEE HAS MADE. THE      *
*  PROGRAM SELECTS ONLY THE RECORDS THAT PERTAIN TO EMPLOYEE    *
*  NUMBER 100 AND WRITES THESE RECORDS TO A DISKETTE FILE.      *
*                                                               *
*  THE FOLLOWING DATA SHOULD BE SENT FROM THE HOST.             *
*                                                               *
*  EMP NO.     DEPT NO.     STOCK NO.     PRICE                 *
*   100          31           3791         8.50                *
*   200          24           4286        13.75                *
*   100          31           3121         3.95                *
*   300          04           8070        14.50                *
*   300          08           7729         7.00                *
*   100          28           1377         2.99                *
*   200          21           5540        25.00                *
*                                                               *
*  THE SYSSNAU  CAM MUST BE LOADED INTO A BACKGROUND            *
*  PARTITION PRIOR TO EXECUTING THIS PROGRAM. THE PROGRAM       *
*  MAY BE EXECUTED IN A FOREGROUND OR BACKGROUND PARTITION.     *
*  A DISKETTE WITH DATA SET NAME = EMPSALES AND RECORD          *
*  LENGTH = 128, SHOULD BE MOUNTED ON DISKETTE DRIVE 4000       *
*  TO RECEIVE THE DATA. AFTER EXECUTING THIS PROGRAM,           *
*  DATASET EMPSALES SHOULD CONTAIN 3 RECORDS.                   *
*                                                               *
*****************************************************************
.START PNAM='SAMPLE'  ENTRY=ENTRYPT;
.EJECT;
*****************************************************************
*  KEYBOARD/CRT IOB                                             *
*****************************************************************
.KBCRT  CRBA=CBUF  PRBA=CBUF  ELAB=KBEXST;
*****************************************************************
*  BINARY REGISTERS                                             *
*****************************************************************
.DC LABEL=BINCODE TYPE=BIN;          BINARY COMPLETION CODE
.DC LABEL=CAMIOBAD TYPE=BIN INIT=ADDR(CAMIOB); ADDRESS OF
*                                    CAMIOB
.DC LABEL=CAMBFADR TYPE=BIN INIT=ADDR(CAMBUF); ADDRESS OF CAM
*                                    CAM I/O BUFFER
.DC LABEL=DSKBFADR TYPE=BIN INIT=ADDR(DISKBUF); ADDRESS OF
*                                    DISKETTE BUFFER
.DC LABEL=DSKIOBAD TYPE=BIN INIT=ADDR(DISKIOB); ADDRESS OF
*                                    DISKETTE IOB
.DC LABEL=TRANIDAD TYPE=BIN INIT=ADDR(TRANSID); ADDRESS OF
*                                    TRANSACTION ID
.DC LABEL=ESTMSGAD TYPE=BIN INIT=ADDR(ESTCONN); ADDRESS OF
*                                    ESTABLISH CONNECTION MESSAGE
.DC LABEL=ESTMSGLN TYPE=BIN INIT=32; LENGTH MINUS ONE OF
*                                    ESTABLISH CONNECTION MESSAGE
.DC LABEL=ROWCOL   TYPE=BIN INIT=X'0201'; ROW AND COLUMN WHERE
*                                    ESTABLISH CONNECTION MESSAGE
*                                    WILL BE DISPLAYED ON SCREEN
.DC LABEL=CLEARFUN TYPE=BIN INIT=X'0029'; CLEAR SCREEN FUCTION
*                                    FOR KEYOP INSTRUCTION
.SPACE NUMB=2;
```

```
*****************************************************************
*  DECIMAL REGISTERS                                            *
*****************************************************************
.DC LABEL=COMPCODE TYPE=DEC;          EBCDIC COMPLETION CODE
.DC LABEL=TESTREG TYPE=DEC;           TEST REGISTER
.DC LABEL=EMP#1 TYPE=DEC INIT='100';  EMPLOYEE NUMBER BEING
*                                     SELECTED
.EJECT;
*****************************************************************
*  DISKETTE DATASET DEFINITION                                  *
*****************************************************************
.DATASET DSN=1 NAME=DSNNAME RECL=128 BSIZ=0
    DEV=X'4000' LBUF=DISKBUF PB1=PDISKBUF
    TYPE=SW,ERS ELAB=DSKEXST LABEL=DISKIOB;
*****************************************************************
*  COMMUNICATIONS IOB DEFINITION                                *
*****************************************************************
.COMM CAM=SNA DSN=2 RECL=128 LBUF=CAMBUF
    TYPE=COM  ETAB=CAMEXSTB  LABEL=CAMIOB;
*****************************************************************
*  CAM RETURN CODES - LAST BYTE OF 46XX CODES                   *
*****************************************************************
.EQUATE NUMB=(X'03',CHASERCV);        CHASE COMMAND RECEIVED
.EQUATE NUMB=(X'05',SIGNLRCV);        SIGNAL COMMAND RECEIVED
.EQUATE NUMB=(X'06',SHUTDRCV);        SHUTD COMMAND RECEIVED
.EQUATE NUMB=(X'18',EOBRCV);          END OF BLOCK RECEIVED
.EQUATE NUMB=(X'19',EODRCV1);         END OF DATA RECEIVED
.EQUATE NUMB=(X'20',EODRCV2);         END OF DATA RECEIVED
.EQUATE NUMB=(X'21',DATAERR);         DATA LENGTH ERROR
.SPACE NUMB=2;
.EJECT;
*****************************************************************
*  COMMON FUNCTION AREA INTERFACE TO DISPLAY SYSTEM             *
*  LOAD PROMPT                                                  *
*****************************************************************
.XTRN  LABEL=CFLOAD01;
.SPACE NUMB=2;
*****************************************************************
*  BACKGROUND/FOREGROUND INDICATOR                              *
*****************************************************************
.EQUATE IND=(I110,BACKGRND);
.SPACE NUMB=2;
*****************************************************************
*  DISKETTE INDICATORS                                          *
*****************************************************************
.EQUATE IND=(I0,DSERRIND);            DISKETTE ERROR INDICATOR
.EQUATE IND=(I3,DSOPENED);            DISKETTE DATASET OPENED
*                                     INDICATOR
.SPACE NUMB=2;
*****************************************************************
*  CAM INDICATORS                                               *
*****************************************************************
.EQUATE IND=(I1,EODIND);              END OF DATA INDICATOR
.EQUATE IND=(I2,RPTIND);              REPEAT INDICATOR - NO DATA
.EQUATE IND=(I6,CAMOPEND);            CAM OPEN ISSUED INDICATOR
.EQUATE IND=(I4,CMERRIND);            CAM ERROR INDICATOR
.EQUATE IND=(I5,INITISUE);            TINIT ISSUED INDICATOR
.SPACE NUMB=2;
*****************************************************************
*  ADDRESS REGISTER FOR 64 BYTE REGISTER SAVE AREA FOR CALL     *
*  TO CFLOAD01 ROUTINE                                          *
*****************************************************************
.EQUATE REG=(BR32,CFSAVREG);
.SPACE NUMB=2;
```

```
*****************************************************************
*  NUMERIC EQUATES                                              *
*****************************************************************
.EQUATE NUMB=(X'40',BLANK);          EBCDIC BLANK
.EQUATE NUMB=(X'04',ERCODFLD);       IOB OFFSET TO
*                                    COMPLETION CODE FIELD
.EQUATE NUMB=(X'11',CLEAROP);        CLEAR OPERATION FOR KEYOP
.EJECT;
*****************************************************************
*  STORAGE DEFINITIONS                                          *
*****************************************************************
.DC LABEL=EBCDCODE TYPE=STOR LEN=4; EBCDIC COMPLETION CODE
.DC LABEL=CBUF     TYPE=STOR LEN=40 INIT=' '; CURRENT RECORD
*                                    BUFFER
.DC LABEL=DISKBUF  TYPE=STOR LEN=128 LEVL=1 BDY=128; LOGICAL
*                                    DISKETTE BUFFER
.DC LABEL=EMPNUM  LEN=3  LEVL=2;     EMPLOYEE NUMBER
.DC LABEL=PDISKBUF TYPE=STOR LEN=1024 BDY=128; PHYSICAL
*                                    DISKETTE BUFFER
.DC LABEL=CAMBUF  TYPE=STOR  LEN=128; CAM I/O BUFFER
.DC LABEL=LOGON1 LEVL=2 LEN=64
    INIT='LOGON APPLID(IMS) LOGMODE(USERLOG)';
.DC LABEL=LOGON2 LEVL=2 LEN=64 INIT=' '; 2ND HALF OF BUFFER
.DC LABEL=DSNNAME  TYPE=STOR LEN=9 INIT='EMPSALES '; DATASET
*                                    NAME
.DC LABEL=TRANSID TYPE=STOR LEN=7 INIT='TRANS16'; TRANSACTION
*                                    PROGRAM NAME
.DC LABEL=SAVEAREA TYPE=STOR LEN=64; REGISTER SAVE AREA FOR
*                                    CALL TO CFLOAD01 ROUTINE
.SPACE NUMB=2;
*****************************************************************
*  TABLE OF SUBROUTINES FOR CAM EXTERNAL STATUS                 *
*****************************************************************
.LABTAB  LABEL=CAMEXSTB  ENTRY=CAMEXCPT,CAMERROR,ENDCEXST;
.EJECT;
*****************************************************************
*  PROMPT MESSAGE DEFINITIONS                                   *
*****************************************************************
.DC LABEL=ENDMSG TYPE=PRMT LEN=38 LEVL=1;
.DC LABEL=ENDMSG1 LEN=32 LEVL=2
   INIT='SAMPLE PROGRAM HAS COMPLETED EXE';
.DC LABEL=ENDMSG2 LEN=6 LEVL=2
   INIT='CUTION';
.DC LABEL=ERRMSG TYPE=PRMT LEN=41 LEVL=1;
.DC LABEL=ERRMSG1 LEN=32 LEVL=2
   INIT='PROGRAM TERMINATED DUE TO ERROR ';
.DC LABEL=ERRMSG2 LEN=5 LEVL=2
   INIT='CODE ';
.DC LABEL=ERRMSG3 LEN=4 LEVL=2;
.DC LABEL=PRESENTR TYPE=PRMT LEN=11
   INIT='PRESS ENTER';
.DC LABEL=ESTCONN  TYPE=PRMT LEN=33
   INIT='ESTABLISH CONNECTION IF NECESSARY';
*****************************************************************
*  SCREEN FORMAT DEFINITIONS                                    *
*****************************************************************
.SFMTST LABEL=ENDPRMT CNTL=CS,MV;
.SFMTPMT PRMT=SP,ENDMSG CSPS=NL;     SAMPLE PROGRAM HAS
*                                    COMPLETED EXECUTION
.SFMTFLD FLDF=A,1 CSPS=1;            DUMMY FIELD
.SFMTPMT PRMT=SP,PRESENTR CSPS=04; PRESS ENTER
.SFMTEND;
.SFMTST LABEL=ERRPRMT CNTL=CS,MV;
.SFMTPMT PRMT=SP,ERRMSG CSPS=NL;     PROGRAM TERMINATED DUE TO
*                                    ERROR CODE XXXX
.SFMTFLD FLDF=A,1 CSPS=1;            DUMMY FIELD
.SFMTPMT PRMT=SP,PRESENTR CSPS=04; PRESS ENTER
.SFMTEND;
.EJECT;
```

```
*****************************************************************
*  INITIALIZE INDICATORS AND OPEN IOBS                          *
*****************************************************************
ENTRYPT;                                PROGRAM ENTRY POINT
     CFSAVREG=ADDR(SAVEAREA);           LOAD ADDRESS OF REGISTER
*                                       SAVE AREA FOR CALL TO CFLOADOL
     SOFF(DSERRIND);                    TURN DISKETTE ERROR IND OFF
     SOFF(INITISUE);                    TURN TINIT ISSUED IND OFF
     SOFF(DSOPENED);                    TURN DATASET OPENED IND OFF
     SOFF(CAMOPEND);                    TURN DATASET OPENED IND OFF
     SOFF(CMERRIND);                    TURN CAM ERROR IND OFF
     SOFF(EODIND);                      TURN END OF DATA OFF
     SOFF(RPTIND);                      TURN REPEAT IND OFF
     CRTMM(ROWCOL,ESTMSGAD,ESTMSGLN, ); DISPLAY ESTABLISH
*                                       CONNECTION MESSAGE
     TINIT(2);                          INITIALIZE COMMUNICATIONS
*                                       NOTE THAT LOGON INFO IS
*                                       IN CAMBUF BEFORE TINIT
     KEYOP(CLEAROP,CLEARFUN);           CLEAR SCREEN AFTER TINIT
     IFI CMERRIND IS ON GOTO DSERR;     BRANCH IF CAM ERROR
     SON(INITISUE);                     TURN TINIT ISSUED IND ON
     TOPEN(2);                          OPEN COMMUNICATIONS IOB
     IFI CMERRIND IS ON GOTO DSERR;     BRANCH IF CAM ERROR
     SON (CAMOPEND);                    INDICATE COMM OPENED
     OPEN(1);                           OPEN DISKETTE DATASET
     IFI DSERRIND IS ON GOTO DSERR;     BRANCH IF DISKETTE ERROR
     SON(DSOPENED);                     TURN DATASET OPENED IND ON
.SPACE NUMB=3;
*****************************************************************
*  SEND TRANSACTION ID TO HOST                                  *
*****************************************************************
     CAMBUF = BLANK;                    BLANK OUT FIRST BYTE OF
*                                       BUFFER
     DUP(0,CAMBFADR,127);               ZERO OUT REMAINDER OF BFR
     MVC(CAMBFADR,TRANIDAD,7);          MOVE TRANSACTION ID TO BFR
     TWRT(2,,F,0);                      SEND THE TRANSACTION ID
*                                       THIS IS DONE OVERLAPPED TO
*                                       ALLOW KEYBOARD EXT STATUS
     TWAIT(2);                          WAIT FOR IT TO COMPLETE
     IFI CMERRIND IS ON GOTO DSERR;     BR IF ERROR ON TWRT
.EJECT;
*****************************************************************
*  READ A RECORD FROM COMMUNICATIONS, THEN PROCESS ANY          *
*  INDICATORS SET BY THE EXTERNAL STATUS ROUTINE.               *
*****************************************************************
READLOOP;
     TREAD(2,,,0);                      READ A RECORD FROM CAM
*                                       THIS IS DONE OVERLAPPED TO
*                                       ALLOW KEYBOARD EXT STATUS
     TWAIT(2);                          WAIT FOR IT TO COMPLETE
     IFI CMERRIND IS ON GOTO DSERR;     BR IF ERROR ON READ
     IFI EODIND IS ON GOTO EODRCV;      BR IF END OF DATA RECVD
     IFI RPTIND IS ON GOTO RPTRCV;      BR IF TREAD NEEDS TO BE
*                                       REDONE - NO DATA RECEIVED
*                                       NOTE - FALL THRU PATH IS
*                                       NORMAL, SUCCESSFUL TREAD
     DISKBUF=BLANK;                     BLANK OUT FIRST BYTE OF
*                                       DISKETTE BUFFER
     DUP(0,DSKBFADR,127);               BLANK OUT REST OF DISKETTE
*                                       BUFFER
     MVC(DSKBFADR,CAMBFADR,128);        MOVE RECORD FROM CAM BUFFER
*                                       TO DISKETTE BUFFER
     TESTREG=EMPNUM;                    GET EMPLOYEE NUMBER
     IF TESTREG NE EMP#1 GOTO READLOOP; BRANCH IF NOT EMPLOYEE
*                                       #1
     WRT(1,,0,N);                       WRITE RECORD TO DISKETTE
*                                       DATASET
     IFI DSERRIND IS ON GOTO DSERR;     BRANCH IF DISKETTE ERROR
     GOTO READLOOP;                     LOOP BACK FOR NEXT RECORD
.SPACE NUMB=2;
```

```
*****************************************************************
*  REPEAT OF INSTRUCTION NEEDED. (NO DATA RETURNED)             *
*****************************************************************
RPTRCV:;
     SOFF(RPTIND);                        RESET THE INDICATOR
     GOTO READLOOP;                       GO REPEAT THE READ
.SPACE NUMB=2;
*****************************************************************
*  ERROR DETECTED. ISSUE ERROR MESSAGE                          *
*****************************************************************
DSERR:;
     SOFF(DSERRIND,CMERRIND);             SET OFF ERROR INDICATORS
     ENTR(ERRPRMT);                       ISSUE ERROR MESSAGE
.EJECT;
*****************************************************************
*  CLOSE THOSE DEVICES WHICH HAVE BEEN OPENED, AND QUIT         *
*****************************************************************
EODRCV:;
     IFI CAMOPEND NOT ON GOTO CLOSE1; BRANCH IF COMM NOT OPEN
     TCLOZ(2);                            CLOSE COMMUNICATIONS JOB
     IFI CMERRIND NOT ON GOTO CLOSE1; BRANCH IF NO ERROR
     SOFF(CMERRIND);                      RESET ERROR IND
     ENTR(ERRPRMT);                       ISSUE ERROR MESSAGE
CLOSE1:;
     IFI DSOPENED NOT ON GOTO CLOSE2; BRANCH IF DSKT NOT OPEN
     CLOZ(1);                             CLOSE DISKETTE JOB
     IFI DSERRIND NOT ON GOTO CLOSE2; BRANCH IF NO ERROR
     ENTR(ERRPRMT);                       ISSUE ERROR MESSAGE
CLOSE2:;
     IFI INITISUE NOT ON GOTO CLOSE3; BRANCH IF TINIT NOT DONE
     TTERM(2);                            TERMINATE COMMUNICATIONS
     IFI CMERRIND NOT ON GOTO CLOSE3; BRANCH IF NO ERROR
     ENTR(ERRPRMT);                       ISSUE ERROR MESSAGE
CLOSE3:;
     ENTR(ENDPRMT);                       DISPLAY END PROMPT
     IFI BACKGRND IS ON GOTO EXITBACK; BRANCH IF IN BACKGROUND
*                                         PARTITION
FGPART:;
     CALL CFLOAD01;                       DISPLAY SYSTEM LOAD PROMPT
     GOTO FGPART;                         REPEAT UNTIL OVERLAID
EXITBACK:;
     EXIT;                                EXIT BACKGROUND PARTITION
.EJECT;
*****************************************************************
*  COMMUNICATIONS EXTERNAL STATUS ROUTINE                       *
*****************************************************************
.SPACE NUMB=1;
*****************************************************************
*  EXCEPTION ERROR  (46XX). TEST FOR THOSE TO RECOVER FROM      *
*****************************************************************
CAMEXCPT:;
     BINCODE=FRCODFLD(2,CAMJOBAD);  GET CAM COMPLETION CODE
     IFH BINCODE EQ CHASERCV GOTO CAMEXRPT; CHASE RECVD -
*                                         TREAD MUST BE REPEATED
     IFH BINCODE EQ SIGNLRCV GOTO CAMEXRPT; SIGNAL RECVD-
*                                         TREAD MUST BE REPEATED
     IFH BINCODE EQ SHUTDRCV GOTO CAMEXRPT; SHUTD RECVD -
*                                         TREAD MUST BE REPEATED
     IFH BINCODE EQ EOBRCV   GOTO ENDCEXST; END OF BLOCK-
*                                         TREAT AS NORMAL DATA
     IFH BINCODE EQ DATAERR  GOTO ENDCEXST; DATA LENGTH ERR
*                                         TREAT AS NORMAL DATA
     IFH BINCODE EQ EODRCV1  GOTO CAMEXEOD; END OF DATA -
*                                         INDICATE SO TO MAINLINE
     IFH BINCODE EQ EODRCV2  GOTO CAMEXEOD; END OF DATA -
*                                         INDICATE SO TO MAINLINE.
*                                         NOTE THAT ANY EXCEPTION
*                                         ERRORS OTHER THAN THOSE
*                                         ABOVE ARE TREATED AS
*                                         SEVERE ERRORS, AND FALL
*                                         THROUGH TO CAMERROR.
```

```
*****************************************************************
*  SEVERE ERROR (42XX) OR UNHANDLED 46XX.                       *
*****************************************************************
CAMERROR:;
    BINCODE=ERCODFLD(2,CAMIOBAD);  GET CAM COMPLETION CODE
    SON(CMERRIND);                 TURN CAM ERROR IND ON
    BINHEX(EBCDCODE,BINCODE);      CONVERT FROM BINARY TO
*                                  EBCDIC
    COMPCODE=EBCDCODE;             LOAD COMPLETION CODE INTO
*                                  DECIMAL REGISTER
    ERRMSG3(4)=COMPCODE;           LOAD ERROR CODE INTO ERROR
*                                  MSG FIELD
    GOTO ENDCEXST;                 BRANCH TO END OF ROUTINE
CAMEXRPT:;
    SON(RPTIND);                   TURN REPEAT INDICATOR ON
    GOTO ENDCEXST;                 BRANCH TO END OF ROUTINE
CAMEXEOD:;
    SON(EODIND);                   TURN END OF DATA IND ON
*****************************************************************
*  AUTOMATIC REPEAT (4700);                                     *
*****************************************************************
ENDCEXST:;
    RETURN;                        RETURN
.EJECT;
*****************************************************************
*  DISKETTE ERROR                                               *
*****************************************************************
DSKEXST:;                          DISKETTE EXTERNAL STATUS
*                                  ROUTINE
    SON(DSERRIND);                 TURN DISKETTE ERROR IND ON
    BINCODE=ERCODFLD(2,DSKIOBAD);  GET DISKETTE ERROR CODE
    BINHEX(EBCDCODE,BINCODE);      CONVERT FROM BINARY TO
*                                  EBCDIC
    COMPCODE=EBCDCODE;             LOAD ERROR CODE INTO
*                                  DECIMAL REGISTER
    ERRMSG3(4)=COMPCODE;           LOAD ERROR CODE INTO ERROR
*                                  MSG FIELD
    RETURN;                        RETURN
.SPACE NUMB=5;
*****************************************************************
*  KEYBOARD EXTERNAL STATUS                                     *
*****************************************************************
KBEXST:;                           KEYBOARD EXTERNAL STATUS
*                                  ROUTINE
    RETEXT;                        RESET EXTERNAL STATUS AND
*                                  RETURN
.END;                              END OF SAMPLE PROGRAM
```

Chapter 6. Data Communications Programming with DE/RPG

The 5280 communications support and DE/RPG instructions enable you to write a communications program using DE/RPG. The program can be executed using either a BSC or SDLC data link; most of your DE/RPG communications coding does not depend on the data link protocol. A DE/RPG program must be compiled using the DE/RPG compiler. To perform data transfers, your program must execute in conjunction with a version of the communications access method (CAM).

You might want to write your own DE/RPG program:

- When you want to process data online as it is received from the host.
- When you want to match your 5280 communications program to a particular host application program.
- When the BSC or SNA Data Communications Utility does not meet your needs. The functions provided by these utilities are sending batch data, receiving batch data, and sending inquiries and receiving replies. For more complete descriptions, see Chapters 3 and 4.

You should already be familiar with BSC and/or SNA terminology; see Chapter 1 for a description of this support. For a complete description of how to write a DE/RPG program, see the *5280 DE/RPG Reference Manual*.

CAPABILITIES

Using BSC protocol, you can write a DE/RPG program to communicate with:

- System/3 RPG II and CCP
- System/32 RPG II
- System/34 RPG II and SSP-ICF
- 3741 Data Station Models 2 and 4
- 3747 Data Converter
- 5260 Retail System
- Series/1 RPS Version 4
- Another 5280 Distributed Data System

Using BSC or SNA/SDLC protocol, your DE/RPG program can communicate with:

- System/370
  - DOS/VS CICS/VS
  - OS/VS1 CICS/VS
  - OS/VS2 CICS/VS
  - OS/VS1 IMS/VS
  - OS/VS2 IMS/VS

The communications support for your program includes:

- Establishing the data link connection
- Sending and receiving data
- Disconnecting the data link
- Providing most data link error recovery procedures

Your program executes in conjunction with the CAM to perform data transfers. The CAM enforces BSC or SNA protocol and performs network functions and error recovery. Your program interfaces to the CAM by DE/RPG instructions, which provide the following functions:

- Specify the communications line as a device
- Open a data set
- Read a logical record
- Write a logical record
- Close a data set

REQUIREMENTS

To write and execute your own DE/RPG communications program you need the Communications Utilities licensed program and the DE/RPG licensed program. The Communications Utilities licensed program provides the CAM; the DE/RPG licensed program provides the DE/RPG compiler and a Source Entry Program, which can be used to enter source statements using the keyboard/display. The communications adapter must also be installed on your 5280 system. For SNA/SDLC communications, the elapsed time counter feature must also be installed on your system.

Two CAMs support programs you write, SYSBSCEX for a program to be executed using BSC link protocol, and SYSSNAU for SNA/SDLC protocol. The CAM must be loaded using the Communications Load Utility before your program begins execution. The minimum partition sizes required are 18K for the BSC CAM and 22K for the SNA CAM. In addition, a completed communications configuration record is required to control the execution of the CAM.

Your program should also meet any requirements unique to the host computer and/or host subsystem with which it will communicate. Host access method, host subsystem and host sysgen parameters must be coordinated with parameters in the communications configuration record and your program to ensure that your 5280 system can communicate with the host.

CODING YOUR PROGRAM

This section describes the DE/RPG statements essential to communications programming. Other DE/RPG statements, which are not required but which could be used in a communications program, are described in the *DE/RPG Reference Manual*. In addition, you might want to consult the *DE/RPG User's Guide*. You should be familiar with the DE/RPG language before you try to write a communications program.

The Z, A, and C specifications are needed to code a DE/RPG communications program. The Z form contains job description and format statements. The A specification describes the files, records, and fields to be used. The C specification contains subroutines made up of arithmetic, comparison and branching, and I/O operations.

Z Specification

On the Z specification you must name the communications job. You can also define the entry point for the communications subroutine (on the C specification). This causes the subroutine to be called when the statement is executed. A statement which names a subroutine can include the EOJ keyword. This causes the program to go to end of job when control returns to the Z specification from the subroutine.

A Specification

The A specification contains file, record and field statements for each file used in the program. For communications, the same file can be used for both input and output, that is, you can transmit from and receive to the same file. At least one communications file is required, and only one file can be open at any given time.

To specify a communications file, use the keyword and parameter DEVICE(COMM). Note that an address parameter is not included. A file statement can optionally include the LOGON keyword. Logon is a requirement of some SNA host subsystems; it is not used in BSC and, if specified, is ignored. If included, LOGON should be specified for the first communications file to be opened. The parameter for the LOGON keyword is a variable field name. The logon data can be defined as a character constant, or can be read from any input device; the maximum length is 80 characters.

C Specification

To execute statements coded on the C form, you need to write at least one subroutine. This subroutine can be called by:

- A subroutine name on the Z specification
- The EXSR keyword in a field statement on the A specification
- An EXSR operation on the C specification This requires writing at least one other subroutine, which must be called using one of the first two methods. If called in this way the subroutine may not issue an open operation.

Six I/O instructions are used in a communications subroutine; they are listed in the operation column below.

Factor 1	Operation	Factor 2	Description
label	BEGSR		denotes beginning of and entry point to the subroutine
	OPEN	filename	opens a communications file for I/O
	READ	filename record name	reads a record
	WRITE	record name	writes a record
	CLOSE	filename	closes a communications file
label	ENDSR		marks end of and exit from a subroutine

In BEGSR, the label is the name of the subroutine. This name must be used elsewhere in your program with the EXSR keyword or as the subroutine name on the Z specification.

The filename in an OPEN or CLOSE statement is the name of the communications file specified on the A form. An OPEN statement must be issued before you read from or write to a file.

The READ and WRITE operations transmit one record to, or receive one record from, the host. Although you can specify a filename for a READ operation, only one record is read each time the statement is executed.

An ENDSR statement may optionally include a label. This facilitates branching to the end of the subroutine.

Special Considerations

- For an SNA/SDLC netowrk the communications connection is established as part of the processing for OPEN.
- For a BSC network the communications connection is established with the first READ or WRITE.

- CLOSE will not break the communications connection. This only occurs at end of job.

- If a program goes to abnormal end of job (operator initiated via EOJ key or reset after a severe error) the communication session will be terminated abnormally (TTERM before TCLOZ).

SAMPLE PROGRAM

The following sample program can be executed in a BSC or SNA network. Using BSC protocol, it interfaces to another 5280 system. To execute it using BSC, do not enter any data for the prompt "Enter your comm ID"; press RECADV. For an SNA/SDLC network, enter logon data for this prompt.

The program reads a record from diskette and writes the same record to the communications line. If an error occurs during a read or write operation, an error message is displayed and the program terminates.

```
Z*
Z*
ZJ  SENDFILE
Z A1CSPEC     1E                                        EOJ
A           F COMMFILE      80          DEVICE(COMM) LOGON(
A           R COMMREC
A             FLDO           5
A             FLD1           5
A             FLD2          70
A*
A           F DISKFILE      80          DEVICE(DISK)
A           R DISKREC
A             FLD0           5
A             FLD1           5
A             FLD2          70
A*
A           F KEYBOARD      80          DEVICE(CRT)
A           R LOGID
A             A             80      3  1PMT(ENTER COMM ID,
A                                       RECORD ADVANCE)
A*
A           R ESTAB
A                                   2  1'ESTABLISH CONNECTI
A           R GOING
A                               0   2  1'COMMUNICATIONS IN
A*
A           R ERR1
A                               0   2  1'ERROR WHILE READIN
A                             1 I   3  1
A                               0       'PRESS RECORD ADVAN
A*
A           R ERR2
A                               0   2  1'ERROR WHILE WRITIN
A                             1 I   3  1
A                               0       'PRESS RECORD ADVAN
A*
A           R EOF
A                               0   2  1'DATA TRANSMISSION
A                             1 I   3  1
A                               0       'PRESS RECORD ADVAN
C            CSPEC     BEGSR
C                      EXFMTLOGIC                      GET
C*
C            A         COMP ' '                      10IF B
C*                                                     ASSU
C*
C  N10                 WRITEESTAB                      IF S
C                      OPEN COMMFILE
C  N10                 WRITEGOING                      IF S
C*
C*
C            READRC    TAG
C*
C                      READ DISKREC                2021
C   20                 GOTO DSKERR
C   21                 GOTO DSKEOF
C*
C   10                 WRITEESTAB                      1ST
C                      WRITECOMMREC                 30
C   30                 GOTO COMERR
C   10                 WRITEGOING
C                      SETOF                     10
C                      GOTO READRC
C*
C            DSKERR    TAG
C                      EXFMTERR1
```

```
C                       GOTO END
C*
C           COMERR      TAG
C                       EXFMTERR2
C                       GOTO END
C*
C           CSKEOF      TAG
C                       EXFMTEOF
C*
C           END         ENDSR
```

BSC Online Test Utility (SYSBOLT)

The BSC Online Test Utility (SYSBOLT) tests the proper operation and integrity of the communications link, namely the line and modems. It serves as an aid in detecting and/or correcting malfunctions and should be run when you suspect a problem exists in the communications link. This utility can be run with any BSC system or host with which the 5280 can communicate, provided it supports at least one of the types of tests that the 5280 supports. The 5280 can be used to initiate or to respond to a request for test.

SYSBOLT requires a dedicated display station. It can execute in conjunction with the CAM named SYSBSCBA or SYSBSCEX. You *must* use the Communications Load Utility to load the CAM into main storage.

After the utility is loaded, you respond to prompts which request data on which test to run and, if applicable, the text of the test. While the test is running, the utility provides interim data on how the test is progressing on the display. When the test is completed, the results of the test (whether it executed successfully or failed) and statistics are displayed.

TYPES OF TESTS

A request-for-test (RFT) message is used to request that an online test be initiated. The requester is the station that sends the RFT message; the responder is the station that receives the RFT message. As a requester, the 5280 can perform 12 different types of tests. As a responder, the 5280 supports three types of tests.

Tests Supported When 5280 is the Requester

Test Number	Test Data	Code
01	Send and receive variable data	EBCDIC or ASCII
02	Receive 256 bytes of EBCDIC transparent data	EBCDIC
04	Receive 245 bytes of EBCDIC data	EBCDIC
05	Receive 117 bytes of ASCII data	ASCII
06	Receive 36 alphanumeric characters	ASCII
14	Receive 36 alphanumeric characters	EBCDIC
15	Receive 80 bytes of all zero weak pattern	EBCDIC
16	Receive 80 bytes of alternate zero-one pattern	EBCDIC

Test Number	Test Data	Code
19	Receive 290 bytes of weak pattern transparent	EBCDIC
20	Receive 80 characters of transparent data	EBCDIC
21	Receive 120 characters of transparent data	EBCDIC
22	Receive 144 characters of transparent data	EBCDIC

Tests Supported When 5280 is the Responder

Test Number	Test Data	Code
01	Send and receive variable data	EBCDIC or ASCII
06	Send 36 alphanumeric characters	ASCII
14	Send 36 alphanumeric characters	EBCDIC

The requester always receives the test data, with the exception of test 01 when the requester first sends the test data and then receives the same test data back. The responder always sends the test data.

For test 01, the requester sends an RFT message followed by the test data. The test data can be a maximum of 293 characters in length. The responder sends the test data back to the requester a specified number of times.

For tests 02–22, the test data is predefined. When the 5280 is the requester, it sends an RFT message to the host which identifies the test number. The host sends the predefined test data, based upon the test number, back to the 5280 the number of times specified in the RFT message.

For tests 06 and 14, when the 5280 is the responder, it receives an RFT message from the host. The test data for tests 06 and 14 is predefined and stored in the 5280. The 5280 retrieves the appropriate test data and sends it to the host the number of times specified.

The test data and format for test numbers 02 through 22 are given below.

Test 02—Transparent EBCDIC

Format: DLE STX . . . Test Data . . . DLE STX

Test Data: 256 EBCDIC characters in collating sequence order.

Test 04—Normal EBCDIC

Format: STX SYN SYN . . . Test Data . . . ETX

Test Data: 245 non-data link control characters. Data link control characters excluded are SOH, STX, ETX, ETB, ENQ, ACK, NAK, DLE.

Test 05—Normal ASCII

Format: STX SYN SYN . . . Test Data . . . ETX

Test Data: 117 non-data link control characters in ASCII. Same data link control characters excluded as in test 04.

Test 06—Alphanumeric ASCII

Format: STX SYN SYN . . . Test Data . . . ETX

Test Data: 26 letters in the alphabet (A through Z) in alphabetic order followed by the 10 integers (0 through 9) in ascending sequence.

Test 14—Alphanumeric EBCDIC

Format: STX SYN SYN . . . Test Data . . . ETX

Test Data: 26 letters in the alphabet (A through Z) in alphabetic order followed by the 10 integers (0 through 9) in ascending sequence.

Test 15—EBCDIC All Zero Weak Pattern

Format: STX SYN SYN . . . Test Data . . . ETX

Test Data: 74 null (X'00') characters followed by six SYN (X'32') characters.

Test 16—EBCDIC Weak Pattern

Format: STX SYN SYN . . . Test Data . . ETX

Test Data: 40 bytes of X'AA' followed by 40 bytes of X'55'.

Test 19—Transparent EBCDIC Weak Pattern

Format: DLE STX . . . Test Data . . . DLE ETX

Test Data: 280 null (X'00') characters followed by ten SYN (X'32') characters.

Test 20—Transparent EBCDIC

Format: DLE STX . . . Test Data . . . DLE ETX

Test Data: 80 characters in following order: alphabetic U through Z, integers 0 through 9, X'00' through X'3F'.

Test 21—Transparent EBCDIC

Format: DLE STX . . . Test Data . . . DLE ETX

Test Data: 120 characters in following order: alphabetic A through Z, integers 0 through 9, X'00' through X'53'.

Test 22—Transparent EBCDIC

Format: DLE STX . . . Test Data . . . DLE ETX

Test Data: 144 characters in following order: alphabetic A through Z, integers 0 through 9, X'00' through X'6B'.

Wrap Test

The wrap test provides a comprehensive test of the communications adapter and the modem; it does not test the communications line or communications hardware at the host. It runs the power-on, protocol, and data communications equipment diagnostics exactly as at power-on time. The results of the test are reported on the display as either successful or failed.

REQUIREMENTS

You must use the Communications Load Utility to load the CAM into main storage; SYSBOLT does not invoke this utility to load the CAM. The CAMs which can be used are SYSBSCBA, which requires a partition size of at least 15K, or SYSBSCEX, which requires a partition size of at least 18K.

You also need a completed configuration record created using the Communications Configuration Utility. The record must contain the following values:

- Receive timeout of 3 seconds (prompt B22)
- WACK receive limit of 25 (prompt B26)
- Transmit timeout of 2 seconds (prompt B24)
- CAM I/O buffer size must be at least 302 bytes

In addition, if the 5280 is the requester, it must send the initial line bid and be designated as the secondary station. If the 5280 is the responder, the host must send the initial line bid and the 5280 must be the primary station.

Note: To execute test 05 or 06 the communications configuration record must specify ASCII.

After you load the CAM, then load SYSBOLT; it requires a 6K partition.

HOW TO RUN SYSBOLT

The following prompts can appear while SYSBOLT is executing.

```
SYSBOLT - SINGLE BSC CAM ONLINE TEST UTILITY
What function do you want to execute?
  Options are
    1.  Requester test
    2.  Responder test
    3.  Wrap test
    4.  Exit
Select option:
                                        Press ENTER                    67-01
```

Select 1 to run a test with the 5280 as the requester; this means that the 5250 sends the RFT header.

Select 2 to run a test with the 5280 as the responder; this means that the 5250 receives the RFT header.

Select 3 to run a wrap test.

Select 4 to terminate SYSBOLT.

```
Specify the following:
Test number:
Number of transmits/receives:
Security information, if required:
                                        Press ENTER                    67-02
```

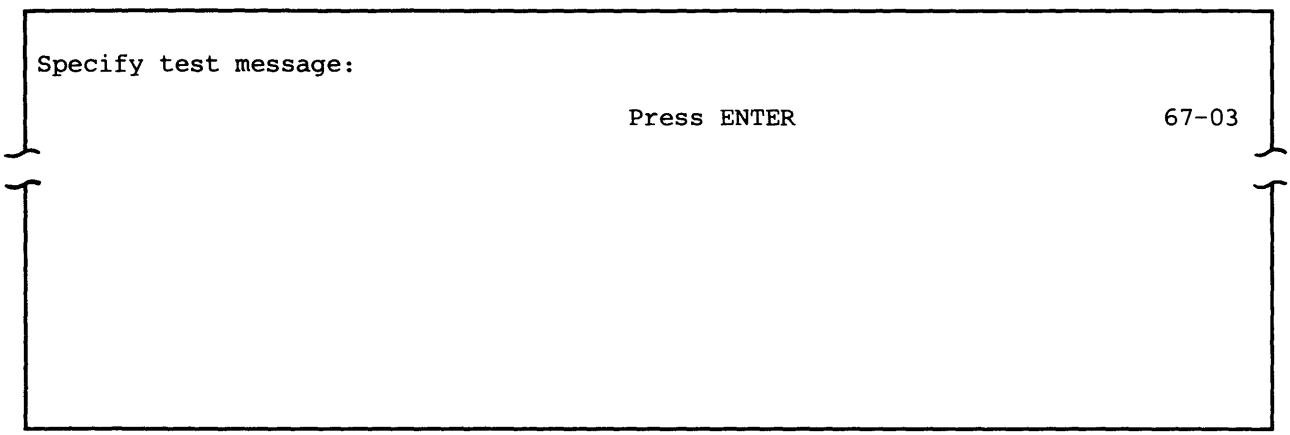
This prompt appears only if you selected requester test (option 1) on the previous prompt.

Test number: Enter the number of the test to be performed. The valid entries are 01, 02, 04, 05, 06, 14, 15, 16, 19, 20, 21, or 22.

Note: These tests may require more than one communications configuration record.

Number of transmits/receives: Enter the number of times the test data is to be sent to the 5280. The valid entries are 01–99 times.

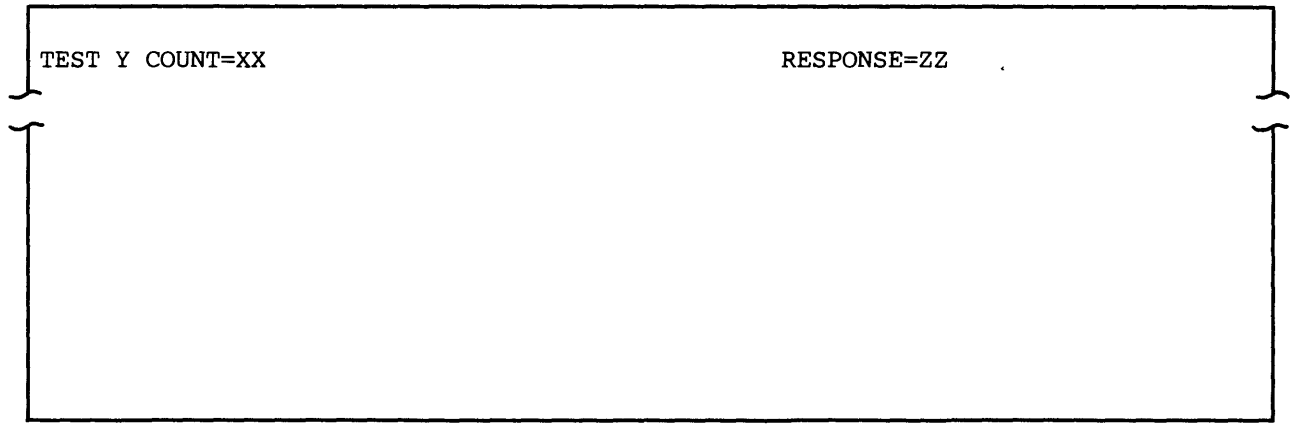
Security information: This is a 14 byte field used only by an IBM Customer Engineer. It is used to identify the requester by the responder to prevent any unwarranted requests to run SYSBOLT.



This prompt appears only if the test number is 01.

Enter the test data to be transmitted to the host. The maximum length is 293 characters.

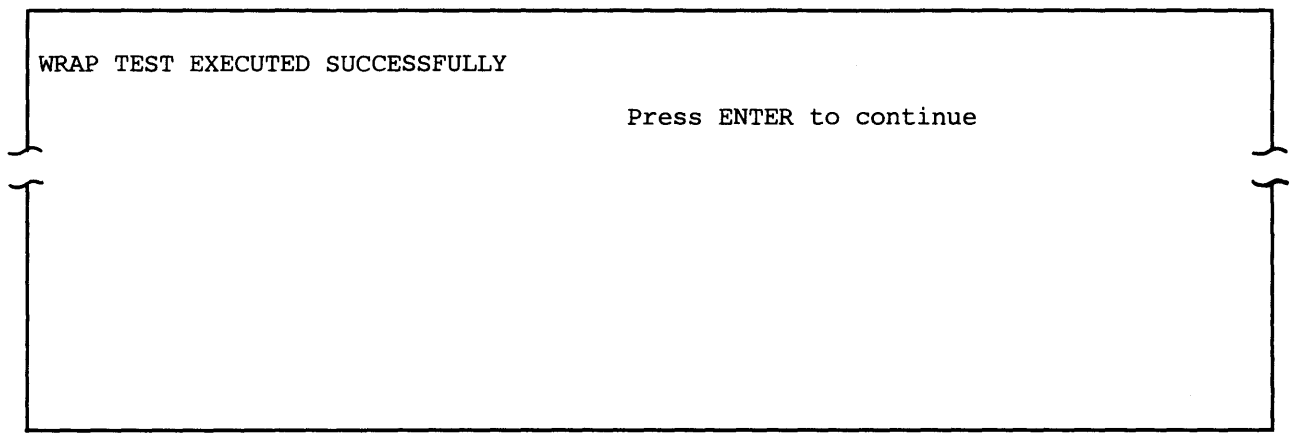
The message "TEST XX STARTED" appears briefly after the test has begun. It appears for all tests except the wrap test. XX identifies the number of the test. For the wrap test, the message "WRAP TEST IN PROCESS" is displayed.



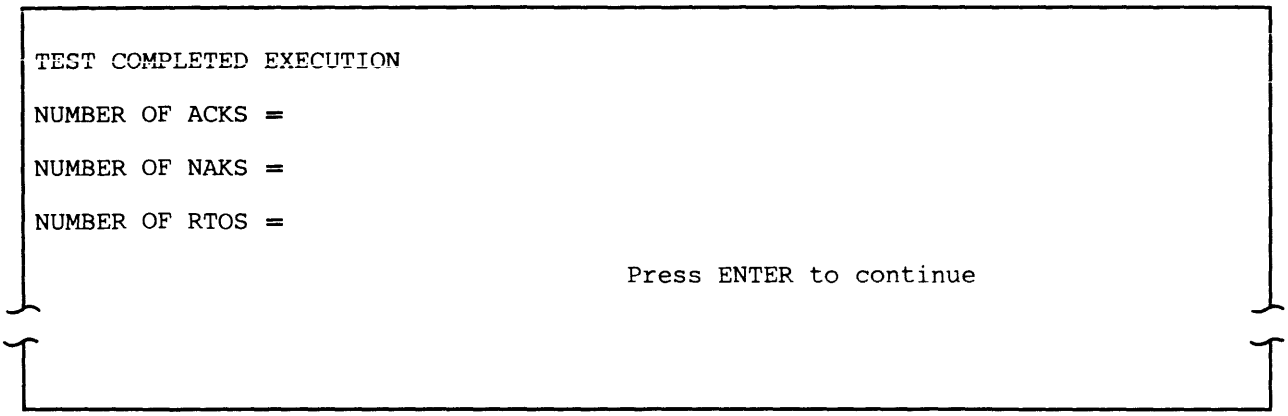
This is an informational message which appears for all tests except the wrap test. Y is the test number. XX is initially the number of times the test data is to be transmitted or received. Each time the test data is transmitted or received, XX is decreased by 1.

ZZ tells the results of each attempt to transmit or receive the test data. One of the following three control characters is displayed for ZZ:

Control Character	Meaning
RTO	Receive timeout occurred
NAK	Negative acknowledge
ACK	Positive acknowledge, good transmission



This is an informational message which reports the results of the wrap test. If the test was unsuccessful, the message displayed is "WRAP TEST FAILED".



This message summarizes the results of the online test. If the 5280 was the transmitter for the test, the ACK count is the total of all transmits. If the 5280 was the receiver for the test, the ACK count is the number of good receives. After you review the statistics press ENTER and the prompt requesting the function to be executed (prompt 67-01) reappears.

Trace Table

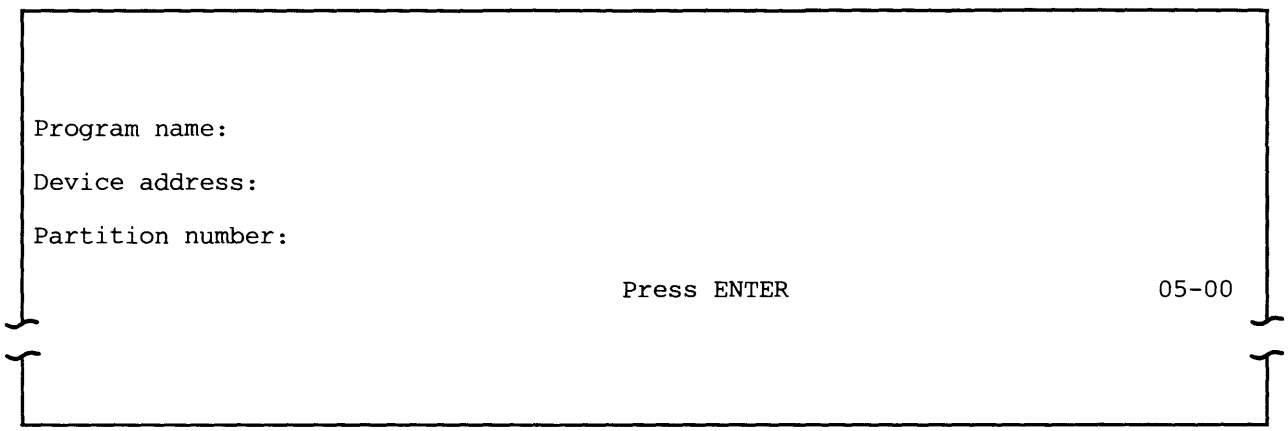
The communications trace captures the critical portion of data in each record sent or received. This information is stored in the CAM partition in a trace table. This portion of main storage can be dumped to allow you to inspect the contents of the table. See the *5280 Data Areas and Diagnostic Aids Handbook* for information on how to find the trace table and how to dump the 5280 main storage containing the trace table.

The trace table can be allocated when you are executing any BSC or SNA/SDLC communications program. The Communications Configuration Utility is used to specify whether a trace table should be allocated and, if so, the number of entries in the table (see prompt C19). The table wraps around after each entry has been used one time; thus newer events overlay older ones. An entry in the table is made each time an input buffer is taken from the input queue and each time an output buffer is placed on the output queue. The *5280 Data Areas and Diagnostic Aids* describes the content of each trace table entry and explains how to use the trace table as a diagnostic aid.

Chapter 8. Concepts of Operation

LOADING A COMMUNICATIONS UTILITY

Each communications utility is loaded using the system load prompt, shown below. After you press ENTER, the utility is loaded and the first prompt appears.



Program name: Enter the name of the utility to be run.

Device address: Enter the address of the diskette drive on which you have mounted the diskette which contains the above-named program.

Partition number: Enter the number of the partition into which the utility should be loaded. The valid entries are 0–7. The default is the partition to which the keyboard is currently attached.

PARTITION CONSIDERATIONS

Foreground and Background Partitions

There are two kinds of partitions: foreground and background. Each foreground partition is associated with a keyboard/display as defined during system configuration. The number of foreground partitions your system can have is equal to the number of keyboard/displays which are installed; the maximum is four.

A background partition is associated with the keyboard/display used to load a program into it. A program running in a background partition accesses a keyboard/display only when necessary. When a program in a background

partition needs a keyboard/display, a solid rectangle appears on the right side of the display. Use the ATTN function key to detach the foreground partition from the keyboard/display and thereby allow the requesting background partition to use it.

The communications utilities can execute in either a foreground or background partition. However, consider the following factors when deciding whether to load a program into a foreground or background partition:

- Amount of expected use of the keyboard/display
- Input/output devices used by a communications job
- Mode of operation for a job
- Length of execution time for a job
- Size of available partitions

The utilities which are interactive and therefore use the keyboard/display throughout their execution should normally be executed in a foreground partition; they are SYSCCU, SYSDCDU, SYSRJEDU and SYSBOLT. Non-interactive programs should normally be run in a background partition; these include all the CAMs as well as SYSCLU (because the latter is overlaid by the CAM it loads).

In addition, communications jobs which use the keyboard/display as an input/output device should be executed in a foreground partition. MRJE and SRJE use the keyboard as either the reader or console device, and therefore they should execute in a foreground partition. SYSBDCU supports the magnetic stripe reader as a device from which to transmit data. If the job uses the magnetic stripe reader, SYSBDCU *must* be executed in a foreground partition; otherwise an error occurs.

Unattended mode assumes that an operator is not present at the system during program execution, and a keyboard/display is not required until the job is ready to terminate. Therefore unattended jobs are suited for execution in a background partition.

If a communications job requires a long time to execute, it may be desirable to execute it in a background partition so that the keyboard/display can be used for other work. However, the input/output devices and mode of operation are more critical determining factors than length of execution time.

Depending upon the size of the program and of available partitions, it may be necessary to execute a communications program in a background partition. Background partitions are usually larger than foreground partitions. If a foreground partition of the needed size is not available, you can run a communications program in a background partition while no program is running in the foreground partition. (You could use SYSCLU to load the CAM into the foreground partition if the partition is big enough.) In this instance you can attach the background partition to the keyboard/display and it will execute the same as if it were in the foreground.

Summary of Partition Sizes

The following chart shows the partition sizes needed to execute the communications utilities and the CAMs. The sizes given for the execution utilities and CAMs are the *minimum* amount of storage required; see the following sections to determine the actual size needed. The communications utilities and CAMs run with any of the common functions options. For a total storage calculation, be sure to include a common functions option.

Communications Utility	Minimum Partition Size (in K)
SYSCCU	21
SYSCLU	9
SYSDCDU	15
SYSRJEDU	7
SYSBDCU	22
SYSBBTU	11
SYSMRJE	22
SYSSDCU	22
SYSSRJE	22
SYSBOLT	6

Communications Access Method (CAM)	Minimum Partition Size (in K)
SYSBSCBA	15
SYSBSCEX	18
SYSBSCR	10
SYSSNAD	22
SYSSNAR	21
SYSSNAU	22

Execution Utility Partition Sizes

The execution utilities support Basic, H and I exchange diskettes with physical sector sizes of up to 256 bytes in the minimum partition sizes. These utilities support I exchange data sets with block and physical sector sizes up to 1024 bytes if the partition contains an additional 3K (for SYSBBTU, SYSBDCU and SYSSDCU) or 7.5K (for SYSMRJE and SYSSRJE). The preparation utilities support diskettes with a physical sector size of up to 1024 bytes in the minimum partition sizes.

The dump/trace diskette data set cannot have a physical sector size block length greater than 256 bytes.

CAM Partition Sizes

The size of the partition needed for successful execution of a communications access method depends upon factors which vary for each particular CAM. Use the following formulas to calculate the partition size needed for the CAM to be used.

SNA CAMs (SYSSNAD, SYSSNAR, and SYSSNAU)

Partition size (in bytes) = C + 20T + 350L + 274B + 1400

C = CAM object code size. The object code sizes of the SNA CAMs are:

- SYSSNAD (used by SNA Data Communications Utility) – 18,432
- SYSSNAR (used by SRJE) – 17,408
- SYSSNAU (used by user-written program) – 18,432

T = number of entries in trace table. Use the number you entered in response to prompt C19 of the Communications Configuration Utility.

L = number of concurrent LU-LU sessions. Use the number you entered in response to prompt S8 of the Communications Configuration Utility. For the SRJE CAM (SYSSNAR), the value of L is always 1.

B = minimum buffer requirement, as follows: B = ((P + 5) x L) + 2. For P, use the larger of the receive pacing count or the send pacing count, as entered in prompt S5 or S6 of the Communications Configuration Utility. L is the number of concurrent LU-LU sessions.

After you use the formula to calculate the partition size (in bytes), divide by 1024 and if you have a remainder, round up to the next whole number. This is the smallest size partition in K bytes which is required for the CAM.

BSC CAMs (SYSBSCBA and SYSBSCEX)

Partition size (in bytes) = C + 20T + B + 768

C = CAM object code size. The object code sizes of the BSC CAMs are:

- SYSBSCBA (used by BSC Batch Transfer Utility) – 13,824
- SYSBSCEX (used by BSC Data Communications Utility) – 15,360

T = number of entries in trace table. Use the number you entered in response to prompt C19 of the Communications Configuration Utility.

B = minimum buffer requirement, as follows: B = N (S + 5). N is the number of buffers and S is the buffer size, in bytes. The value for N is 4 or three times the ITB blocking factor, that is, at least four buffers are required. For S, use the number you entered in response to prompt B17 of the Communications Configuration Utility.

For running SYSBBTU or SYSBDCU the minimum size for S is two greater than the largest record size being used for the input or output data sets. For SYSBOLT the minimum size for S is 302 bytes. For user-written programs the minimum buffer size is the maximum block size plus 2 to be transmitted or received.

After you use the formula to calculate the partition size (in bytes), divide by 1024 and if you have a remainder, round up to the next whole number. This is the smallest size partition in K bytes which is required for the CAM.

MRJE CAM (SYSBSCR)

Partition size (in bytes) = C + 20T + B + 768

C = CAM object code size. Use 6,912.

T = number of entries in trace table. Use the number you entered in response to prompt C19 of the Communications Configuration Utility.

B = minimum buffer requirement, as follows: B = 4 (S + 7). There are four buffers. For S, use the number you entered in response to prompt B17 of the Communications Configuration Utility.

When using ITB transmission format, the number of buffers required is three times the ITB blocking factor.

After you use the formula to calculate the partition size (in bytes), divide by 1024 and if you have a remainder, round up to the next whole number. This is the smallest size partition in K bytes which is required for the CAM.

Removing CAM from a Partition

When you select the exit option for prompt XX-26 of SYSBBTU, SYSBDCU or SYSSDCU the execution utility terminates and is removed from main storage. The CAM, however, remains in its partition. Therefore, if you want to use the partition or to load the partition with a different CAM, you must take action to remove it from main storage.

To terminate the SYSBSCBA, SYSBSCEX, SYSSNAD or SYSSNAU CAM at the normal end of job, perform the following steps in the order indicated. Steps 1–3 attach a background partition to the keyboard/display; perform these steps only if the CAM is in a background partition. If the CAM is in a foreground partition, only perform step 4.

1. Press CMD and then C to invoke the console function.

2. Press B.

3. On the data entry keyboard, press and hold down the NUM (numeric shift) key and enter the number of the partition where the CAM is. On the typewriter keyboard, just enter the partition number of the CAM. Valid entries for the partition number are 0–7.

4. Press the CMD key and then the End of Job command key.

Note: For multiple LU-LU sessions (using SYSSNAD or SYSSNAU), do not remove the CAM from main storage until all application programs which use the CAM have been terminated.

When MRJE or SRJE completes its processing, the RJE utility terminates and is removed from main storage. If the RJE utility terminates normally, it automatically removes its CAM from main storage. However, if the RJE utility does not terminate normally, the CAM may remain in its partition.

To cancel and remove any CAM from main storage at any time other than normal end of job, perform steps 1–3 if the CAM is in a background partition. Then press the CMD key and, on the data entry keyboard, press and hold down the NUM (numeric shift) key while you press the CNCL (cancel) key; on the typewriter keyboard, press and hold down the upper case shift key while you press the CNCL key. The CAM should be cancelled only to alleviate abnormal conditions.

DISKETTE DATA SETS

Types of Support

The communications utilities support diskette exchange types Basic, H and I. Position 44 of the data set label indicates the exchange type. The communications utilities support the three diskette types available for use on the 5280 system, namely 1, 2 and 2D.

The communications utilities can transmit and receive unblocked and unspanned records as well as blocked and spanned records. The data set

organizations which can be used are direct, key-indexed and sequential. However, all diskette data sets transmitted and received are treated as sequential data sets. For direct access data sets, this means that the communications execution utilities do not perform any conversions to obtain the relative record number of a record. For key-indexed data sets, the index is not transmitted. Data set labels (or headers) are not transmitted or received.

All diskette data sets used in communications are opened as *unshared* data sets. This applies to data sets which contain communications configuration records and job description records as well as user data sets that contain data to be transmitted, or data sets that are opened to receive data. When a utility completes its use of a data set, it closes the data set; it can then be opened by another program.

For more information on diskettes and diskette data sets, see the *IBM 5280 System Concepts*.

Using Diskette Data Sets for Communications

A single data set is one data set. Multiple data sets are more than one data set that are treated as a group by the execution utility. Each data set of multiple data sets has its own header (or data set label). Multiple data set names are always 8 characters in length and consist of a prefix and suffix. The prefix is the first five or six characters of the name and is the same for each data set. The first character of the name (of the prefix) must be alphabetic. The suffix consists of two or three digits and differs for each data set. The names of multiple data sets cannot contain embedded blanks.

SYSBDCU and SYSSDCU use multiple data set names that consist of a six character prefix and a two digit suffix. For example, PAYROL01, PAYROL02, PAYROL03, and PAYROL04 are multiple data sets; PAYROL is the prefix.

SYSMRJE and SYSSRJE use multiple data set names that consist of a five character prefix and a three digit suffix. For example, PRINT001, PRINT002 and PRINT003 are multiple data sets; PRINT is the prefix.

All of the execution utilities except SYSBOLT support transmitting and receiving single data sets. SYSBDCU and SYSSDCU can transmit multiple data sets; SYSBDCU, SYSSDCU, SYSMRJE and SYSSRJE can receive multiple data sets.

Transmitting Diskette Data

A data set to be transmitted can be multivolume, that is, it can be contained on more than one diskette volume. If the data set is multivolume, the data set label should contain C (for continued) or L (for last) for the multivolume indicator (position 45) and a volume sequence number (positions 46–47) from 00 to 99. To transmit multiple data sets which are multivolume, make sure that the label for the last data set to be transmitted is marked as continued.

A single data set to be transmitted is identified to SYSBBTU, SYSBDCU or SYSSDCU by its name. A data set to be transmitted by MRJE or SRJE is identified by the DSN parameter of a READFILE utility control statement.

SYSBDCU and SYSSDCU are the only execution utilities which transmit multiple data sets. To transmit multiple data sets, you specify only the prefix. The execution utility transmits only those data sets with the specified prefix which have suffixes in ascending order, beginning with 01. The utility stops transmitting when it cannot find a data set with a suffix one greater than that of the last data set transmitted. If a multiple data set has a bypass indicator (B) in position 41, the data set is not transmitted.

The diskette logical records lengths supported for data sets to be transmitted are:

Utility	Record Length
SYSBBTU	≤ 128
SYSBDCU (3741)	≤ 512
SYSBDCU (3780)	80
SYSSDCU	≤ 512

SYSSDCU always reformats the records and passes them to the CAM as 80 byte records and the host will receive them as 80 byte records. It is the host program's responsibility to reformat the records if necessary. The BSC execution utilities pass each diskette logical record to the CAM without any reformatting. Each logical record in a data set must be the same length.

Receiving Diskette Data

An important consideration when receiving diskette data is how the data set is allocated. All of the execution utilities except SYSBOLT can automatically allocate, at execution time, the data set(s) needed to receive data. If multiple data sets are to be received, or if the execution utility is MRJE or SRJE, you *must* allow the utility to allocate the data set(s). The only instance in which data can be written to a pre-allocated data set is when a *single* data set is to be received by SYSBBTU, SYSBDCU or SYSSDCU.

When receiving data to a pre-allocated data set the following diskette logical record lengths are supported:

Utility	Record Length
SYSBBTU	≤ 128
SYSBDCU (3741)	≤ 512
SYSBDCU (3780)	128 for print data
SYSBDCU (3780)	80 for punch data
SYSSDCU	≤ 512 for print, punch or console data

All records must have the same record length. The logical record length of the data set must be equal to the length of the first record received in SYSBDCU and SYSBBTU. SYSSDCU assumes the following record lengths for data received: 80 bytes for punch data, 128 bytes for print and and 120 bytes for console data. When receiving data to a preallocated data set, SYSSDCU reformats and writes the data to diskette using the record length of the data set.

If a pre-allocated data set is not large enough, the utility marks the diskette which is currently mounted as multivolume, and then notifies you that it is attempting to allocate another volume. You should mount another diskette.

When the execution utility allocates a data set, it first allocates all available space on the diskette for the data set to be received. After the data has been received, the unused space is released; this means that the end of extent is set to one less than the end of data in the header. If a permanent error occurs during execution, the unused space is not released.

When SYSBBTU or SYSBDCU receives data for a pre-allocated data set, the logical record length of the data set must equal the record length of the first record received. If the utility must allocate the data set, then the logical record length of the data set being allocated is set to the record length of the first record received. The first record received by the utility must not contain any compression characters if you specify either blank expansion or blank truncation in the communications configuration record.

When SYSBBTU, SYSBDCU or SYSSDCU allocates a data set at execution time, it allocates an I exchange data set and sets the logical record length equal to the length of the first record received. The following logical record lengths are supported:

Utility	**Record Length**
SYSBBTU	≤ 128
SYSBDCU (3741)	≤ 512
SYSBDCU (3780)	128 for print data
SYSBDCU (3780)	80 for punch data
SYSSDCU	128 for print data
SYSSDCU	80 for punch data
SYSSDCU	120 for console data

The block length is set equal to the physical sector size. All records must have the same logical record length.

For SYSBDCU and SYSSDCU, you must specify the prefix for multiple data sets to be received. The first data set received is named with the prefix and a suffix of 01; the suffix for each succeeding data set received is incremented by one.

SYSMRJE and SYSSRJE do not allow you to name a data set to be received; the utility names it according to the type of data stream, namely punch or print. The name of the first data set received is "PUNCH001" or "PRINT001". If more data streams of the same type are received, the three-digit suffix in the name is incremented by one for each new data stream.

Distributing Programs, Records and Data on Diskettes

Because the 5280 is a diskette-based system, you should plan the best way to distribute various types of data on diskettes. This minimizes the number of times that diskettes need to be mounted while an execution utility is running, and therefore contributes to more efficient utilization of your system. However, the following restrictions apply:

- The Communications Load Utility (SYSCLU), the CAM to be loaded, and the communications configuration record to be used *must* be on the same diskette.

- If a job is to be executed in unattended mode by SYSBBTU, SYSBDCU, or SYSSDCU, the diskette(s) containing the job data set and the data set(s) to be used to transmit from or receive to *must* remain mounted throughout execution of the job.

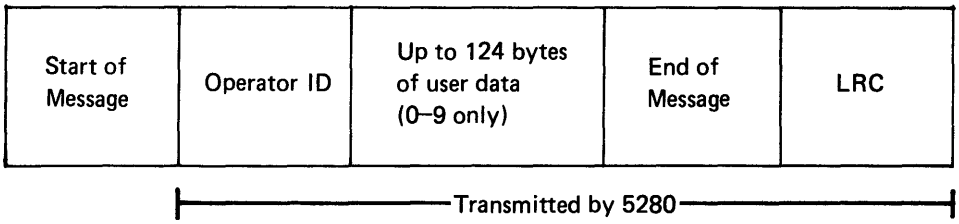
The location of the job data set(s) should be kept consistent at your facility. You may want to place the job data set(s) and your data on the same diskette or to keep them on your communications diskette.

STATUS LINE

The top line of the display is the status line. It displays information about the program which is executing in the partition attached to the keyboard/display. If an error occurs, information to help you recover from the error is displayed; in this situation, the status line flashes until you press RESET.

Magnetic Stripe Data Format

If the protocol type is 3741, SYSBDCU can transmit up to 128 bytes from the magnetic stripe in the following format:



The 5280 transmits the operator ID, user data, end of message character and the longitudinal redundancy check (LRC). The start of message character is not transmitted. The user data can consist only of digits 0-9 and must have even parity. Each digit (0-9) of the user data is transmitted in EBCDIC format (X'F0'-X'F9'). Hex digits A-F are transmitted as shown in the following chart:

Hex digit	transmitted as hex	character	
A	7A	:	operator ID
B	7B	#	
C	7C	@	start of me
D	7D	/	
E	7E	=	
F	7F		end of mes

In World Trade countries the above characters may be different. The LRC is also transmitted in EBCDIC if 0-9 or using the above table if A-F.

Note: The magnetic stripe message must not be more than 44 characters when transmitting to CICS.

To receive a magnetic stripe record before the data, you need to have defined a separate function definition record. When the 5280 receives the magnetic stripe reader data, SYSBBTU or SYSBDCU posts a 5602 error (heading text received). Then the error recovery prompt (see prompt XX-29 in Chapter 8) is displayed. Select option 6 in SYSBDCU or option 3 in SYSBBTU (continue current function) and SYSBBTU or SYSBDCU will write the magnetic stripe reader data to the diskette data set specified in the function definition record and then continue to the next function definition.

At the end of the job, SYSBBTU displays job statistics.

When a communications utility is running, the status line appears as follows:

A (position 1) is the partition number.

BBBB (positions 3–6) is the position of the cursor on the display.

C (position 13) is the shift mode of the keyboard.

DD (positions 15–16) is the number of remaining positions in the field in which you are entering data, including the cursor position.

EE (positions 18–19) is the hexadecimal value of data currently in the cursor position of the field.

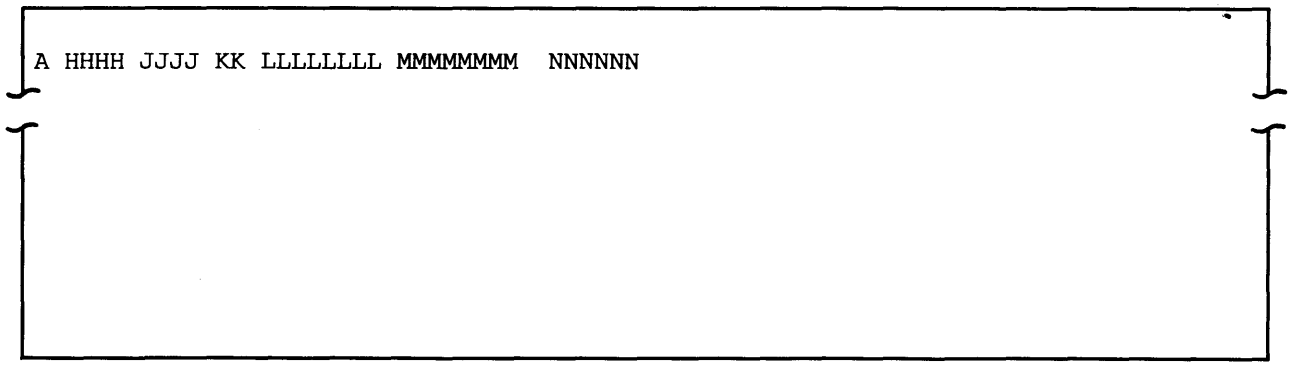
Note: Positions 3 through 19 are displayed only when you are entering data at the keyboard.

F (position 41) is the type of data transfer function which is executing, either T (transmit), R (receive) or I (inquiry).

GGGGGGGGGG (positions 43–52) display a solid rectangle as data is being transmitted or received. The rectangle moves from one position to another, from left to right. Each move of the rectangle represents two logical reads transmitted or received.

Note: Positions 41 through 52 are displayed only when SYSBDCU or SYSSDCU is executing a job. in a foreground partition.

The format of the status line when error occurs is:



A (position 1) is the partition number.

HHHH (positions 3–6) is the physical device address, if any, of the device associated with the error.

JJJJ (positions 8–11) is the error code. To determine the specific cause of and recovery for the error, look up the error code in the *5280 Message Manual*.

KK (positions 13–14) is the logical device address, if any, of the device associated with the error.

LLLLLLLL (positions 16–23) is the name of the utility which is executing in partition A.

MMMMMMMM (positions 25–32) is the last 8 characters of the data set name (if applicable). If a 5XXX or 9XXX error is displayed in SYSBBTU, the function name is displayed in these positions.

NNNNNN (positions 35–40) is the BSC 3741 status code or the category and modifier bytes (in hex) of the SNA sense code, if either is applicable.

FUNCTION AND COMMAND KEYS

Function Keys

The following figures show the data entry and typewriter keyboards. The keys which can be used while executing a communications utility are explained below.

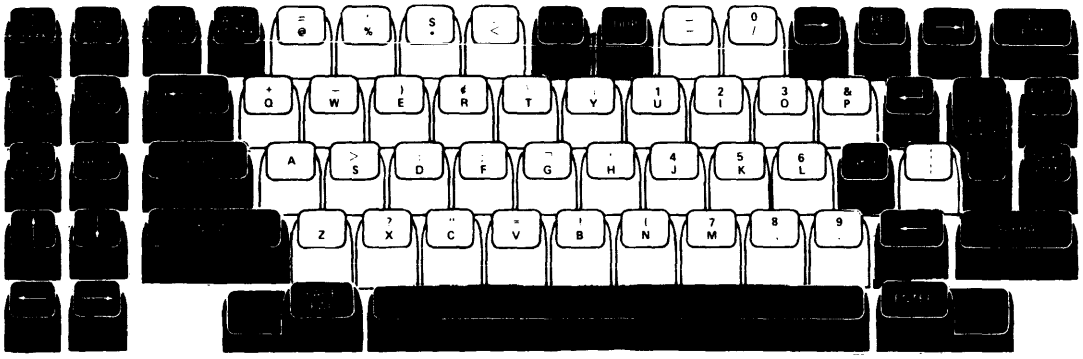


Figure 8-1. Data Entry Keyboard

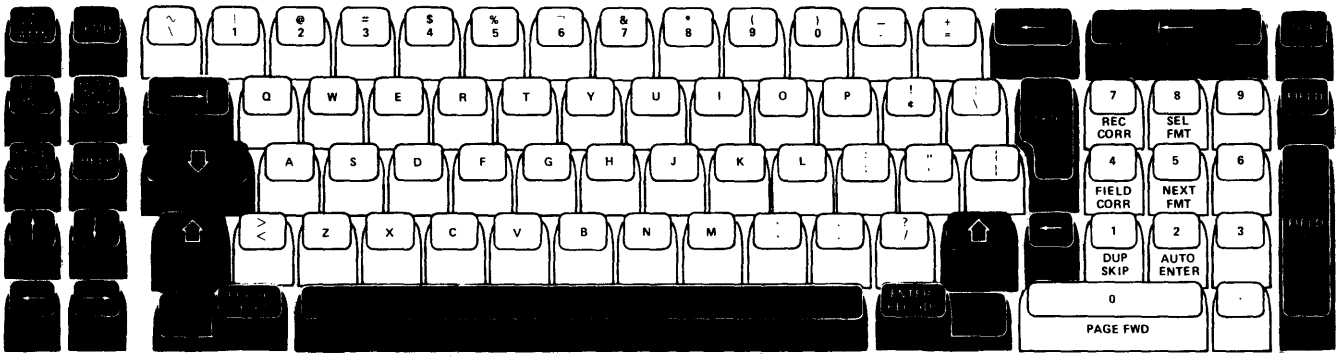


Figure 8-2. Typewriter Keyboard

SYS REQ/ATTN

The system request key is most commonly used to load a program into a background partition. If a communications utility is running in a foreground partition and this key is pressed, the system load prompt (prompt 05-00) appears on the display. You can then load a program into a background partition. After you load the background partition and the keyboard/display is no longer needed, press the ATTN key.

The attention key allows a partition to detach from the keyboard/display. When a background partition requests the use of the keyboard/display, a solid rectangle appears on the right side of the display. When you press this key, the requesting background partition is attached to the keyboard/display.

All of the communications utilities support the use of SYS REQ/ATTN.

Down Cursor

The down cursor key temporarily stops data being scrolled up on the display. It can be used when you are running SYSBDCU, SYSSDCU, SYSMRJE and SYSSRJE. When the utility has additional output for the display, error 9113 occurs. Press the RESET key to recover from the error and resume scrolling.

RESET and ERROR RESET

This key stops the flashing on the status line and unlocks the keyboard after an error occurs. When an error occurs, check the status line for the specific error code before you press RESET. After you press RESET for some communications errors, the utility displays a prompt which provides valid recovery options (see "Error Recovery for SYSBBTU, SYSBDCU and SYSSDCU" later in this chapter). After you press RESET for some syntax errors, the utility redisplays the prompt so you can enter a valid response.

Command Keys

Figure 8-3 shows the template which is used in conjunction with the CMD key. The commands which can be used in communications are shown in white.

	Comm Attention	End Input	Comm Status	Search End of Data	Load Format	Change Format	Display Format	Display Data		Dump/ Trace File Open	Auto Mark	Alternate Record Advance	Clear Screen
Hex	Review Second Dataset	Transfer Record	Return to Transaction Dataset	Search Content	Search Seq Content	Search Record Number	End of Job	Edit Release	Mark Field	Delete Record	Insert Record	Display Verify Record	

Figure 8-3. Command Keys

Comm Attention

SYSMRJE and SYSSRJE use the Comm Attention command key sequence to open the keyboard for input. This sequence must be entered each time you want to enter input from the keyboard. To make multiple successive entries, you must use Comm Attention after each time you press ENTER.

End Input

End Input is supported by SYSCCU, SYSBDCU and SYSSDCU. For SYSCCU, this command key sequence indicates that you want to end the prompting sequence, that is, you have completed all updates to a communications configuration record. For the latter two utilities, it applies only when the utility is executing a function which transmits data from the keyboard or an inquiry function. It indicates that no more data for the current function will be entered from the keyboard.

Comm Status is supported by all execution utilities except SYSBOLT and SYSBBTU. It is used to display function or job statistics, status/counters and error log information. The utility continues processing while the statistics are displayed.

SYSBDCU, SYSSDCU, SYSMRJE and SYSSRJE display this information as scrolled data. To stop the scrolling, press the down cursor key. When the utility has additional output for the display, error 9113 occurs. Press the RESET key to recover from the error and resume scrolling.

The communications status is displayed on the right side of the screen in the following format:

```
STATUS/COUNTERS          ERROR LOG INFORMATION

S1 S2 S3 S4 S5           XXYY     EEEEPPPPPPPPINCC

S6 S7 S8 S9 S10          XXYY     EEEEPPPPPPPPINCC

C1 C2 C3 C4              XXYY     EEEEPPPPPPPPINCC

C5 C6 C7 C8              XXYY     EEEEPPPPPPPPINCC

C9 C10 C11 C12           XXYY     EEEEPPPPPPPPINCC
```

This display is scrolled up from line 10. If the display station is being used as an input or output device, you may use the STOP SCROLL function key which is the cursor down key, to stop the display from being scrolled off the screen by output to the screen. If the STOP SCROLL function key is pressed, the utility displays an X'9113' error code on the status line as soon as the screen is required for additional output. You can then press the RESET key to continue scrolling.

The information on the communications status portion of the screen contains the following fields from the Communications Control Block (CCB) in hexadecimal notation:

S1-S8 - Represents status bytes 1-8 of the CCB (displacement X'00' - X7').

S9 - Trap Status (displacement X'4F').

S10 - System Indicators (displacement X'F8').

C1 - Underrun Counter (displacement X'60').

C2 - Overrun Counter (displacement X'61').

C3 - Data Set Ready Glitch Counter (displacement X'62').

C4 - Clear to Send Glitch Counter (displacement X'63').

C5 - Carrier Detect Glitch Counter (displacement X'64').

C6 - Frame Check Sequence Error Counter-SDLC (displacement X'65').

Block Check Character Error Counter-BSC (displacement X'65').

C7 - Sequence Error Counter-SDLC (displacement X'66').

Data Response Timeout Counter-BSC (displacement X'66').

C8 - Transmit Retry Count (displacement X'67').

C9 - Test Command Received-SDLC (displacement X'68').

Line Bid Timeout Counter-BSC (displacement X'68').

C10 - Test Response Sent-SDLC (displacement X'69').

Write Timeout Counter-BSC (displacement X'69').

C11 - Read Timeout Counter-BSC (displacement X'6A').

C12 - Cummulative Count of Received NAKS-BSC (displacement X'53').

The error log information contains the last five distinct CCB and CAM errors and their frequency of occurrence. The CCB error log, which is made up of five 2-byte entries, contains error counters. The CAM error log, which is made up of five 12-byte entries, contains error information recorded by the communications access method.

The CCB error log (displacement X'6C' of CCB) is displayed in the following format in hex:

XX Error Code Byte

YY Counter Byte

The CAM error log (in CCB Extension) is displayed in the following format:

EEEE Error code (in hex)

PPPPPPPP Program name

I IOB number (in hex)

N Partition number

CC Counter (in hex)

Additional information about the above CCB fields and error log can be found in the *5280 Data Areas and Diagnostic Aids Handbook*.

End of Job

End of Job is supported by all the utilities, and causes the utility to terminate processing. Most of the preparation utilities display a prompt which allows you to terminate or restart the utility. After you enter the End of Job command key sequence, the execution utilities display job statistics; in some instances a prompt which allows you to terminate or restart the utility is then displayed.

End of Job is also used to remove the CAM from main storage. (See "Removing CAM from a Partition" in this chapter.)

CNCL

The CNCL (cancel) key is a function key, but in communications it is used in conjunction with the CMD key. The key sequence CMD, shift and CNCL is used to cancel and remove the CAM from main storage to alleviate hang or severe error conditions (see "Removing CAM from a Partition" in this chapter).

Console

To invoke the console function, press CMD and then C. This function is used when attaching a background partition to the keyboard/display. Refer to the *IBM 5280 Systems Concepts* for use of this command key.

MRJE AND SRJE MESSAGES

The following messages can be generated by MRJE or SRJE. Those which appear in conjunction with an error code on the status line are followed by an asterisk (*). For further information on these messages, look up the error code in the *5280 Message Manual.*

ABORT RECEIVED: This message appears for SRJE only. It indicates that the host system has terminated the data stream it was transmitting.

DUMP/TRACE FILE OPEN: Prompts will be displayed to allow the dump/trace file to be opened. Refer to *Functions Reference Manual,* GA21-9353, for additional information.

AUTO ALLOCATE FAILED ON DRIVE NNNN:* The error code indicates the reason why data set allocation on diskette drive NNNN failed. If the error code is 3228 and the data set name on the status line is the name of a previously allocated data set, the diskette is full. Mount another diskette.

CAM LOAD FAILED:* The RJE utility was unable to load CAM in the requested partition.

CANCEL COMPLETE: This message appears for SRJE only. It indicates that a CANCEL request was received from the host and has been completed.

DISCONNECT RECEIVED: This message appears for MRJE only. Following LOGOFF, this is a normal condition. At any other time, it indicates that the host system has terminated the session.

EOF MUST BE IN READER STREAM: An EOF statement was entered from the keyboard while the keyboard was not assigned as the reader device. To assign the keyboard as the reader, enter a MODIFY statement with RDR-K.

INCORRECT JOB NAME: The job description record specified to be used was not created for the RJE utility you are executing. Check the job name and the name of the execution utility (see prompts 68-01 and 68-03 of the RJE Description Utility) to ensure they are correct.

INVALID AUTO ALLOCATE DEVICE:* The device address in the job description record is invalid for auto allocation.

INVALID DEVICE ADDRESS:* An invalid device address was entered.

LOGON FAILED:* The error code indicates the reason why logon failed.

NO AUTO ALLOCATE DEVICE:* The job description record does not contain a device address for automatic allocation of a diskette data set, but diskette output has been requested.

OUTPUT DEVICE FOR YYYYY NOT ASSIGNED: The value of YYYYY is either PUNCH or PRINT. This message indicates that a device has not been assigned for the data stream type (punch or print). Enter a MODIFY statement to assign a device to receive the data stream.

READER INHIBITED BY HOST: The host response to logon indicated that no reader input would be accepted.

READER TERMINATED: The RJE utility has read an EOF utility control statement or encountered the physical end of data set for the last READFILE. This means that there is no more data to be sent to the host in this reader stream. If the keyboard was the reader (MODIFY RDR-K) for this reader stream, it has automatically been reset to RDR-N.

READFILE ACTIVE QUEUE OVERFLOW: The maximum number of nested diskette READFILE statements after the first READFILE is eight. This message means that the maximum has been exceeded. The job terminates.

READFILE PENDING QUEUE OVERFLOW: The maximum number of pending nested READFILE statements entered from the keyboard is eight. This message means that the maximum has been exceeded, and the last READFILE entered was not accepted.

READFILE REQUIRED: The RJE utility cannot find the data set specified in a job description record.

READY FOR INPUT: This message appears when initialization is complete. Press the CMD key, and then hold down the shift key while you press Comm Attention. The keyboard can now be used to enter input.

SHUTDOWN COMPLETE: This message appears for SRJE only. It indicates that a request shutdown command was received from the host and has been completed.

SYSLOG WRAPPING:* The syslog data set is full. Insert another diskette with the same data set name for the syslog data set, or press RESET and the data currently in the syslog data set will be overlaid.

UTILITY COMMAND ACCEPTED: The RJE utility has read and accepted the last utility control statement you entered.

UTILITY COMMAND ERROR: The RJE utility has read a utility control statement (that is, a record starting with "..ƀ"), but it contains an invalid entry or a device assignment conflict. Correct and re-enter the last utility control statement shown on the display.

In the following four messages, XXXXXXXX is the name of a diskette data set.

XXXXXXXX ALLOCATED: The RJE utility has allocated the above-named data set to receive a print or punch data stream from the host.

XXXXXXXX CLOSED: For a transmit operation, this message appears after the file has been transmitted. For a receive operation, it occurs after the job output has been received and written to diskette. It also appears if the diskette is the log device and you enter a MODIFY statement to assign a different log device.

XXXXXXXX OPENED: This message appears when the RJE utility opens a data set to be transmitted or when it encounters a MODIFY statement which assigns the diskette as the log device (LOG-D).

XXXXXXXX NOT FOUND: The RJE utility tried to open but could not find the above-named data set. Check to ensure that the correct data set name was specified and that the diskette which contains it is mounted on the proper drive. This message occurs when the RJE utility tries to open a data set specified in a READFILE statement or in the DSN parameter of MODIFY LOG-D.

In the following five messages, ZZZZ is the name of the RJE execution utility, either MRJE or SRJE.

ZZZZ INITIALIZATION COMPLETE: The RJE utility has read the job description record, the proper CAM has been loaded, and the line connection from the 5280 to the host has been established.

ZZZZ INPUT ERROR:* When the RJE utility was receiving data, the CAM returned an abnormal completion code. Refer to the *5280 Messages Manual.*

ZZZZ OUTPUT ERROR:* When the RJE utility was transmitting data, the CAM returned an abnormal completion code. Refer to the *5280 Messages Manual.*

ZZZZ STARTED: The RJE utility has begun to execute a communications job.

ZZZZ START ERROR:* Before initialization was complete, the CAM returned an abnormal completion code. Refer to the *5280 Messages Manual.*

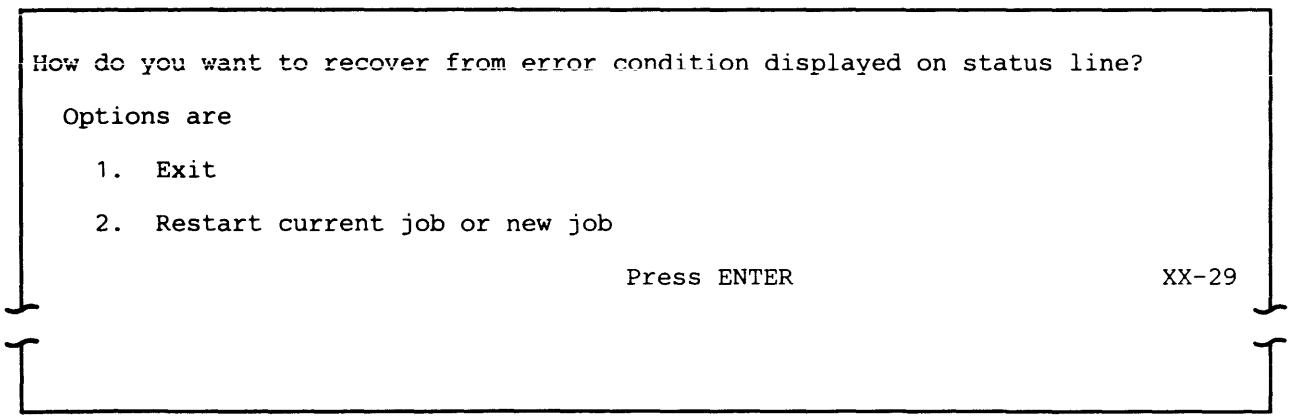
ERROR RECOVERY FOR SYSBBTU, SYSBDCU AND SYSSDCU

SYSBBTU, SYSBDCU and SYSSDCU provide prompts which allow you to select an option to recover from an error. If an error occurs while one of these utilities is executing a job, the following conditions occur simultaneously:

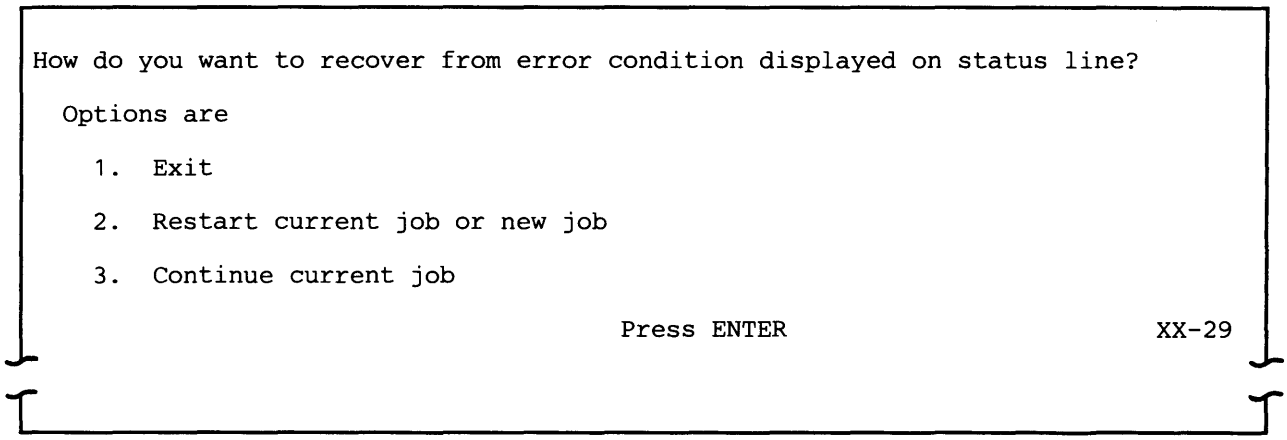
- For SYSBDCU and SYSSDCU function statistics are displayed. If the error is a communications error (error code 4XXX or 5XXX), counters and error log information are shown on the right side of the display. See Chapters 3 and 4 for a complete description of the function statistics.
- The status line displays error information, including the four-digit error code (positions 8–11) and the name of the utility (positions 16–23).
- The status line flashes.

To determine the specific cause of the error, look up the error code in the *5280 Message Manual.* To stop the flashing of the status line, press RESET.

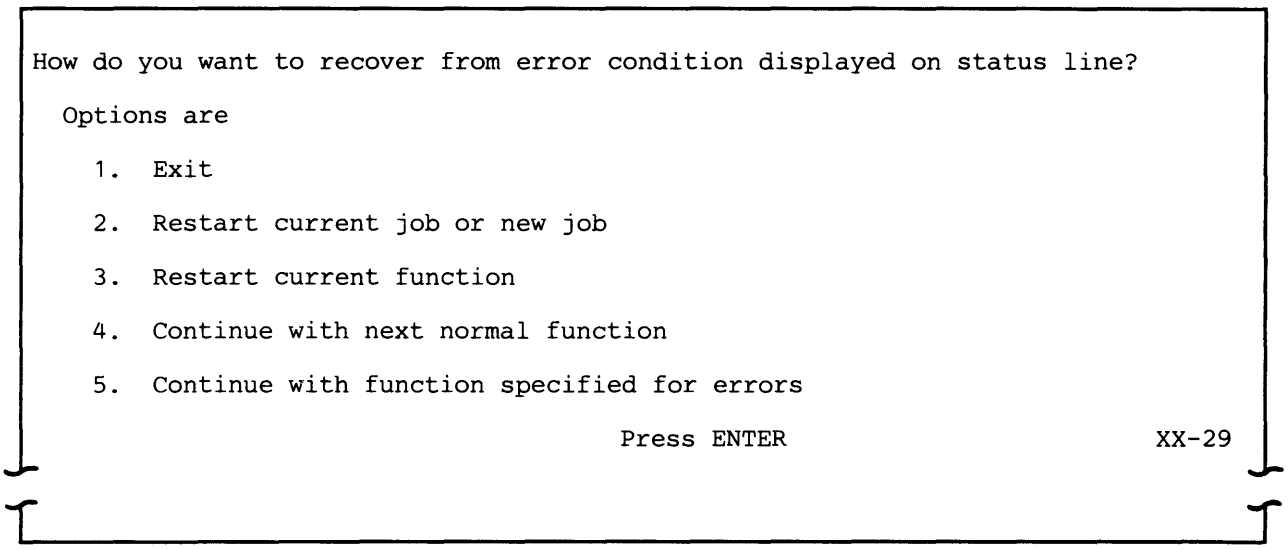
After you press RESET, an error recovery prompt appears. The recovery options displayed vary depending on the cause of the error. The value of XX (the first two positions of the prompt ID) in the following prompts can be 62 (for SYSBBTU), 63 (for SYSBDCU), or 64 (for SYSSDCU).



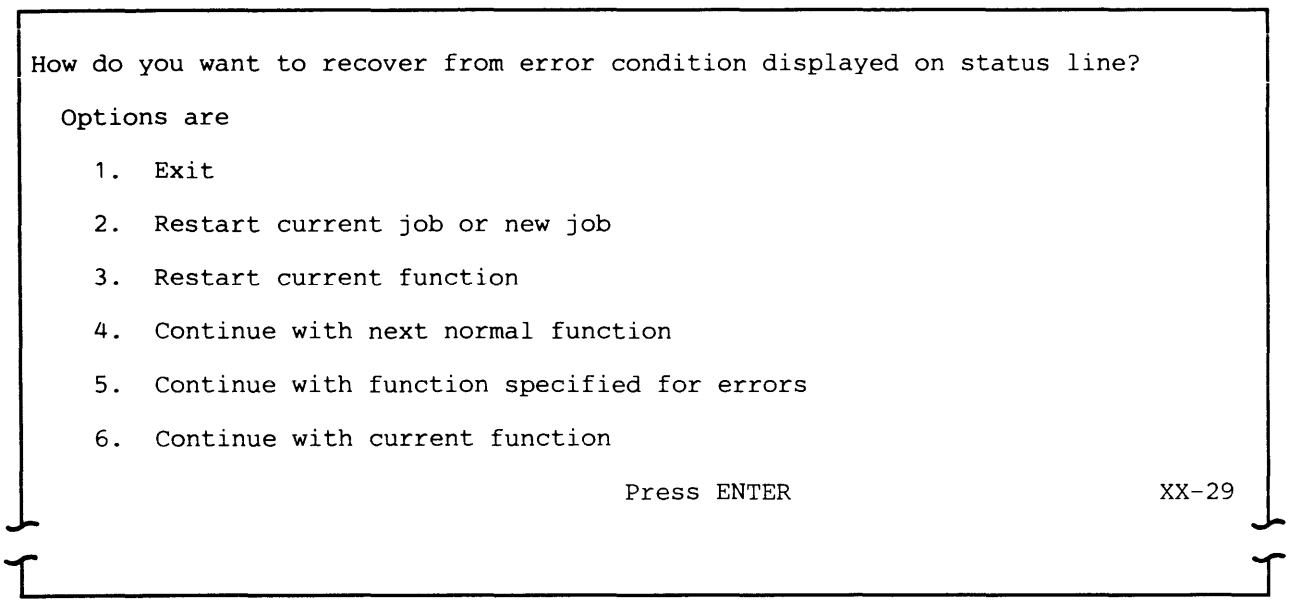
This prompt appears when a terminal error occurs. The job which was executing terminates.



This prompt appears if a diskette error occurs while the utility is trying to obtain a job description or function definition record.



This prompt appears in SYSBDCU and SYSSDCU when the function which was executing cannot continue, but the current job can continue.



This prompt appears when an error requiring operator intervention occurs. After the error condition is corrected, the function which was executing can continue.

The meanings of the error recovery options are given below.

Select 1 to prematurely end the current function and job. Job statistics for the current job (prompt XX-37) will be displayed. After you press ENTER, the utility displays the system load prompt if in a foreground partition or exits the partition if in a background partition.

Select 2 to prematurely end the current function and job. Then job statistics for the current job will be displayed. After you press ENTER, the prompt requesting job information (XX-01) reappears.

Select 3 to end the current function early and start the current function from the beginning again.

The utility closes all open diskette data sets if you select any error recovery except to continue the current function or job (option 3 or option 6). If the current function is a receive or inquiry function, the data set header label is updated in one of the following ways:

- The utility closes the data set without updating the header label if the utility is adding data to a data set. The last volume empty is the utility added volumes to a multivolume data set.
- The data set header label is updated as usual if the utility is replacing data in a data set.
- The data set header label is updated as usual and any unused space is released if the utility is allocating the data set.

If the error that occurs is a printer or diskette error and the user does not select to continue the current function, the utility notifies the host that the

current data set is being aborted. SYSBCDU and SYSBBTU notify the host by sending an early EOT followed by the status character D (X'C4'). SYSSDCU notifies the host by sending a negative response with the sense code X'0824' (compnent aborted).

If the error that occurs is a diskette error and the user chooses to continue the current job or function, the utility displays the following prompt:

```
Insert diskette-data set name is XXXXXXXXXXXXXXXXX

                Device address is YYYY

                                        Press ENTER                    XX-31
```

If the error is a multivolume sequence error (9102) or an incomplete data set (9700), the utility displays the following information with prompt XX-31.

VOLUME SEQUENCE NUMBER XX

Insert the diskette containing the indicated data set and volume if the data set is preallocated.

Insert a diskette that does not have the indicated dat set name if the utility is allocating the indicated data set.

Note: The job statistics are cumulative each time option 3 is is selected and, therefore, will not accurately indicate the number of reads or the number of multiple data sets transmitted or received from the 5280 I/O device.

Select 4 to end the current function before completion and continue the current job with the next function in the job.

Select 5 to end the current function early and continue processing with the alternate function specified for errors.

Note: If any of the above options (1–5) are selected after a diskette or printer error, data that has been received but not yet written to the I/O device may be lost. Also note that options 3, 4, and 5 are not displayed in SYSBBTU and option 6 is displayed as option 3.

Select 6 or 3 if you want to correct the error and continue normal processing. For diskette I/O errors, the utility asks you to insert the correct diskette. If you want to continue after a magnetic stripe reader error, prompt 63-30 will reappear. For printer errors, you must correct the error before you press ENTER.

UNATTENDED OPERATION ERROR RECOVERY

When a job is being executed by SYSBDCU or by SYSSDCU in an unattended mode and a 46XX or 56XX error or any other noncommunications I/O device error occurs, the utility will end the current function and attempt to execute the alternate FDR if it was specified for the function in which the error occurred.

For the following conditions in unattended mode, the utilities will terminate the session:

- All errors in SYSBBTU
- All communications errors except 46XX and 56XX in SYSBDCU and SYSSDCU
- If no alternate function definition was specified for the function in which the error occurred

After the utility terminates the session, the error code is displayed on the status line. If the utility is SYSBDCU or SYSSDCU the function statistics are also displayed, and if the error was a communications error, the communications status information is displayed. After you press the reset key, the utility goes through normal termination and displays the job statistics followed by the end options prompt.

For any error which occurs while executing SYSSRJE or SYSMRJE in unattended mode, the session is terminated and the utility displays the job statistics. When you press the enter key, the utility exits the partition. If the log was specified to go to diskette, you should later print the log to determine the cause of the failure.

Appendix A. Status Codes Sent by the 5280 to the Host

The format of the status message sent by the 5280 is SOH.%.V.STX.Q.ETX where "Q" is the variable status code. The following status codes and their meaning are sent by the 5280:

Status Code	Meaning
D	Device I/O error and the user chose not to continue. The user selected a recovery option other than "6" in SYSBDCU or "3" in SYSBBTU.
S	Job is aborted. The user entered the end of job key sequence.
U	Application mismatch. The host sent data when the 5280 was expecting to transmit.

Appendix B. BSC Data Link Control Characters

The following are the data link control characters used in Binary Synchronous Communications (BSC) by the 5280 system. Shown below each character sequence is its hexadecimal representation.

Name	Mnemonic	ASCII	EBCDIC
Start of heading	SOH	SOH 01	SOH 01
Start of text	STX	STX 02	STX 02
End of transmission block	ETB	ETB 17	ETB 26
End of text	ETX	ETX 03	ETX 03
End of transmission	EOT	EOT 04	EOT 37
Enquiry	ENQ	ENQ 05	ENQ 2D
Negative acknowledge	NAK	NAK 15	NAK 3D
Synchronous idle	SYN	SYN 16	SYN 32
Data link escape	DLE	DLE 10	DLE 10
Intermediate block character	ITB	US 1F	IUS 1F
Even acknowledge	ACK0	DLE 0 1030	DLE(70) 1070
Odd acknowledge	ACK1	DLE 1 1031	DLE/ 1061
Wait before transmit–positive acknowledge	WACK	DLE; 103B	DLE, 106B
Mandatory disconnect	DISC	DLE EOT 1004	DLE EOT 1037
Inter group separator	IGS	GS 1D	IGS 1D
Inter record separator	IRS		IRS 1E
Reverse interrupt	RVI	DLE< 103C	DLE@ 107C
Temporary text delay	TTD	STX ENQ 0205	STX ENQ 022D
Transparent start of text	XSTX		DLE STX 1002
Transparent intermediate block	XITB		DLE IUS 101F
Transparent end of text	XETX		DLE ETX 1003
Transparent end of transmission block	XETB		DLE ETB

Name	Mnemonic	ASCII	EBCDIC
			1026
Transparent synchronous idle	XSYN		DLE SYN
			1032
Transparent block cancel	XENQ		DLE ENQ
			102D
Transparent TTD	XTTD		DLE STX DLE ENQ
			10 02 10 20
Data DLE in transparent mode	XDLE		DLE DLE
			10 10

Appendix C. BSC Utility/CAM Protocol

The following diagrams are intended to be used by personnel knowledgeable about BSC link protocol.

FDR	UTL.	LINE
XMIT MULTIPLE (2 data sets) or XMIT MULTIPLE (1 data set) chained to a XMIT SINGLE	TINIT TOPEN	
	TWRITE (1st data set)	ENQ → ACK ← DATA → ACK ←
	TCLOZ TOPEN	
	TWRITE (2nd data set)	NULL → ACK ← DATA → ACK ←
	TCLOZ	
	TTERM	NULL → ACK ← EOT →
RECV MULTIPLE (2 data sets)	TINIT TOPEN	
	TREAD (1st data set)	ENQ ← ACK → DATA ←
	TREAD (end of data)	ACK → NULL ←
	TCLOZ TOPEN	
	TREAD (2nd data set)	ACK → DATA ←
	TREAD (end of data)	ACK → NULL ←
	TCLOZ TOPEN	
	TREAD (end of transmission)	ACK → EOT ←
	TCLOZ TTERM	

FDR	UTL.	LINE
XMIT SINGLE chained to a RECV SINGLE	TINIT TOPEN	
	TWRITE	ENQ → ACK ← DATA → ACK ←
RECV SINGLE	TCLOZ TOPEN	
	TREAD	NULL → ACK ← EOT → ENQ ← ACK → DATA ←
	TREAD (end of data)	ACK → NULL ←
	TCLOZ	
	TTERM	ACK → EOT ←
RECV SINGLE chained to a XMIT SINGLE	TINIT TOPEN	
	TREAD	ENQ ← ACK → DATA ←
	TREAD (end of data)	ACK → NULL ←
XMIT SINGLE	TCLOZ TOPEN	
	TWRITE	ACK → EOT ← ENQ → ACK ← DATA → ACK ←
	TCLOZ	
	TTERM	NULL → ACK ← EOT →

FDR	UTL	LINE
INQUIRY MULTIPLE (2 inquiries) CICS/IMS	TINIT TOPEN	
	TWRITE (1st inquiry)	ENQ (ID) → (ID) ACK ← REQUEST →
	TREAD	RVI ← EOT → ENQ ← ACK → DATA ←
	TREAD (end of data)	ACK → NULL ←
	TCLOZ TOPEN	
	TWRITE (2nd inquiry)	ACK → EOT ← ENQ → ACK ← REQUEST →
	TREAD	RVI ← EOT → ENQ ← ACK → DATA ←
	TREAD (end of data)	ACK → NULL ←
	TCLOZ	
	TTERM	ACK → EOT ←
INQUIRY CONVERSATIONAL BTAM	TINIT TOPEN	
	TWRITE	ENQ (ID) → (ID) ACK ← REQUEST →
	TREAD	DATA ←
	TREAD (end of data)	ACK → NULL ←
	TCLOZ	
	TTERM	ACK → EOT ←

FDR	UTL.	LINE
RECV MULTIPLE (1 data set) chained to a RECV SINGLE	TINIT TOPEN	
	TREAD	ENQ ← ACK → DATA ←
	TREAD (end of data)	ACK → NULL ←
	TCLOZ TOPEN	
	TREAD (end of transmission)	ACK → EOT ←
RECV SINGLE	TCLOZ TOPEN	
	TREAD	ENQ ← ACK → DATA ←
	TREAD (end of data)	ACK → NULL ←
	TCLOZ	
	TTERM	ACK → EOT ←

Appendix D. MRJE Link Protocol

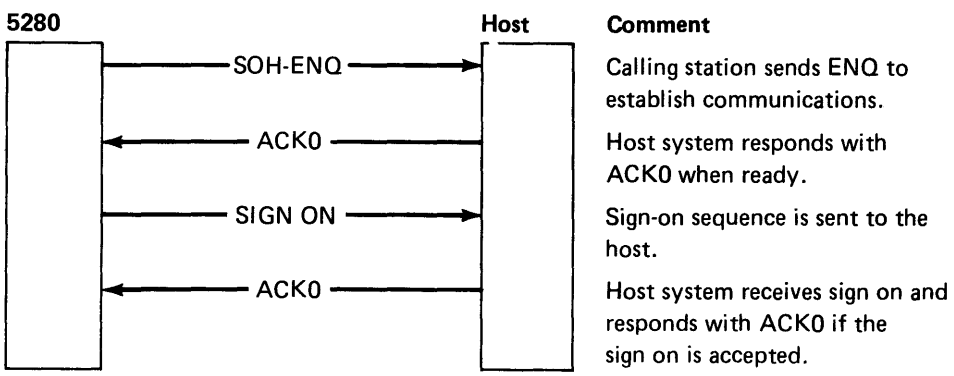
BSC CONTROL CHARACTERS USED BY MRJE

MRJE supports only EBCDIC transmission code. The following EBCDIC BSC control characters are used by MRJE:

Name	Mnemonic	Hex Value
Start of heading	SOH	01
Start of text	STX	02
End of transmission block	ETB	26
End of transmission	EOT	37
Enquiry	ENQ	2D
Negative acknowledge	NAK	3D
Synchronous idle	SYN	32
Data link escape	DLE	10
Even acknowledge	ACK0	1070
Mandatory disconnect	DISC	1037

SESSION INITIATION

The 5280 system initiates all sessions with the host system. The 5280 is always the bidder.



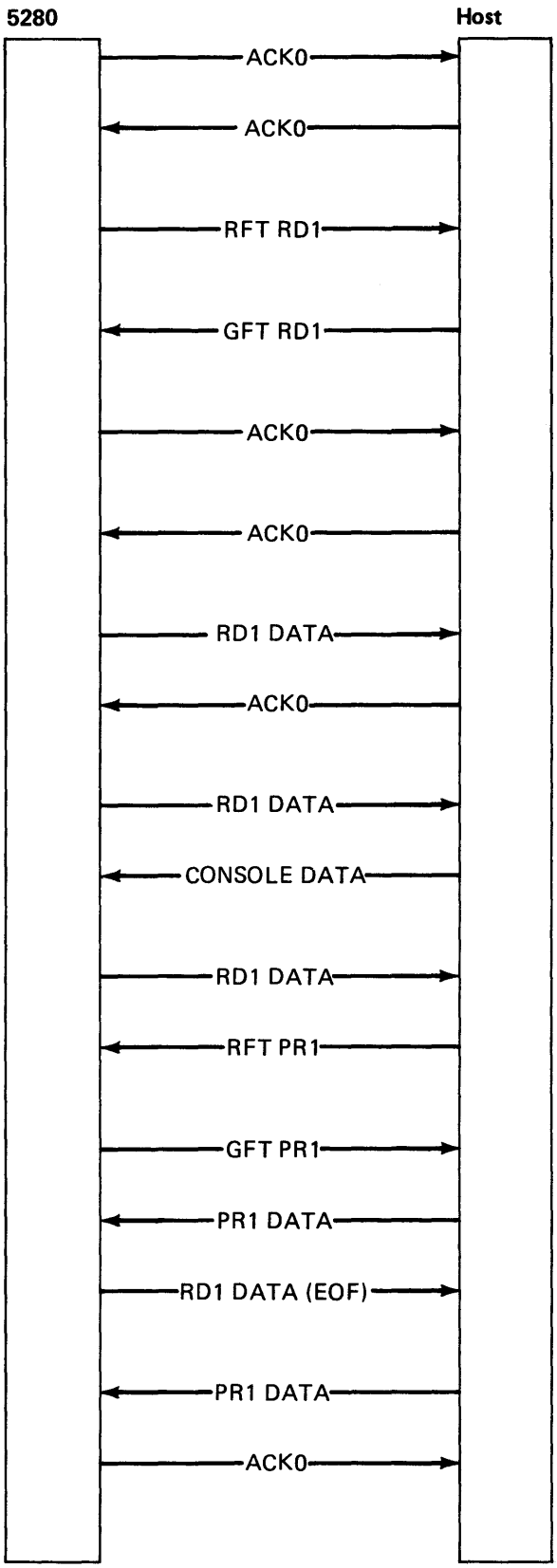
The 5280 retries ENQ the number of times specified in the communications configuration record (see prompt B18 of the Communications Configuration Utility). After the retry limit is reached, the operator is informed (via completion

code 5502) that communications with the host has *not* been established. The operator then has the option to try again to establish communications or to terminate the MRJE program.

If the host does not accept the signon/logon from the 5280, the host responds with EOT or DISC and the session and the MRJE program are terminated.

DATA TRANSMISSION

The following sequence is a generalized illustration of the MULTI-LEAVING characteristics of MRJE line protocol.



Comment

5280 sends ACK0 because there is nothing to send (see note 1).

Host system responds with ACK0 because there is nothing to send (see note 1).

MRJE sends request function transmission (RFT) for the reader (RD1).

Host system sends grant function transmission (GFT) allowing activation of the reader.

5280 sends ACK0 because there is no data ready to send to the host.

Host system responds with ACK0 because there is nothing to send to the 5280.

5280 sends a RD1 text block to the host system.

Host system responds with ACK0 if there is no information to send.

5280 sends another RD1 text block to the host.

Host system responds with data to be displayed at the keyboard/display (see note 2).

5280 responds with another text block.

Host system responds with a request function transmission for the 5280 print data set.

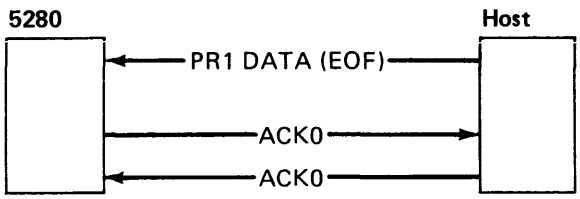
5280 sends grant function transmission for the print data.

Host sends a print data stream to the 5280.

5280 sends an RD1 text block with end of file (end of reader input).

Host system sends another printer text block (see note 2).

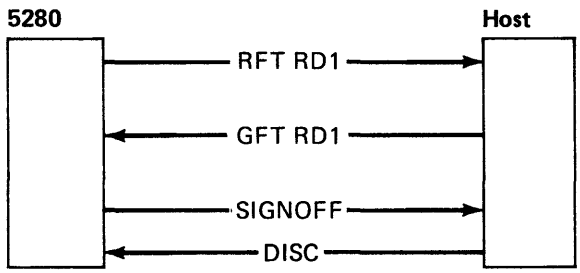
5280 responds with ACK0 because the print data has been received and there is no more data to send from the 5280.



Notes.

1. When there is no information to be transferred, the line connection is maintained by sending and receiving ACK0. This sequence continues until either the host system or the 5280 system has information to transmit.
2. If either station receives a transmission successfully and has data ready to transmit, the data transmission is a positive acknowledgement to the data received (ACK0 is not required). Positive acknowledge is embedded in the transmission block in the form of a block sequence count field in the block control byte.

SESSION TERMINATION



On a switched line, the 5280 system will drop the line connection after receipt of DISC.

Appendix E. 5280 SNA BIND Support

Bind session (BIND) is sent by the host to the 5280 system 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 5280 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 5280 are given below.

Displacement Hex	Dec	Bytes	Field Description	
0	0	1	Request code	
			X'31'	BIND request code
1	1	1	Format and type	
			0000....	Format 0
			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	PLU protocol
			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 (SYSSDCU and SYSSRJE only)

Displacement Hex	Dec	Bytes	Field Description	
			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
			.....1.	Compression may be used on requests from the secondary (SYSSDCU and SYSSRJE only)
			0	Secondary will not send EB
			1	Secondary may send EB
6	6	1	FM usage	Common protocol
			0....000	Reserved
			.0.....	No FM headers allowed (user interface only)
			.1.....	FM headers allowed (SYSSDCU and SYSSRJE 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

Displacement Hex	Dec	Bytes	Field Description	
8	8	1	TS usage	
			0.....	One stage pacing
			1.....	Two stage pacing
			.0.....	Reserved
			..NNNNNN	Secondary send pacing count
9	9	1	TS usage	
			00.....	Reserved
			..NNNNNN	Secondary receive pacing count
A	10	1	TS usage	
			X'85'	Secondary maximum send RU size (larger values are acceptable)
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 by 5280)
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. These fields are used by the SNA CAMs only for SYSSDCU and SYSSRJE batch support. FM headers are not supported for the SNA user interface.

Displacement Hex	Dec	Bytes	Field Description	
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
			...00000	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
			.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

Displacement Hex	Dec	Bytes	Field Description	
			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 (SYSSRJE only)
			...0....	Disk data management format not allowed
			...1....	Disk data management format allowed (CICS/VS, IMS/VS). 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 (allowed for IMS/CICS hosts only)
			0	Reserved

The following four bytes describe the 5280 support of the indicated items as they will be sent from the 5280. These bytes will not be validated by the 5280 system upon receipt of the BIND from the host, since the host may support more than the 5280 will send.

Displacement Hex	Dec	Bytes	Field Description	
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
			.....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
			.0.....	PLU will not alternate from attended to unattended
			..000000	Reserved

Displacement Hex	Dec	Bytes	Field Description	
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
			......1.	PLU must send CD every EDS
			0	Reserved
1A	26	1	CRYPTO field	
			0000....	Reserved
			0000	Length of CRYPTO field
1B	27	1	LUNAME field	
			X'00'	Length of LUNAME field
			0–8	LUNAME
N	M	1	User data field	
			X'00'	Length of user data field

Any remaining BIND fields are ignored by the 5280.

In the secondary LU parameter request protocol, the 5280 system supports either exception response or definite response.

The 5280 system will never request 'no response.' The BIND will be rejected if this parameter specifies no response (B'00').

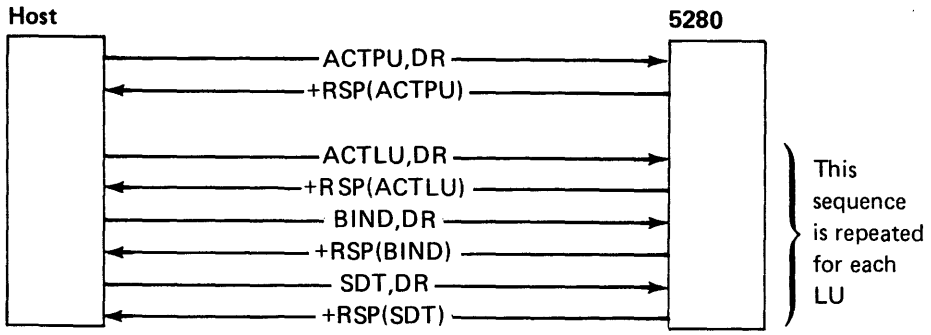
Appendix F. SNA Protocol Sequence Diagrams

This appendix shows sample transmission flows that depict some of the common protocol sequences used while the 5280 is in session with various host subsystems. It contains a subset of the host protocols which are possible. The protocols can also occur in different sequences than those shown. Abbreviations used in the diagrams are:

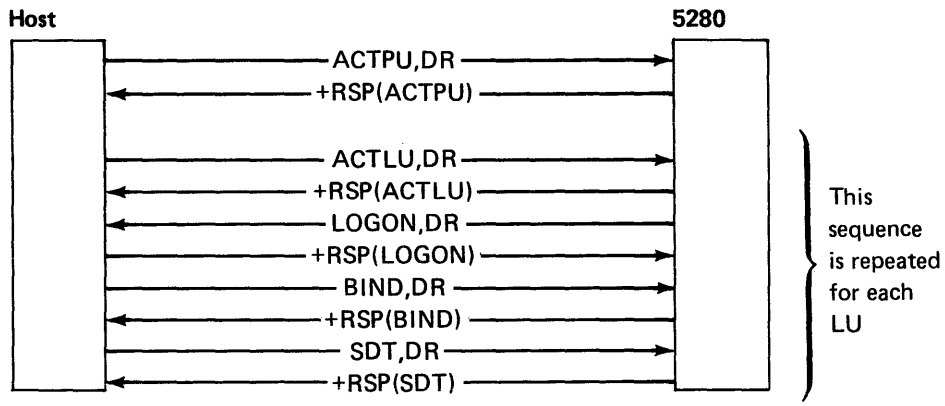
BB	begin bracket
EB	end bracket
FC	first in chain
MC	middle of chain
LC	last in chain
OC	only in chain
FMH	function management header
ADS	abort data set
BDS	begin data set
EDS	end data set
SDS	suspend data set
RDS	resume data set
CD	change direction
ER	exception response request
DR	definite response request
+RSP	positive response
−RSP	negative response

Activation/Deactivation for All Hosts

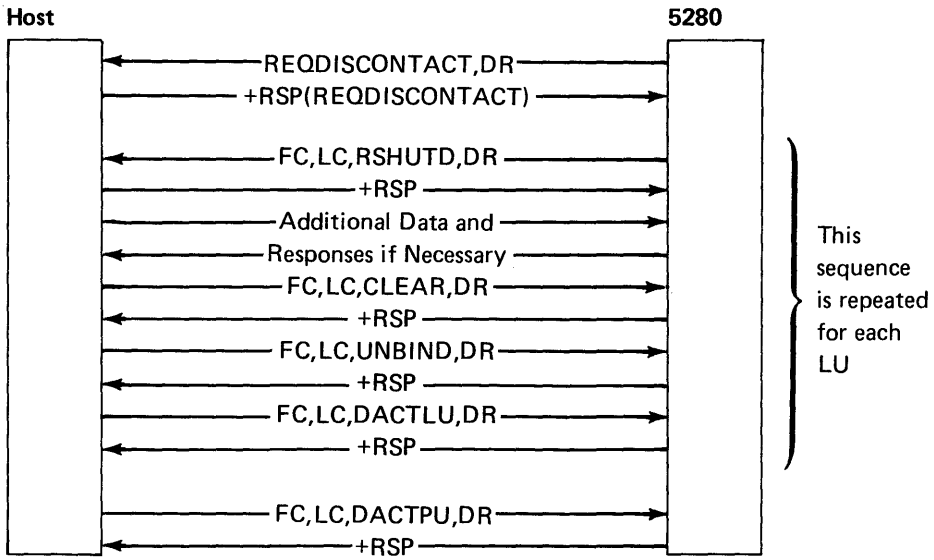
NORMAL ACTIVATION—NO LOGON



NORMAL ACTIVATION—LOGON

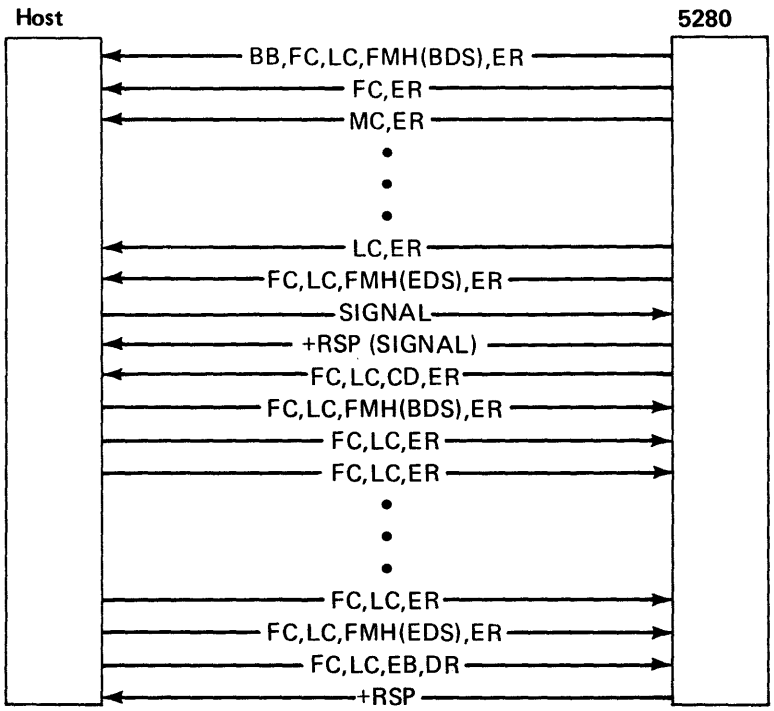


NORMAL DEACTIVATION

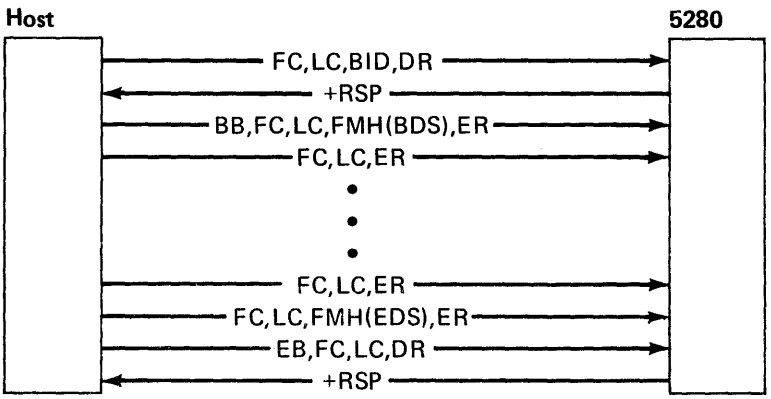


CICS/VS Example Protocols for SYSSDCU

5280 INITIATED BRACKET



CICS/VS INITIATED BRACKET



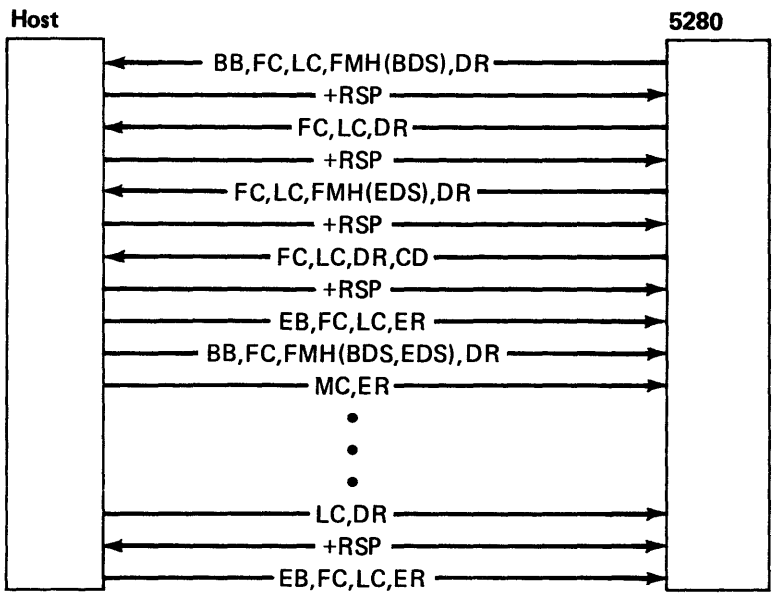
(Note 1)

Notes:

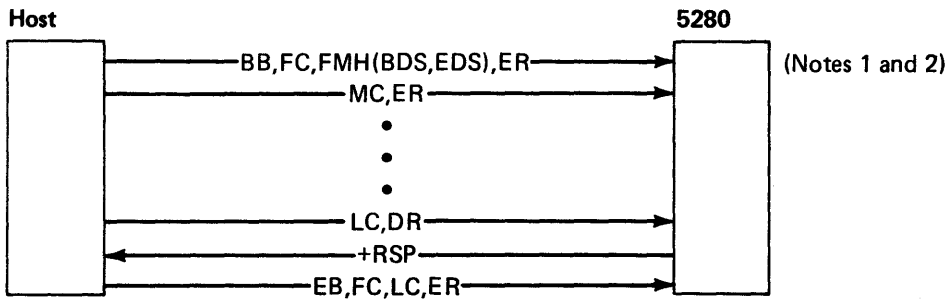
1. If the 5280 rejects the bid, negative response 0813 will be sent. The host must rebid the line.

IMS/VS Example Protocols for SYSSDCU

5280 INITIATED BRACKET



IMS/VS INITIATED BRACKET



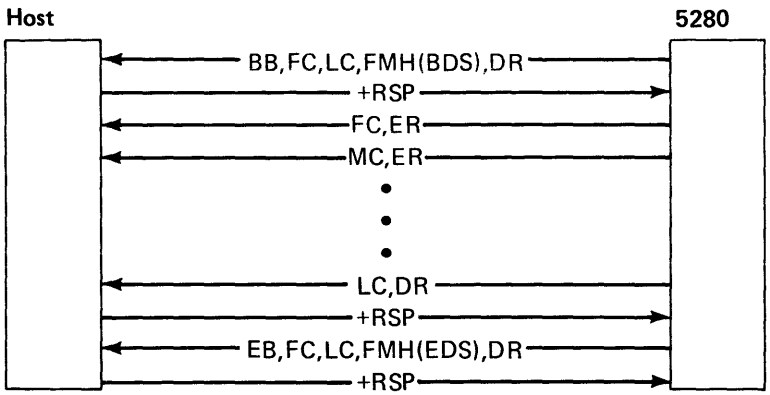
Notes:

1. If the 5280 rejects the (implied) begin-bracket-bid, negative response 0813 will be returned. The host must resend BB.
2. This example shows a single-chain dataset, allowing BDS and EDS on a single FM header.

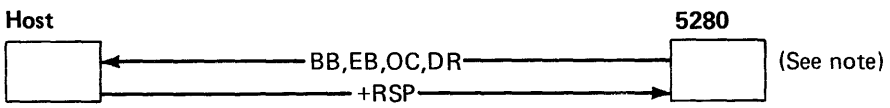
RES, JES2 and DOS VSE/POWER Example Protocols for SYSSRJE

A different subset of protocols for DOS VSE/POWER is shown in the following section.

5280 INITIATED BRACKET—READER DATA

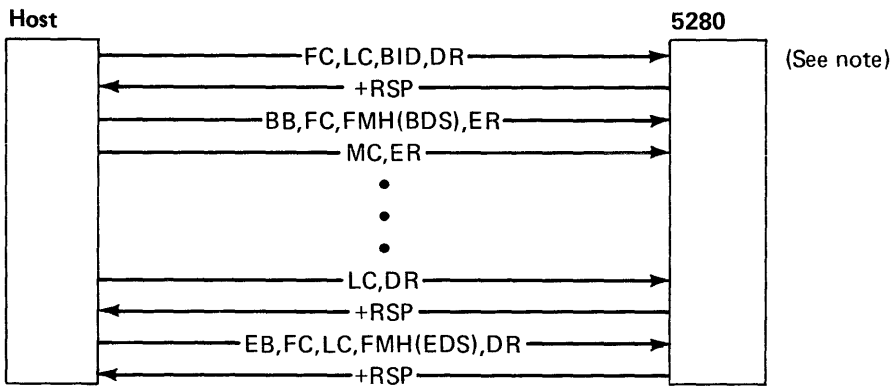


5280 INITIATED BRACKET—CONSOLE DATA (HEADERLESS DATA)



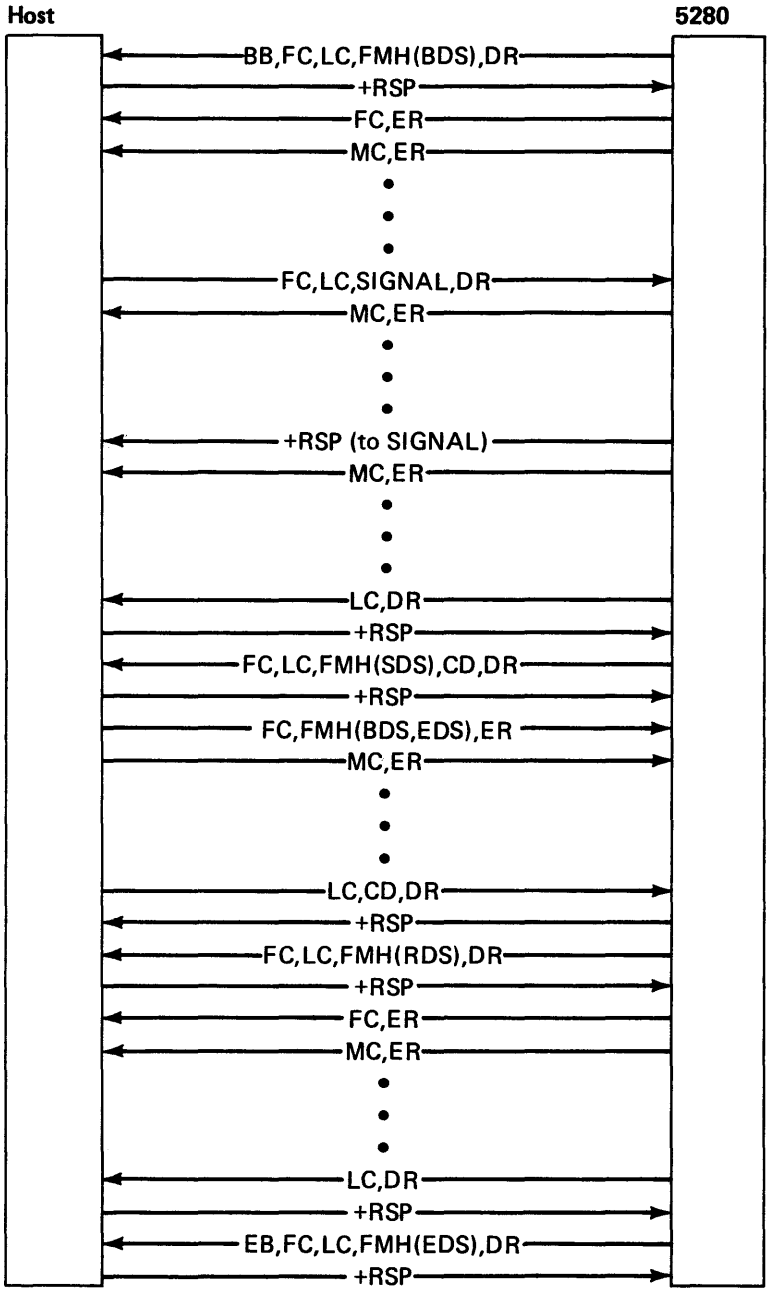
Note: If console data is contained in one RU, it is sent as FC,LC,DR.

HOST INITIATED BRACKET

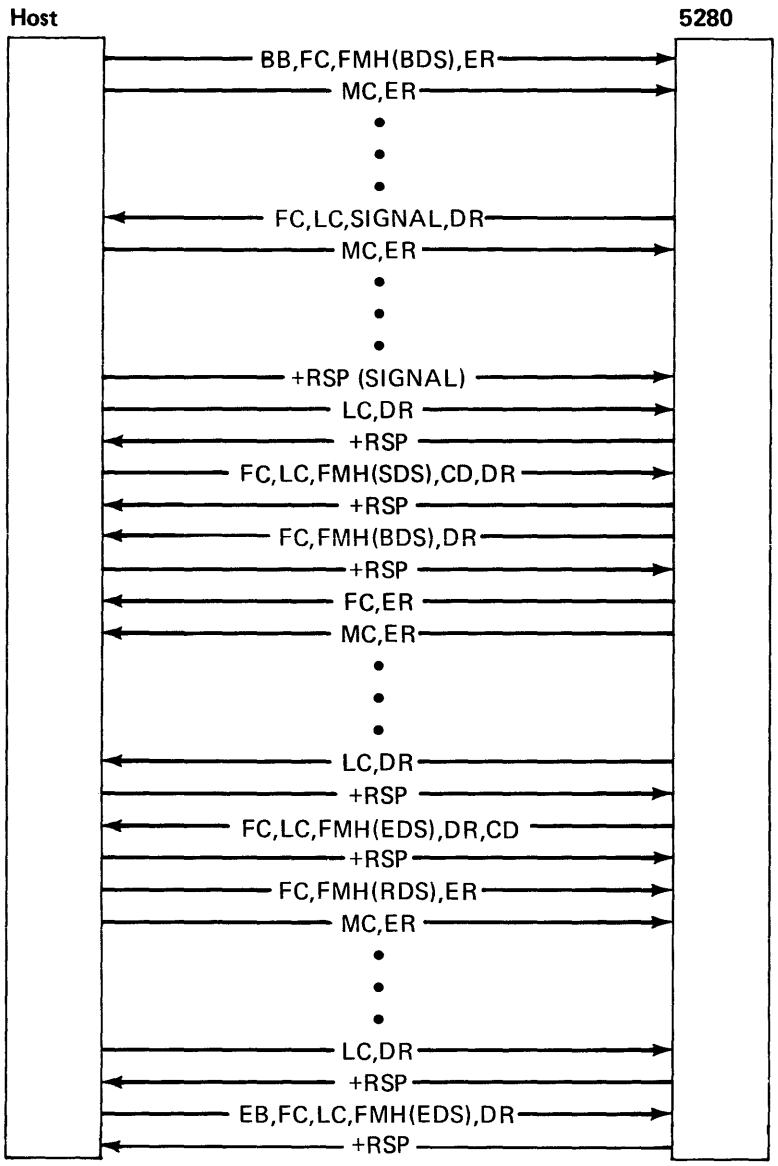


Note: If the 5280 rejects the bid, negative response 0813 will be sent. The host must rebid the line.

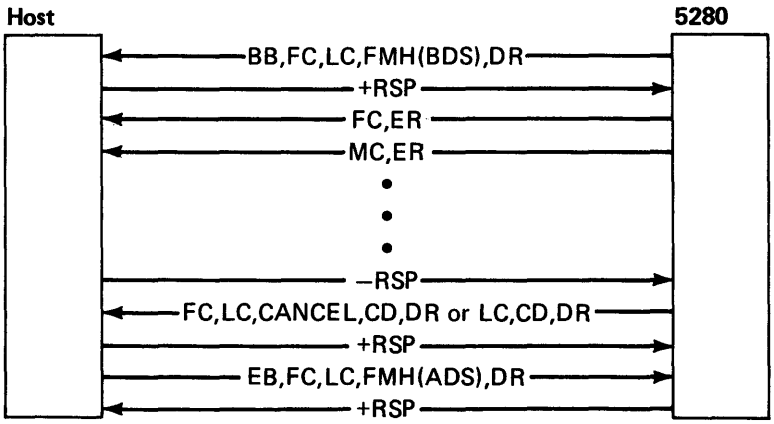
DIRECTION CHANGE REQUEST—HOST INITIATED



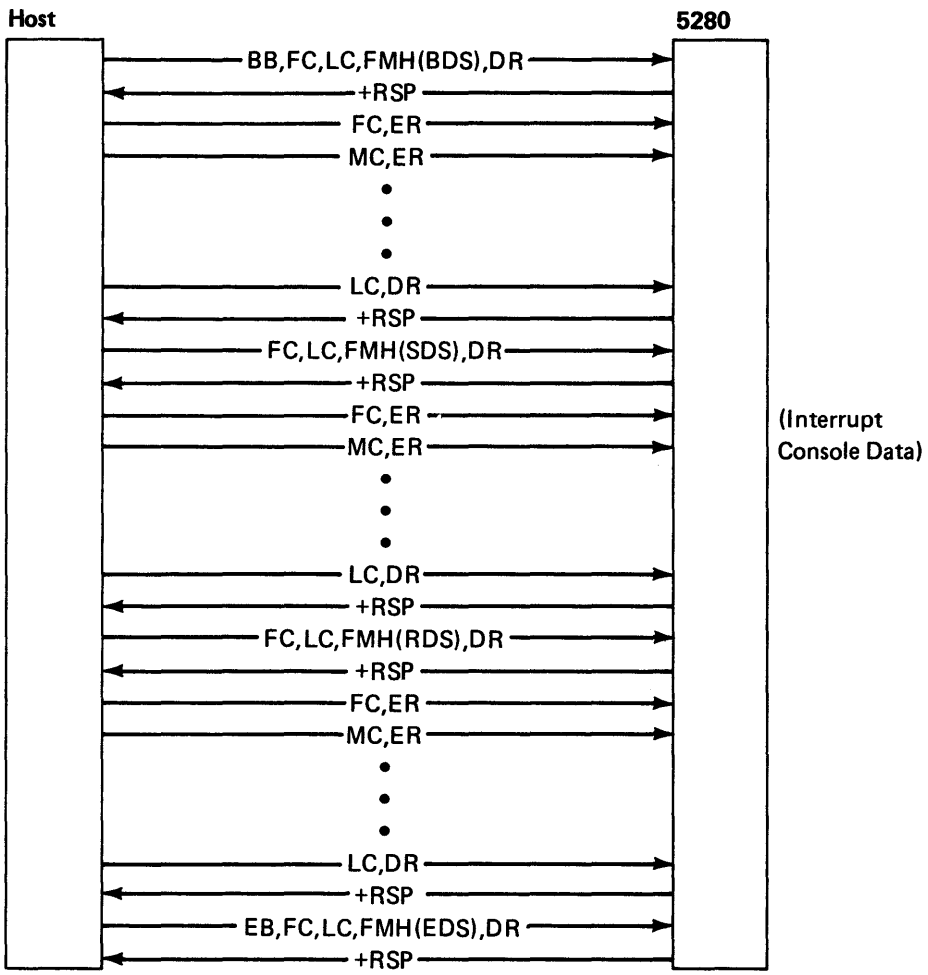
DIRECTION CHANGE REQUEST—5280 INITIATED (FOR CARD DATA)



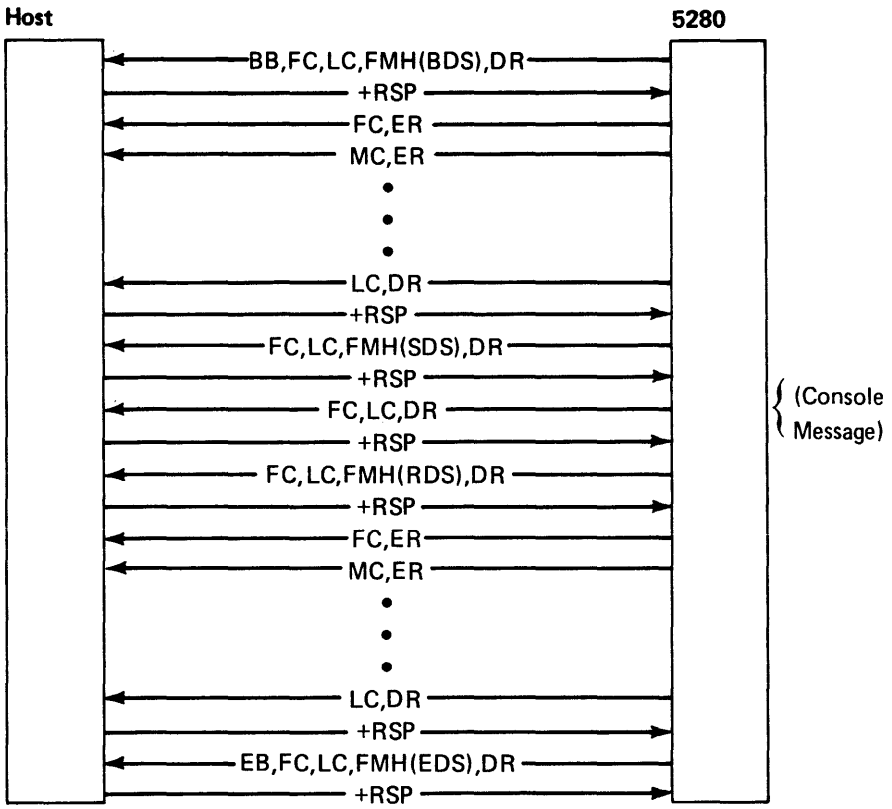
HOST DETECTED ERROR



HOST INTERRUPTED OUTBOUND DATA

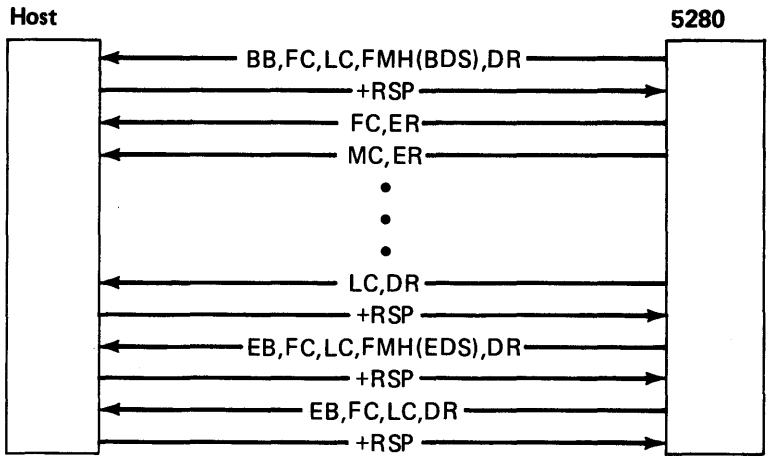


5280 INTERRUPTED INBOUND DATA

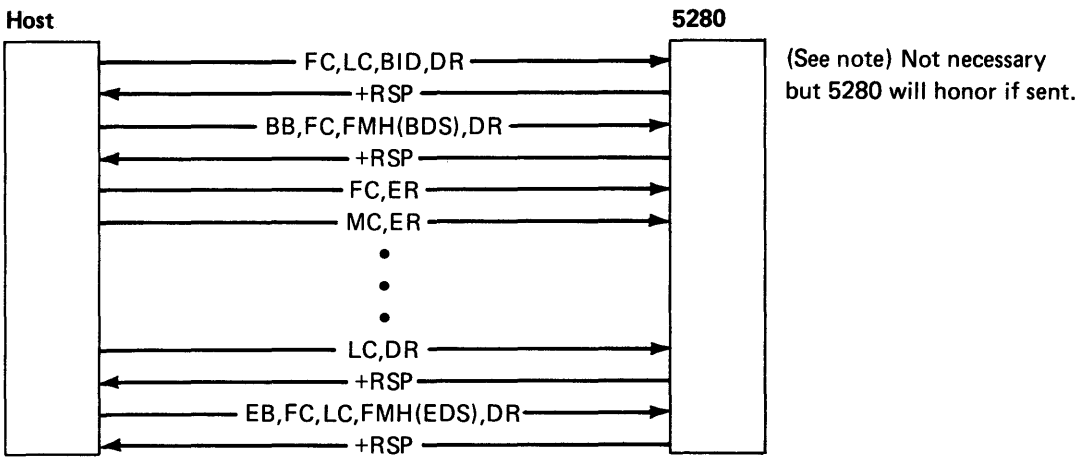


DOS VSE/POWER Example Protocols for SYSSRJE

5280 INITIATED BRACKET TO DOS VSE/POWER—READER DATA

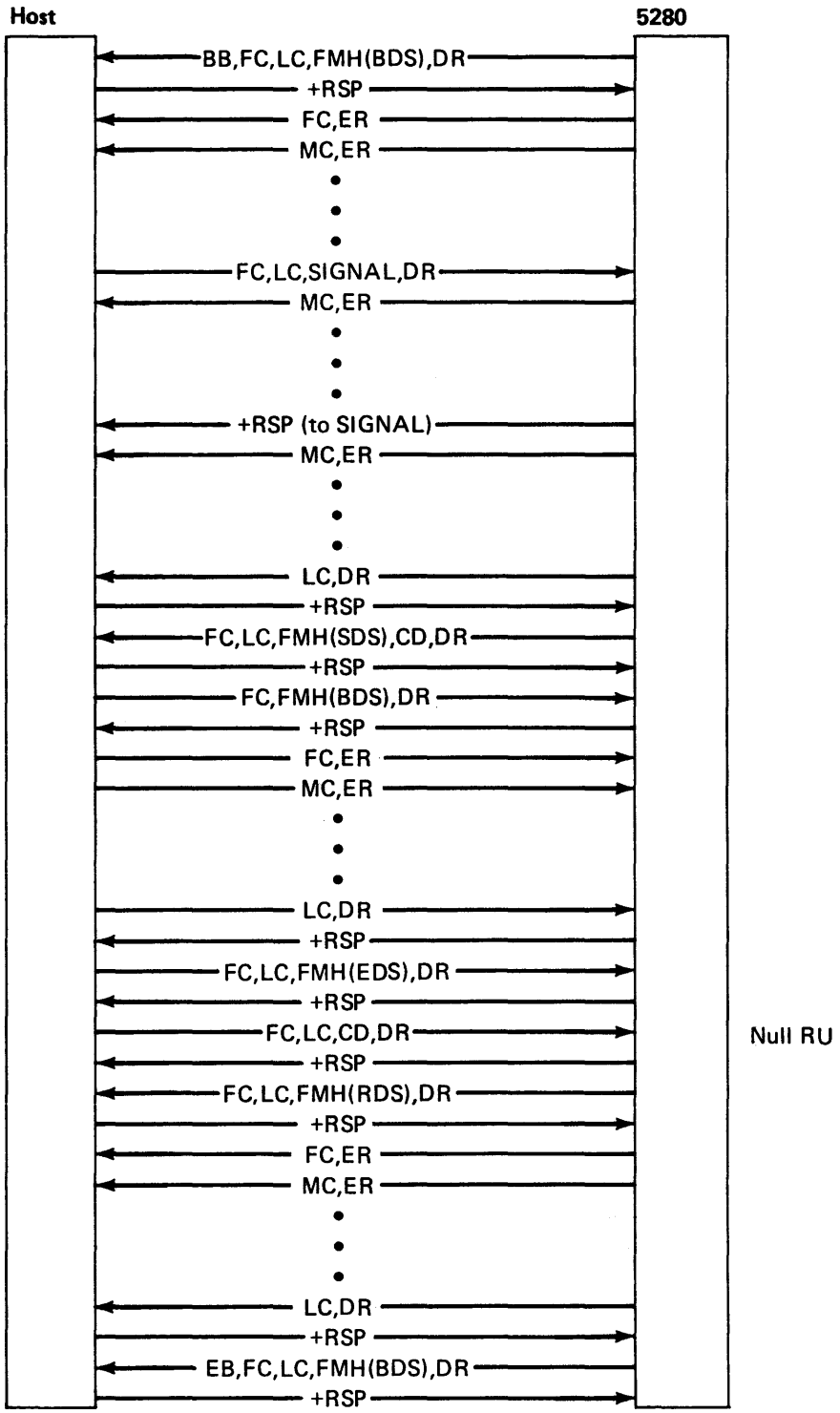


DOS VSE/POWER INITIATED BRACKET (DEFINITE RESPONSE BDS)

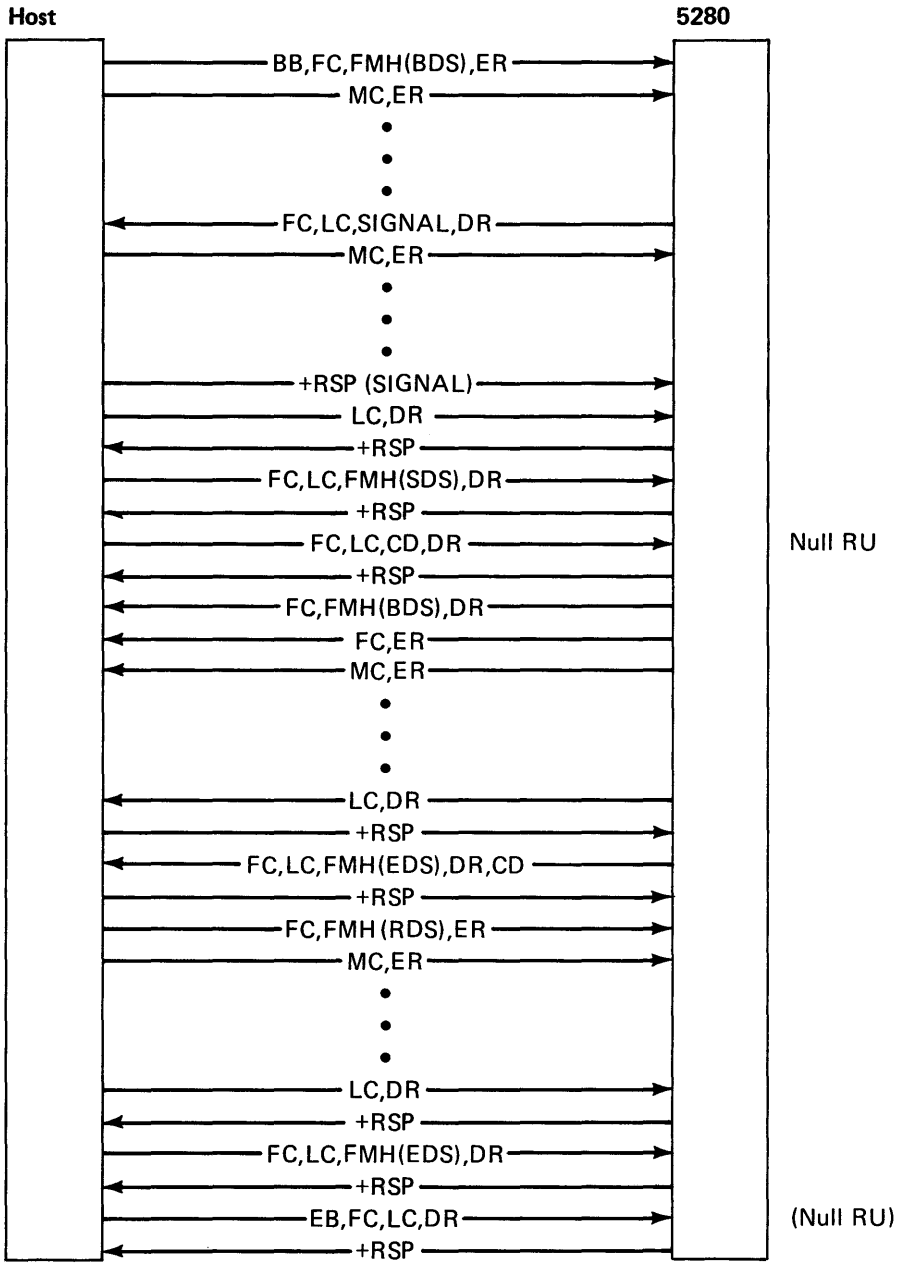


Note: If the 5280 rejects the bid, negative response 0813 will be sent. The host must rebid the line.

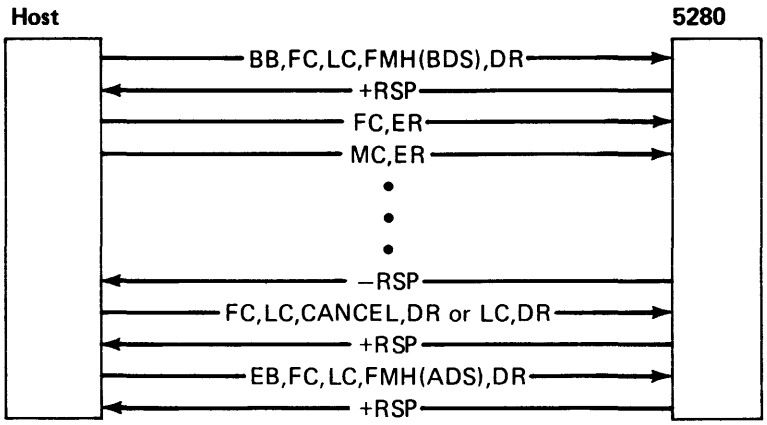
DIRECTION CHANGE REQUEST—DOS VSE/POWER INITIATED



DIRECTION CHANGE REQUEST—5280 INITIATED TO DOS VSE/POWER (FOR CARD DATA)



5280 DETECTED ERROR



Appendix G. Layouts of Records Created Using Preparation Utilities

COMMUNICATIONS CONFIGURATION RECORD

The communications configuration record describes the communications environment. Each record contains common parameters (positions 1–71) and either BSC or SNA parameters (positions 72–256). The data in the record must be in EBCDIC. The record is created using the Communications Configuration Utility (SYSCCU).

Common Parameters

Positions	Field Length	Description
1–8	8	Communications configuration record name
9–11	3	Network type
12	1	Write protect byte
13	1	Line type 1=Non-switched 2=Switched 3=Multipoint
14	1	Line interface 1=Integrated modem 2=EIA-external modem 3=DDSA
15–16	2	Integrated modem attenuation level
17	1	Switched network backup 1=Yes 2=No
18	1	Connection type 1=Manual call/answer 2=Auto answer
19	1	Connect data set to line 1=Yes 2=No
20	1	Answer tone origin 1=Modem 2=Business machine
21–22	2	Timer value for answer tone send
23	1	Answer tone frequency 1=1300 2=2100
24	1	Wrap capability modem 1=Yes 2=No
25	1	Clocking type 1=Internal 2=Modem

Positions	Field Length	Description
26	1	Modem rate 1=Full speed 2=Half speed
27	1	Constant request to send 1=Yes 2=No
28–29	2	Data set ready timeout
30–33	4	Line speed (bps)
34–35	2	Clear to send delay
36–52	17	CAM name
53	1	Line code 1=EBCDIC 2=ASCII
54–56	3	Number of entries in trace table
57–58	2	Number of leading pad characters (See Note 1)
59–60	2	Leading pad characters (See Note 2)
61	1	Underrun retry counter (See Note 3)
62–71	10	Reserved

Notes:

1. For an SNA configuration record, SYSCCU sets this field to two (2). For a BSC configuration record, the user can use prompt B20 to enter a value for this parameter.
2. For a BSC configuration record and for an SNA record which specifies NRZI is *not* to be used (prompt S10), SYSCCU sets this parameter to X'55'. For an SNA record which specifies that NRZI is to be used, this parameter is set to X'00'.
3. This parameter is automatically set to five (5).

BSC Parameters

Positions	Field Length	Description
72	1	Device type 1=3741 look-alike 2=3780 look-alike 3=MRJE
73	1	Initial line bidder 1=5280 2=Host
74	1	Primary station 1=Yes 2=No
75–91	17	Terminal ID
92–108	17	Host ID
109–110	2	Polling address
111–112	2	Selection address
113	1	Record format

Positions	Field Length	Description
		1=Unblocked
		2=Blocked
114	1	ITB blocking factor
115	1	Intermediate record separator
		1=Yes
		2=No
116–118	3	Block size
119	1	Transparency
		1=Yes
		2=No
120	1	Blank expansion
		1=Yes
		2=No
121	1	Blank truncation
		1=Yes
		2=No
122	1	Enable reverse interrupt
		1=Yes
		2=No
123–124	2	TTD receive limit
125–129	5	CAM I/O buffer size
130–131	2	Maximum number of line bid retries
132–133	2	Number of EOTs to EOT
134–135	2	Number of trailing pad characters
136–137	2	Receive timeout
138–139	2	Receive timeout retry count
140–141	2	Transmit timeout
142–143	2	Continue timeout
144–146	3	WACK receive limit
147–148	2	Record retransmit limit
149	1	Character SYN count (See Note)
150–256	107	Reserved

Note: SYSCCU automatically sets this parameter to two (2).

SNA Parameters

Positions	Field Length	Description
72–79	8	Primary LU name
80–87	8	Secondary PU name
88–92	5	XID
93–94	2	SDLC station address
95	1	Receive pacing count
96	1	Send pacing count
97	1	Application program
		1=SYSSRJE
		2=SYSSDCU
		3=User program

Positions	Field Length	Description
98	1	Maximum number of users
99	1	Logon 1=Yes 2=No
100	1	NRZI 1=Yes 2=No
101–102	2	Communications program timeout
103–104	2	Inactivity timeout
105–108	4	User interface block size
109–256	48	Reserved

RECORDS CREATED USING DATA COMMUNICATIONS DESCRIPTION UTILITY

The Data Communications Description Utility creates three different types of records: job description, function definition, and printer format. These records are used by the BSC Batch Transfer Utility (SYSBBTU), the BSC Data Communications Utility (SYSBDCU), and the SNA Data Communications Utility (SYSSDCU). The data in the records can be in EBCDIC or ASCII.

Job Description Record

Positions	Field Length	Description
1–8	8	Job name
9–11	3	Contains the header 'JDR'
12	1	Utility/protocol option 1=SYSBDCU (3741) 2=SYSBDCU (3780) 3=SYSBBTU (3741) 4=SYSSDCU (SNA/SDLC)
13–29	17	Configuration data set name
30–33	4	Configuration device address
34–41	8	Communications configuration record name
42	1	CAM partition number
43	1	Reserved
44	1	Mode of operation 1=Attended 2=Unattended
45–124	80	Logon information (SNA/SDLC only)
125–132	8	Name of first function in job
133	1	Communications configuration record logical device address indicator 1=Logical address 0=Physical address
134–256	123	Reserved

Function Definition Record

The job description record contains the name of the first function definition in a job. All other function definitions in a job (except the last one) contain the name of the next function definition in the job. The job description record and all of the function definitions in a job must be contained in the same data set.

Positions	Field Length	Description
1–8	8	Function name
9–11	3	Contains the header 'FDR'
12	1	Function option 1=Transmit 2=Receive 3=Inquiry
13	1	Device option for transmit, 3741 receive, or punch data 1=Diskette 2=Multiple data sets 3=Magnetic stripe-transmit (BSC only) or printer-receive 4=Keyboard/display 5=Display and printer 6=Printer and diskette data set 7=Printer and multiple data sets 8=Display and diskette data set 9=Display and multiple data sets
14	1	Device option for printer data 1=Diskette 2=Multiple data sets 3=Magnetic stripe-transmit or printer-receive 4=Keyboard/display 5=Display and printer 6=Printer and diskette data set 7=Printer and multiple data sets 8=Display and diskette data set 9=Display and multiple data sets
15	1	Device option for console data 1=Diskette 2=Display and diskette data set 3=Printer 4=Keyboard/display 5=Display and printer 6=Printer and diskette data set
16–32	17	Data set name/prefix for transmit, 3741 receive, or punch data
33–49	17	Data set name/prefix for print data
50–66	17	Data set name for console data
67–98	32	Device addresses for transmit, 3741 receive, or punch data (up to 8 device addresses allowed)
99–130	32	Device addresses for print data (up to 8 device addresses allowed)
131–134	4	Device address for console data (only one address allowed)

Positions	Field Length	Description
135	1	Write to data set option for punch data or 3741 receive 1=Allocate 2=Add 3=Replace
136	1	Write to data set option for print data 1=Allocate 2=Add 3=Replace
137	1	Write to data set option for console data 1=Allocate 2=Add 3=Replace
138–141	4	Printer device address (only one)
142	1	Printer format for 3741 receive 1=Yes 2=No
143–150	8	Printer format name
151	1	Transaction ID option 1=No ID 2=ID as first record 3=ID with each record
152–159	8	Transaction ID
160	1	Alternate function definition option 1=Yes 2=No
161–168	8	Alternate function name
169	1	Next function definition option 1=Yes, this is the last one 2=No
170–177	8	Next function name
178	1	Utility/protocol option 1=SYSBDCU (3741) 2=SYSBDCU (3780) 3=SYSBBTU (3741) 4=SYSSDCU (SNA/SDLC)
179	1	Mode of operation 1=Attended 2=Unattended
180–187	8	Punch data logical device address indicator 0=Physical address 1=Logical address
188–195	8	Print data logical device address indicator 0=Physical address 1=Logical address
196	1	Console data logical device address indicator 0=Physical address 1=Logical address
197	1	Printer logical device address indicator 0=Physical address 1=Logical address

Positions	Field Length	Description
198–256	59	Reserved

Printer Format Record

Positions	Field Length	Description
1–8	8	Printer format name
9–11	3	Contains the header 'PFR'
12–14	3	Maximum number of lines (up to 255) per page
15–17	3	Line number of top margin
18–20	3	Line number of bottom margin
21–23	3	Number of print positions per line (1–132)
24–26	3	Print position of left margin
27–29	3	Print position of right margin
30–161	132	Horizontal tabs (132 tabs) Blank=no tab T=tab in corresponding print position
162–197	36	Vertical tabs or channels (12) Blank or 0=no tab xxx=line number for tab
198–256	59	Reserved

JOB DESCRIPTION RECORD CREATED USING RJE DESCRIPTION UTILITY

This job description record describes a job to be executed by either MRJE or SRJE. The record is created using the RJE Description Utility (SYSRJEDU). The data in the record must be in EBCDIC.

Positions	Field Length	Description
1–8	8	Job name
9–25	17	Communications configuration record data set name
26–29	4	Communications configuration record device address
30–37	8	Communications configuration record name
38–54	17	Readfile data set name
55–58	4	Readfile device address
59–90	32	Auto-allocation device address(es) (8 four byte entries)
91	1	RJE type 1=MRJE 2=SRJE
92	1	Mode indicator 1=Attended 2=Unattended
93	1	CAM partition number
94	1	Host type 1=RES 2=JES2 3=JES3(MRJE) or DOS(SRJE)
95–111	17	Unused (reserved)
112–115	4	Unused (reserved)
116–128	13	Unused (reserved)

129–208	80	Logon command
209–248	40	Unused (reserved)
249–256	8	Job name (same as 1–8)

Appendix H. External Status and Completion Codes

This appendix contains commonly used BSC and SNA external status conditions and completion codes which you may need to know when coding a user program. See Chapter 5 on Data Communications Programming with Assembler Language or Chapter 6 on Data Communications Programming with DE/RPG for additional information. The *IBM 5280 Message Manual* contains a complete list of all BSC and CAM completion codes.

BSC

External status condition	Completion codes	Mnemonic	Meaning
X'01'			CAM load time initialization failure. This code is returned when TINIT is issued. The CAM remains in its partition, in an inactive state, to allow problem analysis (such as dump/display memory. To remove the CAM from main memory, enter the End of Job command key sequence.
X'02'	5609	EOF	While the 5280 was receiving data, an EOF was received from the host.
X'03'	5602	SOH	The data returned to the application program in response to TREAD is heading (SOH) text.
X'04'	5603	EOT	EOT received from host, or line not started at host.
X'06'	5605	RVI	RVI received from the host.
X'08'	5606		BSC 3741 format status message received from the host. The status message has been placed in the IOB when this status code is returned. SYSBBTU and SYSBDCU display the first byte of the status message in column 34. For the meaning of this byte see the applicable host documentation.

External status condition	Completion codes	Mnemonic	Meaning
X'09'	54XX		Application program error
X'0A'	55XX		BSC recoverable error
X'0C'	52XX		Permanent BSC error
X'0D'	59XX		CAM error
X'0E'	5601		No data available when TREAD was executed.

SNA/SDLC

External status condition	Completion codes	Mnemonic	Meaning
X'00'	4602	CANCEL	CANCEL received. The 5280 SNA application program was receiving data from the host, and the host terminated the data set before normal end-of-data-set by sending an SNA CANCEL command.
X'00'	4603	CHASE	CHASE received. The host sent an SNA CHASE command to verify that all data transmitted up to this point was received successfully by the 5280. Data received before transmit. The 5280 application program attempted to transmit data to the host, but the host sent data to the 5280 first. This is probably due to a mismatch of application programs.
X'00'	4605	SIGNAL	SIGNAL received. The host sent an SNA SIGNAL command, indicating that it wants the 5280 to stop transmitting and allow the host to transmit. The 5280 application program may continue to send data temporarily; once it stops (via TWRT (final) or TCLOZ) it must then receive by issuing a TREAD.

External status condition	Completion codes	Mnemonic	Meaning
X'00'	4606	SHUTD	Shutdown received. The host sent an SNA SHUTD command, indicating that it wants to end the session.
X'00'	4607		Negative response received. The host sent a negative response to data sent by the 5280. The negative response sense code received by the 5280 is placed in the IOB.
X'00'	4616		Negative response sent to data. CAM has discovered invalid SNA information in the data set from the host, and has negative response.
X'00'	4618	EOB	End of block received. An end of block indication was encountered at the end of the logical record being defined by CAM on this operation.
X'00'	4619	EOD	End of data, transmit required. No more data is to be received from the host in this series of TREAD operations. The program should follow the TREAD with a TWRT or TCLOZ. No data is transferred to the application program buffer.
X'00'	4620	EOD	End of data, no transmit required. No more data is to be received from the host in this series of TREAD operations. No data is transferred to the application program buffer.
X'00'	4621		Record length error. A logical record was received whose length was greater than the logical record length in the IOB used for TREAD. The number of bytes specified in the logical record length in the IOB have been transferred to the application program buffer.

External status condition	Completion codes	Mnemonic	Meaning
X'00'	4622		Record length error. The program specified a logical record length greater than the blocksize or 4096 bytes. The logical record length was found in an IOB specified in a TWRT instruction.
X'00'	4623		Record length error. The program specified a logical record length of less than 255 bytes, and specified records not allowed by the host.
X'01'	42XX		Permanent SNA/SDLC error.
X'02'	47XX		Instruction not yet complete. RETURN from external status and the communication instruction will be automatically repeated.

Appendix I. Host Programming Considerations

This appendix describes programming considerations, where applicable, involved in writing a host application program to define, activate, and control the communications link with a 5280 Distributed Data System.

Considerations for the following hosts are documented in this appendix:

IMS/VS SNA
IMS/VS SNA User Interface
IMS/VS BSC
CICS/VS SNA
CICS/VS SNA User Interface
CICS/VS BSC
DOS/VS/CICS SNA
DOS/VS/CICS BSC
DOS/VSE/POWER SNA
DOS/VSE/POWER BSC
SRJE JES2
SRJE RES
MRJE JES2 BSC
MRJE JES3 BSC
MRJE RES BSC
S/32 RPG BSC 3741 Protocol
S/34 RPG and SSP-ICF BSC 3741 Protocol
5265 BSC
3741 BSC
S/3 CCP

Related Publications

The following manuals provide additional information on topics discussed in this appendix.

IMS Installation Guide, SH20-9081
IMS/VS1 Utilities Reference Manual, SH20-9029
IMS/VS1 Application Programming Reference Manual, SH20-9026
IMS/VS1 Advanced Functions for Communications, SH20-9054
IMS/VS1 System Programming Reference Manual, SH20-9027
CICS System Programmer's Reference Manual, SC33-0069
OS/VS BTAM Manual, GC27-6980
VSE/POWER Remote Job Entry User's Guide, SH12-5328
VSE/POWER Installation and Operations Guide, SH12-5329
VSE/POWER Messages, SH12-5520
S/32 RPG Reference Manual, SC21-7595
S/34 RPG Reference Manual, SC21-7667
S/34 Data Communications Manual, SC21-7703
S/34 System Support Reference, SC21-5155
IBM 3741 Data Station Reference Manual, GA21-9183
System Program Library: Network Job Entry Facility for JES2, SC23-0003

Operator's Library: OS/VS2 Remote Terminals (JES2), GC38-0225
Advanced Communications Function for VTAM (ACF/VTAM), SC27-0464
Advanced Communications Function for VTAM (ACF/VTAM) Macro Language Guide, SC38-0256
OS/VS1 RES System Programmer's Guide, GC28-6879
OS/VS1 RES RTAM and Workstation Support Logic, SY28-6849
OS/VS1 Information Distribution Workstation Support General Information, GC24-5193
OS/VS1 RES Workstation User's Guide, GC28-6879
OS/VS2 MVS JES3 Commands, GC23-0008
OS/VS2 MVS System Programming Library JES3, GC28-0608
OS/VS2 MVS System Programming Library: JES2, GC23-0002
System Programming Library: Network Job Entry Facility for JES2, SC23-0003
Operator's Library: OS/VS2 MVS JES2 Commands, GC23-0007

IMS/VS SNA

Host Generation Considerations

The 5280 is identified to IMS as a logical unit (LU) type 1 terminal. The following example illustrates how to define a 5280 with four logical units in stage 1 of the IMS generation.

```
 TYPE  UNITYPE=SLUTYPE1
   TERMINAL NAME=SLU100A,MSGDEL=NOTERM,

   COMPT1=(CONSOLE,BASIC-SCS1),
   COMPT2=(PRINTER2,BASIC-SCS1),
   COMPT3=(PUNCH1,BASIC-SCS2),
   COMPT4=(READER1,BASIC-SCS2)
      NAME RD5280A,ICOMPT=4
      NAME PR5280A,COMPT=2
      NAME PU5280A,COMPT=3
      NAME T5280A,COMPT=1

TERMINAL NAME=SLU100B,MSGDEL=NOTERM,
   COMPT1=(CONSOLE,BASIC-SCS1),
   COMPT2=(PRINTER2,BASIC-SCS1),
   COMPT3=(PUNCH1,BASIC-SCS2),
   COMPT4=(READER1,BASIC-SCS2)
      NAME RD5280B,ICOMPT=4
      NAME PR5280B,COMPT=2
      NAME PU5280B,COMPT=3
      NAME T5280B,COMPT=1

TERMINAL NAME=SLU100C,MSGDEL=NOTERM,
   COMPT1=(CONSOLE,BASIC-SCS1),
   COMPT2=(PRINTER2,BASIC-SCS1),
   COMPT3=(PUNCH1,BASIC-SCS2),
   COMPT4=(READER1,BASIC-SCS2)
      NAME RD5280C,ICOMPT=4
      NAME PR5280C,COMPT=2
      NAME PU5280C,COMPT=3
      NAME T5280C,COMPT=1

TERMINAL NAME=SLU100D,MSGDEL=NOTERM,
   COMPT1=(CONSOLE,BASIC-SCS1),
   COMPT2=(PRINTER2,BASIC-SCS1),
   COMPT3=(PUNCH1,BASIC-SCS2),
   COMPT4=(READER1,BASIC-SCS2)
      NAME RD5280D,ICOMPT=4
      NAME PR5280D,COMPT=2
      NAME PU5280D,COMPT=3
      NAME T5280D,COMPT=1
```

This setup shows one physical unit and four logical units. SLU100A and SLU100B are considered logical units. Each logical unit supports four components; reader, printer, punch, and console. The components define the type of data, not necessarily the input or output device. The reader defines input as 80 byte records. The other three components define 5280 output.

The printer defines printer data as 132 byte records. The punch defines 80 byte records, and the console defines 120 byte records. These components define which SNA FM header will be associated with the data.

If BLKREQD is specified in the COMM statement, you must follow the transaction ID with first a blank, then a nonblank character. If NOBLANK is specified in the COMM statement, then only the transaction ID is required.

MSGDEL=NOTERM is required.

Refer to the *IMS Installation Guide* for more information on how to generate IMS for LU type 1 devices.

Application Generation Considerations

The following example of a PSBGEN is for a program which transmits print, punch, and console data. It contains a modify statement which allows the application program to change the terminal destinations associated with the PCB during execution. This is useful because multiple logical units can access the same program at the same time.

In this example, each PCB is associated with a particular type of data and is related to the name of the terminal defined in stage 1 of the IMS generation.

PSBGEN Example

This is the PSB for 5280 at the S/370.

```
PCB     TYPE=TP,LTERM=PR5280A
PCB     TYPE=TP,LTERM=PU5280A
PCB     TYPE=TP,LTERM=T5280A
PCB     TYPE=TP,MODIFY=YES
PSBGEN LANG=ASSEM,PSBNAME=T5280
```

Refer to the *IMS/VS1 Utilities Reference Manual* for more information on the modify statement in the PSBGEN.

ACF/VTAM Programming Considerations

The following ACF/VTAM programming considerations apply when you use SNA support.

- In a ACF/VTAM Release 2 network, the short form (six bytes) of the Exchange Station Identification (XID) command must be used. In a VTAM network beyond Release 2, either the short form or the long form (twenty bytes) of the XID command may be used. The XID command is not required for a non-switched line.

- In a ACF/VTAM Release 2 network, outbound pacing is not supported.

- In a ACF/VTAM Release 2 network, the primary logical unit may not alter the pacing value in the BIND command.

- In a ACF/VTAM Release 2 network, the ISQUEUE parameter of the SNA destination DSD is not supported.

- In a ACF/VTAM Release 2 network, if all the logical units for a physical unit type are active and then are deactivated by the TERM-SELF command, ACF/VTAM deactivates the physical unit. In this situation, the 5280 must be activated before the next session can be established. To avoid this problem, do not use the TERM-SELF command to start session deactivation.

- The XID information (twenty bytes) sent by the 5280 to ACF/VTAM is as follows:

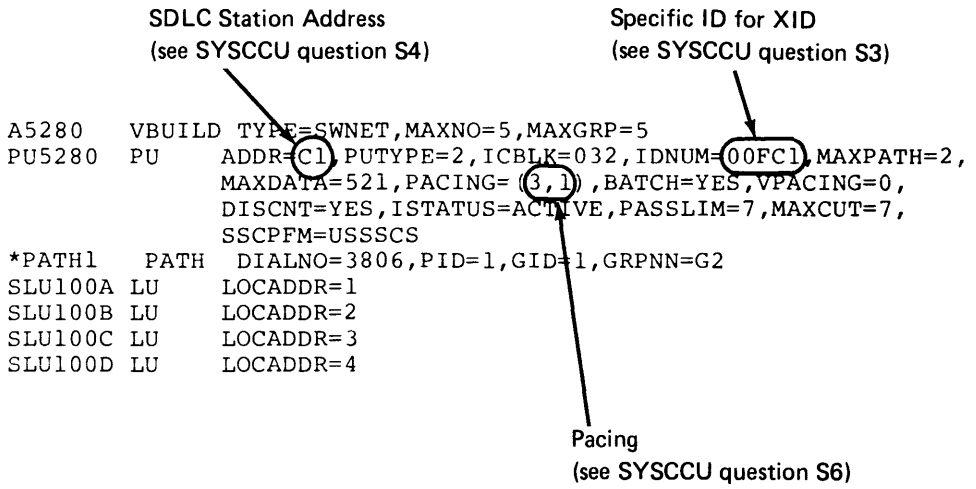
Displacement (Hex)	Value (Hex)	Meaning
0	12	Variable format (PU type 2)
1	14	Length of XID
2-5	032XXXXX	Block number = 032 for the 5280, XXXXX = specific ID as entered by user via SYSCCU
6-7	0000	Reserved
8	00	Sender is secondary (slow connect, HDX)
9	B0	PU can receiveFMD RUs (no segments allowed)
A-B	0100	RU size = 256 bytes
C	00	SNA set
D	00	SREJ, SARM, SIM, RQI not supported
E-F	0000	Reserved
10	07	Maximum link out count
11	00	Reserved
12	00	No address assignment
13	00	No dial digits

From the 5280 point of view, because a session is deactivated when the response to UNBIND is sent, another session may be activated (NETOPEN issued) immediately afterwards. If the new session requests that an INIT-SELF (BINDINT=SELF) be sent and the VTAM program's CLSDST for the previous session has not completed, a NSPE will be sent from VTAM to the 5280. This response will terminate the activation process of the new session. This condition occurs only when both sessions use the same logical unit.

VTAM Considerations

The following is an example of VTAM macros used to describe a switched line. In this example, the VTAM major node is called A5280. The physical unit name is PU5280, and the logical units (SLU100A, SLU100B, SLU100C, and SLU100D) are referenced in the IMS stage 1 system definition generation.

Example of VTAM Macros



Note: The values for ADDR=, IDNUM=, and PACING= relate to values in the communications configuration record and are determined by your responses to the applicable SYSCCU prompts.

Host Programming Considerations for Application Programs

You can use the IMS change call, CHNG, when writing an IMS application program that communicates with multiple logical units (in other words, a program that communicates at the same time to more than one SYSSDCU session). This allows the application program to modify the alternate PCB, thus changing the destination, as long as it is not the I/O PCB, from one PCB to another which was not defined in the PSBGEN.

In the previous example of VTAM macros, only three PCBs are defined and they are associated with SLU100A, but because it is generated modifiable, the application program could send data back to any of the other logical units.

Refer to the *IMS/VS Application Programming Reference Manual* for more information on how to use the change call, CHNG.

Logical Record Length

Regardless what record length the 5280 user is transmitting, CAM breaks the record into 80 byte record lengths, and passes this record length to IMS. For this reason, the IMS application program should read 80 bytes at a time. If you are transmitting 120 byte records, the IMS application will need to do one GN call for 80 bytes, and another GN call to get bytes 81-120 out of the next record. If you are transmitting 40 byte records, the IMS application program reads in two concatenated records with one GN call. If you are transmitting 90 byte records, then the IMS application program reads in 80 bytes with the first GN call, then reads in the last 10 bytes plus the first 70 bytes of the next record with the second GN call.

5280 Programming Considerations

The 5280 can be used to communicate with the sample inventory program described in the *IMS/VS1 Application Programming Reference Manual.* First, set up the necessary communications configuration record, describing your communications environment. Then, create a job description record with an inquiry function described in the function definition record. Because this IMS program generates console data, SYSDCDU prompt 69-11 should be left blank for both punch and print data. The next SYSDCDU prompt, 69-12, should be filled in with the desired option. You should ensure the necessary libraries and data base associated with the IMS sample program have been installed before executing SYSSDCU.

IMS/VS SNA USER INTERFACE

Host Generation Considerations

The 5280 is identified to IMS as a logical unit type 1 terminal. The following example illustrates how to define a 5280 with one logical unit in stage 1 of the IMS generation.

IMS Generation Example — Stage 1

```
TYPE UNITYPE=SLUTYPE1
TERMINAL  NAME=SLU100A,MSGDEL=NOTERM,SEGSIZE=4101,
          COMPT1=(CONSOLE,BASIC-SCS1),
          COMPT2=(PRINTER2,BASIC-SCS1),
          COMPT3=(PUNCH1,BASIC-SCS2),
          COMPT4=(READER1,BASIC-SCS2)
   NAME   RD5280B,ICOMPT=4
   NAME   PR5280B,COMPT=2
   NAME   PU5280B,COMPT=3
   NAME   T5280B,COMPT=1
   NAME   T5280C,ICOMPT=1
```

The component descriptions follow the logical unit definition. The console component is the only component which can be used with the 5280 SNA user program interface. In this example, the IMS applications which communicate with 5280 user-written programs only use components T5280B and T5280C. T5280B, defined as COMPT=1, is used as the output component for messages written to the 5280. T5280C, defined as ICOMPT=1, is used to read messages sent from the 5280.

MSGDEL=NOTERM is required.

Refer to the *IMS Installation Guide* for more information on how to generate IMS for logical unit type 1 devices.

Application Generation Considerations

The following is an example of a PSBGEN for a program which communicates with a user-written program on the 5280.

PSBGEN Example

```
PCB     TYPE=TP,LTERM=T5280B
PSBGEN LANG=PL/I,PSBNAME=IMSUSR
END
```

Example of Logon Mode Table

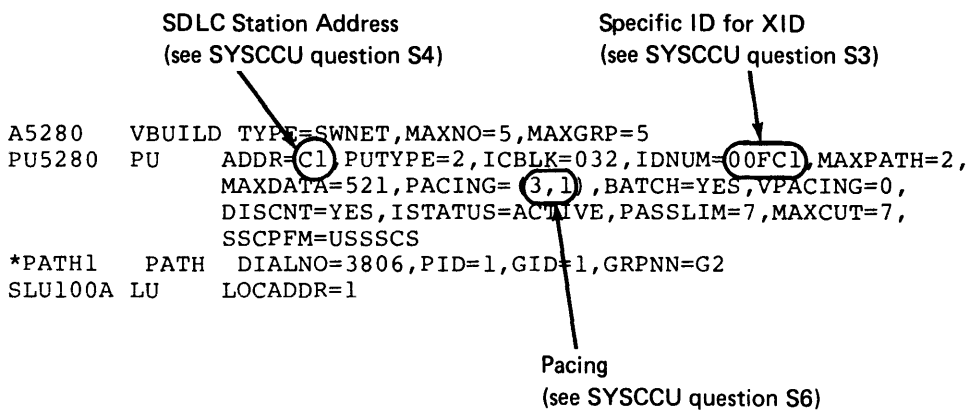
The following logon mode table entry should be used when a 5280 SNA user program is communicating with IMS.

```
MODEENT LOGMODE=USERLOG,FMPROF=X'03',TSPROF=X'03',
      PRIPROT=X'A1',SECPROT=X'A0',COMPROT=X'3080',
      RUSIZES=X'8585',PSERVIC=X'0101000000000000000000000'
MODEEND
END
```

VTAM Considerations

The following is an example of VTAM macros generation. In this example, the VTAM major node is called A5280. The physical unit name is PU5280. The logical unit, SLU100A, is also referenced in the IMS Stage 1 system definition generation.

Example of VTAM Macros



Note: The values for ADDR=, IDNUM=, and PACING= relate to values in the communications configuration record and are determined by your responses to the applicable SYSCCU prompts.

Host Programming Considerations for Application Programs

You can initialize the terminal ID field of the output PCB to the ID of the terminal defined as console in the IMS generation stage 1 example, and leave the input PCB uninitialized. This allows you to read, using GN and GU calls, referencing the input PCB which is initialized by IMS on input, and to write, using ISRT calls, referencing the output PCB which has been initialized by the application program.

Maximum Record Length

The SNA application program must insert the new line and form feed SCS characters after each record. These are recognized by the 5280 CAM as end of logical record and end of block respectively. These characters are not included in the maximum record length to be sent, or passed to the 5280 application program. Thus, a maximum of 4096 characters, plus one new line or form feed character, comprise a maximum record length for the 5280 SNA CAM when communicating with IMS. FM headers are not allowed with the CAM and must not be inserted.

Reading and Writing

Although the 5280 can read and write in any order, the IMS application program must do only a series of reads (GN) or writes (ISRT) after receiving the transaction ID on a GU call. IMS queues its input and output from the telecommunications line. It is your responsibility to relate your input to your output.

IMS/VS BSC

Host Generation Considerations

The 5280 is identified to IMS as a 3741. The following example illustrates how to define the 5280 in stage 1 of the IMS generation.

IMS Generation Example

```
LINEGRP DDNAME=DD3741D,UNITYPE=3741,FEAT=SWITCHED
 LINE ADDR=C36
   TERMINAL FEAT=(128,NONE,NCDISC,NOBUFEXP)
   POOL
     SUBPOOL
        NAME SYS5280
```

For more information on IMS generation, refer to *IMS Installation Guide.*

Restrictions

IMS places certain restrictions on 3741 type devices.

- Communications must be over a switched line.
- The host must dial the remote station.
- A sign-on exit routine must exist to provide the /IAM command and /SET command values required to make a connection between IMS and the 5280.
- Interactive batch processing (inquiry) is not recommended because IMS defines the 5280 as a 3741 batch terminal when running under a BSC protocol. Refer to Appendix C for the level of inquiry function you can do with IMS.
- IMS sends a disconnect if the 5280 is in a receive mode and there is no data in the IMS output queue destined for the 5280. This means that IMS sends a disconnect when the 5280 goes into a receive mode if you are running an IMS application program which reads in data from the 5280, then writes out to a file to be transmitted back to the 5280.
- The transaction ID is defined within the sign-on exit routine with the /SET command. Thus, the 5280 cannot initiate any transaction other than the one specified by the /SET command.
- IMS provides a default 3741 sign-on exit routine which you may modify, or you may write your own sign-on exit routine. For more information, refer to *IMS/V1 System Programming Reference Manual.*

CICS/VS SNA

Host Generation Considerations

The 5280 is identified to CICS as a 3770B. The following example illustrates how to define a 5280 in the terminal macro of the CICS Terminal Control Table (TCT).

Example of Defining a TCT

```
DFHTCT TYPE=TERMINAL,TRMIDNT=TSYS,TRMTYPE=3770B,TRMPRTY=50,
       TRMSTAT=TRANSCEIVE,CHNASSY=NO,TIOAL=256,RUSIZE=256,
       PGESTAT=AUTOPAGE,PGESIZE=(12,80),BUFFER=256,
       BRACKET=YES,ACCMETH=VTAM,NETNAME=LU024A1,
       BMSFEAT=(OBFMT,FMHPARM),LDC=(P1,H1),RELREQ=(YES,YES),
       VF=YES,HF=YES
```

CHNASSY=NO specifies that one RU at a time is passed to the CICS application program. CHNASSY=YES specifies that a complete chain is passed to an application program at one time.

For more information on how to set up the TCT, refer to the *CICS System Programmer's Reference Manual.*

Logon Mode Table

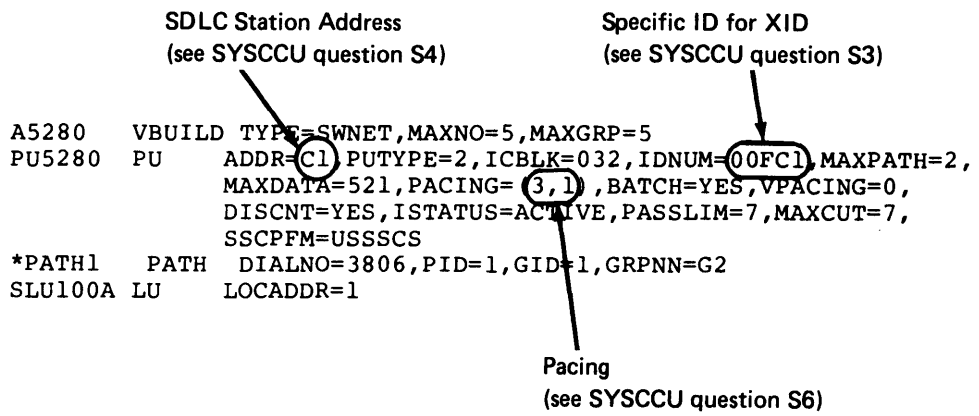
The following is an example of a logon mode table entry.

```
T5280 MODEENT LOGMODE=T5280,FMPROF=X'03',TSPROF=X'03',
            PRIPROT=X'A3',SECPROT=X'A3',COMPROT=X'7080',
            RUSIZES=X'8585',PSERVIC=X'0100000F100C00000010040'
```

VTAM Considerations

The following is an example of VTAM macros. In this example, the VTAM major node is called A5280. The physical unit name is PU5280, and the logical unit name is SLU100A.

Example of VTAM Macros



Note: The values for ADDR=, IDNUM=, and PACING= relate to values in the communications configuration record and are determined by your responses to the applicable SYSCCU prompts.

Host Programming Considerations for Application Programs

Regardless what logical record length your 5280 application program is transmitting, CAM breaks the record into 80 byte lengths, and transmits this record to CICS. Thus, the CICS application program should be set up to receive 80 byte records. The 5280 can only receive print, punch, and console data.

You must ensure that an SCB, if used, begins a chain, and that it does not span request units (RU) within a chain.

5280 SYSSDCU Utility Support for 'CSOT' Transaction

To use the 'CSOT' transaction, you must set up the following function definition records:

FDR 1 – Transmit from keyboard where user enters 'CSOT'
FDR 2 – Receive to console where user receives CSOT output messages.

Note: The 5280 SYSSDCU utility does not support 'CSFE'.

5280 Programming Considerations

The 5280 inquiry is a transaction oriented function. Each inquiry and its corresponding reply sent by the host are sent as one complete bracket. CICS operator command CSOT should not be initiated in inquiry mode. To execute these commands, chain several transmit and receive functions together within a job description record.

CICS/VS SNA USER INTERFACE

Host Generation Considerations

The 5280 is identified to CICS as a 3770B. The following example illustrates how to define a 5280 in the terminal macro of the CICS Terminal Control Table (TCT).

Example of Defining a TCT

```
DFHTCT TYPE=TERMINAL,TRMIDNT=TSYS,TRMTYPE=3770B,TRMPRTY=50,
       TRMSTAT=TRANSCEIVE,CHNASSY=NO,TIOAL=256,RUSIZE=256,
       PGESTAT=AUTOPAGE,PGESIZE=(12,80),BUFFER=256,
       BRACKET=YES,ACCMETH=VTAM,NETNAME=LU024A1,
       BMSFEAT=(OBFMT,FMHPARM),LDC=(P1,H1),RELREQ=(YES,YES),
       VF=YES,HF=YES
```

For more information on how to set up the TCT, refer to *CICS System Programmer's Reference Manual.*

Data Chaining Control

The CICS application programmer is responsible for control of data chaining when communicating with user-written programs on the 5280. The following PCTGEN shows how this control is given to the application program. Key parameters that accomplish this are MSGOPT=(CCONTRL), MSGPREQ=(CCONTRL) on the DFHPCT TYPE=OPTGRP macro, and OPTGRP=T5280 on the DFHPCT TYPE=ENTRY macro.

PCT GEN Example

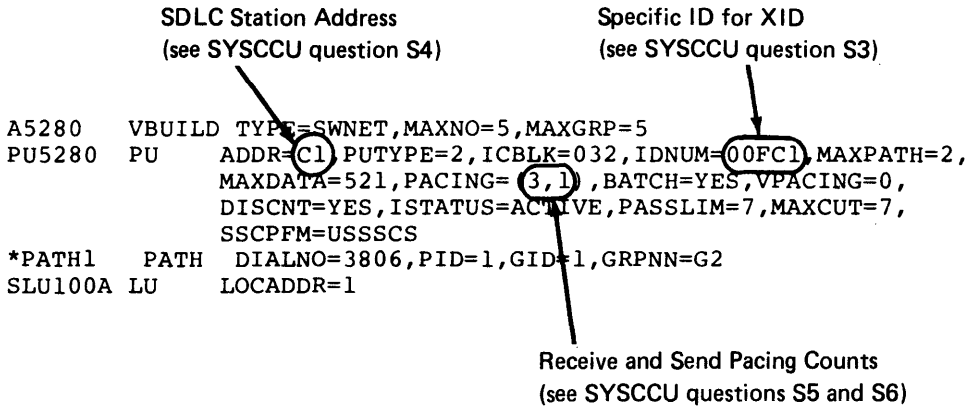
```
      DFHPCT TYPE=INITIAL,SUFFIX=TR,INDEX=YES
T5280 DFHPCT TYPE=OPTGRP MSGPOPT=(CCONTRL),MSGPREQ=(CCONTRL)
      DFHPCT TYPE=ENTRY,PROGRAM=TBHRA,TRANSID=BMRA,
             TWASIZE=512,INBFMH=ALL,DUMP=YES
      DFHPCT TYPE=ENTRY,PROGRAM=DFHSTSP,TRANSID=CAUT,
      DFHPCT TYPE=ENTRY,PROGRAM=A5280,TRANSID=USER,
             TWASIZE=512,DUMP=YES,OPTGRP=T5280,
             LOGREC=YES,TIOTYPE=IMMED,FDUMP=ASRA
```

Example of Logon Mode Table Entry

```
T5280 MODEENT LOGMODE=T5280,FMPROF=X'03',TSPROF=X'03',
           PRIPROT=X'A3',SECPROT=X'A3',COMPROT=X'7080'
           RUSIZES=X'8585',PSERVIC=X'01100000F100C00000010040'
```

VTAM Considerations

The following is an example of VTAM macros. In this example, the VTAM major node is called A5280. The physical unit name is PU5280, and the logical unit name is SLU100A.



Note: The values for ADDR=, IDNUM=, and PACING= relate to values in the communications configuration record and are determined by your response to the applicable SYSCCU prompts.

Host Programming Considerations for Application Programs

Chaining Control

In your application program, you must code CCOMPL=NO on the DFHTC macro when sending every record except the last one. This controls the end of chain on sending records to the 5280. When this parameter is left off the last record, CICS assumes that this is the end of the chain being sent on this transaction.

Maximum Record Length

Insert the new line and forms feed SCS characters after each record in your application program. These are recognized by the 5280 CAM as end of logical record and end of block respectively. These characters are not included in the maximum record length to be sent or passed on to the 5280 application program.

A maximum of 255 characters plus one new line or forms feed character comprise a maximum length record for the SNA User Interface CAM when communicating with CICS. FM headers are not allowed with this CAM and must not be inserted.

CICS/VS BSC

Host Generation Considerations

The 5280 is identified to CICS as a 3740. The following example illustrates how to define a 5280 to CICS in the terminal control table.

5280 Switched Point to Point

```
          DFHTCT TYPE=SDSCI,DEVICE=BSCMDPPT,ERROPT=ET,
                DSCNAME=SPP3740B
          DFHTCT TYPE=LINE,ACCMETH=BTAM,TRMTYPE=3740,
                DSCNAME=SPP3740B,INAREAL=519,BTAMRLN=1,
                LISTADR=M3740,FEATURE=AUTOANSR,ANSWRBK=EXIDVER,
                POOLADR=Q3740,CLASS=(CONV,BISYNC)
Q3740     DFHTCT TYPE=TERMINAL,TRMIDNT=TRSB,TRMTYPE=3740,
                TRMSTAT=TRANSCEIVE,
                TIOAL=516,BUFFER=516
MAG374    DFHTCT TYPE=TERMINAL,TRMIDNT=TRSC,TRMTYPE=3740,
                LASTTRM=POOL,TRMSTAT=TRANSCEIVE,TRANSID=B3TP,
                TIOAL=516,BUFFER=516
M3740     DFTRMLST SWLST,AN,12,4,5,C3D7E41070,(D9C5D4D6E3C52D,0,Q3740),
                (D4C1C7E2E3D92D,0,MAG374)
```

If you use the inquiry function provided by SYSBDCU, the CLASS macro should be defined as conversational/bisynchronous. This allows either inquiry or batch transmit and receive protocol to be accepted by CICS.

Two terminals are defined for this line, TRSB and TRSC. An exchange of IDs starts a session on TRSB. The first record transmitted by the 5280 should include the transaction to be initiated.

TRSC has a separate set of terminal IDs. A session is started on TRSC by transmitting an operator ID found on a magnetic stripe card. The transaction, TRNS, is automatically initiated because of the TRANSID macro.

The DFTRMLST macro defines the terminal IDs which will be used for security, and should also be included in the communications configuration record. For more information on the DFTRMLST macro, see the *OS/VS BTAM Manual.*

Sign On Table

The operator ID should be defined in the CICS sign on table when signing on to a terminal by using the operator ID found on the 5280 magnetic stripe card. The following example illustrates how a sign on table verifies the operator ID, 216245, found on the 5280 magnetic stripe card. For more information on the sign on table, refer to the *CICS System Programmer's Reference Manual.*

Sign On Table Example

```
DFHSNT TYPE=INITIAL
DFHSNT TYPE=ENTRY,OPNAME=LINDLEY,PASSWRD=CICS,
       OPIDENT=RBL
DFHSNT TYPE=ENTRY,OPNAME=DZIADZIOLA,PASSWRD=CICS,
       OPIDENT=MAD
DFHSNT TYPE=ENTRY,OPNAME=216245,NAMFORM=DEC,
       OPIDENT=ABC
DFHSNT TYPE=FINAL
END    DFHSNTBA
```

Host Programming Considerations for Application Programs

The 5280, along with other 3741 type devices, sends a null record after each data set followed by an EOT after the last data set. The application program should be set up to read in the null record and the EOT.

5280 support to CICS in a switched point to point is the same as a 3741, transmit and receive, receive only, or transmit only. CICS allows no other options.

DOS/VS/CICS SNA

Host Generation Considerations

The following example shows how 5280 can be defined as a 3770B to CICS with support for both batch and inquiry.

```
DFHTCT TYPE=TERMINAL,TRMIDNT=TSYS,TRMTYPE=3770B,TRMPRTY=50,
       TRMSTAT=TRANSCEIVE,CHNASSY=NO,TIOAL=256,
       RUSIZE=256,PGESTAT=AUTOPAGE,PGESIZE=(12,80),BUFFER=256,
       BRACKET=YES,ACCMETH=VTAM,NETNAME=LU027A1,
       BMSFEAT=(OBFMT,FMHPARM),
       LDC=(P1,H1),
       RELREQ=(YES,YES),VF=YES,HF=YES,LASTTRM=VTAM
```

Logon Mode Table Generation Example

The following example illustrates the generation of a logon mode table.

```
MODEENT LOGMODE=T5280,
        FMPROF=3,
        TSPROF=3,
        PRIPROT=X'A3',
        SECPROT=X'A3',
        COMPROT=X'7080',
        RUSIZES=X'8585',
        PSERV=X'01100000F100C00000010040
```

NCP Generation Considerations

The following is an example of NCP generation.

```
SSGRPA   GROUP LNCTL=SDLC,
               TYPE=NCP,
               ISTATUS=INACTIVE,
               VPACING=(1,1),
               DUPLEX=HALF,
               SPEED=2400,
               CLOCKNG=EXT,
               RETRIES=(5,1,2),
               POLLED=YES,
               DIAL=YES,
               MAXLU=5
SSLNE027 LINE  ADDRESS=027,
               ISTATUS=INACTIVE,
               NRZI=NO,<---------- See SYSCCU question S10
               CALL=INOUT
PU027    PU    PUTYPE=(1,2)
```

Note: The value for NRZI= must be the same as the value entered for SYSCCU prompt S10. A mismatch of values prevents a link connection.

Host Programming Considerations

The maximum permitted logical record length for a 5280 diskette data set to be transmitted is 512 bytes. However, all data is sent to the host as 80 byte records. It is the responsibility of the host system to reassemble the data into the desired representation.

5280 Programming Considerations

Enter the following to logon:

```
LOGON APPLID(CICS) LOGMODE(T5280)
```

where: T5280 is the logon mode table entry name.

DOS/VS/CICS BSC

Host Generation Considerations

The following example illustrates how the 5280 can be defined as a 3740 to CICS with support for both batch and inquiry operations. For more information, refer to *CICS System Programmer's Reference Manual.*

```
Q3740     DFHTCT TYPE=TERMINAL,
                 TRMIDNT=TRSS,
                 TRMTYPE=3740,
                 LASTTRM=POOL,
                 TRMSTAT=TRANSCEIVE,
                 TIOAL=516,
                 CLASS=(CONV,BISYNC)
LISTANB   DFTRMLST SWLST,AN,12,4,5,C3D7E41070,(D9C5D4D6E3C52D,0,Q3740)
```

The DFTRMLST macro defines the terminal and host IDs which are used for security. The IDs should also be included in the communications configuration record. For more information on the DFTRMLST macro, see the *DOS/VS BTAM* manual.

DOS/VSE/POWER SNA

Host Generation Considerations

The following example illustrates POWER/VSE macro generation.

```
POWER    POWER  DBLK=0,
                TRACKGP=0,
                LTAB=(10,00,05,10,15,20,25,30,35,40,45,50,50),
                PRI=3,
                SUBLIB=P,
                ACCOUNT=NO,
                STDLINE=(5000,1000),
                STDCARD=(100,100),
                JLOG=YES,
                JSEP=(0,0),
                RBS=(0,0),
                SPOOL=NO,
                SNA=(10,,POWER),
                RDREXIT=NO
         PRMT   REMOTE=4,TYPE=LUT1,CONSOLE=YES
```

Logon Mode Table Generation Example

The following example illustrates logon mode table generation.

```
MODEENT  LOGMODE=T5280
         FMPROF=3,
         TSPROF=3,
         PRIPROT=X'A3',
         SECPROT=X'A3',
         COMPROT=X'7080',
         RUSIZES=X'8585',
         PSERV=X'01100000F100C00000010040'
         SRCVPAC=X'01'}
         SSNDPAC=X'01'}  See SYSCCU question S6
```

NCP Generation Considerations

The following example illustrates NCP generation.

```
SSGRPA   GROUP LNCTL=SDLC,
               TYPE=NCP,
               ISTATUS=INACTIVE,
               VPACING=(1,1),
               DUPLEX=HALF,
               SPEED=2400,
               CLOCKNG=EXT,
               RETRIES=(5,1,2),
               POLLED=YES,
               DIAL=YES,
               MAXLU=5
SSLNE026 LINE  ADDRESS=026,
               ISTATUS=INACTIVE,
               NRZI=YES,<-------------See SYSCCU question S10
               CALL=INOUT
PU026    PU    PUTYPE=(1,2)
```

Note: The value for NRZI= must be the same as the value entered for SYSCCU prompt S10. A mismatch of values prevents a link connection.

5280 Programming Considerations

POWER/VSE is a reader/writer spooling system that provides automatic staging of unit record input and output, class scheduling, and priority scheduling for all DOS/VSE programs executed under its control.

After host initialization, jobs can be controlled entirely from the originating remote station through the use of terminal power commands. When a job from the remote terminal has been entered into the POWER/VSE reader queue, and subsequently into the DOS/VSE system under POWER/VSE control, execution of the job proceeds under the supervision of DOS/VSE. Output is in the form of LIST and PUNCH data. This data is put on the POWER/VSE list or punch queue, and is sent to either the originating terminal, a different terminal, or the host system.

DOS/VSE/POWER SNA Example

The following example defines a DOS/VSE/POWER SNA job to display the directory of the host procedure library. The first operation to be executed is the transfer of the job file. This requires a single job description record, previously created with utility SYSRJEDU, which provides a pointer to the communications configuration record and the diskette address of the job data file. Optionally, the job description record can provide logon information. The job is started by executing utility SYSSRJE and providing the job data set name, address, and record ID.

After the message "Ready for input" is written to the console, the 5280 operator enters the utility READFILE control statement '. . R DSN-DSERV,DRV-XXXX, CMD-Y' (where XXXX is the diskette address). File DSERV is then transmitted to the host DOS/POWER/VSE reader queue.

Enter the terminal power command DISPLAY LST and observe the queue status on the console. Once the output from the job DSERV is in the POWER list queue, you enter the DOS/POWER/VSE commands START LST and GO LST. The output list data (directory listing) is now written to the 5280 printer.

Enter the DOS/POWER/VSE command SIGNOFF after all data is received at the printer.

File DSERV contents are:

```
// JOB DSERV
// EXEC DSERV
  DSPLYS PD
/*
/&
..EOF
```

Logon Example

Enter the following to logon:

```
LOGON APPLID(POWER) LOGMODE(T5280) DATA('004')
```

where: T5280 is the logon mode entry name DATA('004') is the remote terminal ID.

Signoff

Enter one of the following POWER commands to sign off a teleprocessing link:

```
SIGNOFF

LOGOFF APPLID(POWER)

LOGOFF APPLID(POWER) TYPE(COND)
```

where: COND is conditional, allowing execution of the current job to complete before the terminal is disconnected.

In the first two examples, the logoff is immediate.

DOS/VSE/POWER BSC

Host Generation Considerations

The following example illustrates DOS/VSE/POWER macro generation:

```
POWER    POWER DBLK=0,
               TRACKGP=0,
               LTAB=(10,00,05,10,15,20,25,30,35,40,45,50,50),
               PRI=3,
               SUBLIB=P,
               ACCOUNT=NO,
               STDLINE=(5000,1000),
               STDCARD=(100,100),
               JLOG=YES,
               JSEP=(0,0),
               RBS=(0,0),
               SPOOL=NO,
               SNA=(10,,POWER)
               RDREXIT=NO
         PLINE ADDR=X'036',SWITCH=YES,TIMEOUT=NO
         PRMT  REMOTE=001,TYPE=3780,TRACE=YES,LIST=132,SCE=YES,CS=YES
```

The following example illustrates EP generation:

```
BSLNE026 LINE  ADDRESS=(026,036),
               AUTO=032,
               SPEED=1200,
               CALL=INOUT,
               CODE=EBCDIC,
               DATRATE=LOW,
               DIALSET=BSSET026,
               DUPLEX=HALF,
               TRANSFR=2,
               RETRIES=(3,1,3),
               INTPRI=3
BST026A  TERMINAL  TERM=3780,
               DIALNO=(65860,8),
               CTERM=NO,
               DIRECTN=INOUT,
               ISTATUS=INACTIVE
```

5280 Programming Considerations

The 5280 is supported by DOS/POWER as a 3780 device.

POWER/VSE is a reader/writer spooling system that provides automatic staging of unit record input and output, class scheduling, and priority scheduling for all DOS/VSE programs executed under its control.

Using terminal power commands, jobs can be controlled entirely from the originating remote station after host initialization. When a job from a remote terminal has been entered into the POWER/VSE reader queue, and subsequently into the DOS/VSE system under POWER/VSE control, execution of the job proceeds under the supervision of DOS/VSE. Output is in the form of list and punch data. This data is put on the POWER/VSE list or punch queue and is sent to either the originating terminal, a different terminal, or the host system.

DOS/VSE/POWER BSC Example

The following is a description of POWER/VSE BSC jobs required to display the directory of the host procedure library. In the order of execution, the jobs are:

- Transmitting the job file to the POWER reader queue
- Determining when the job has been executed by DOS/VSE, and when output data is available in the POWER list queue
- Receiving the output data from the POWER list queue to the 5280

Prior to execution, each of the job description records and function definition records must be predefined using the utility SYSDCDU. Optionally, printer format records may also be predefined.

Each of the jobs are started by executing the utility SYSBDCU and providing the job data set name, address, and record ID.

The function definition records functions required for each session follow:

1. Transmitting the job file to the POWER/VSE reader queue.

```
FDR1    TRANSMIT     * ..SIGNON,XXX
FDR2    RECEIVE      SIGNON MESSAGE RESPONSE
FDR3    TRANSMIT     FILE 'DSERV' TO POWER/VSE READER QUEUE
FDR4    TRANSMIT     * ..SIGNOFF,XXX
FDR5    RECEIVE      SIGNOFF MESSAGE RESPONSE
```

```
FILE 'DSERV' CONTENTS:
// JOB DSERV
// EXEC DSERV
  DSPLYS PD
/*
/&
..EOF
.
```

2. Determining when the job has been executed by DOS/VSE, and when output data is available to the POWER list queue.

```
FDR1    TRANSMIT    * ..SIGNON,XXX
FDR2    RECEIVE     SIGNON MESSAGE RESPONSE
FDR3    TRANSMIT    * ..DISPLAY ALL
FDR4    RECEIVE     STATUS FOR RDR, PUN, AND LST QUEUES
FDR5    TRANSMIT    * ..SIGNOFF,XXX
FDR6    RECEIVE     SIGNOFF MESSAGE RESPONSE
```

Note: This job may have to be executed more than once.

3. Receiving output data from the POWER list queue to the 5280.

```
FDR1    TRANSMIT    * ..SIGNON,XXX
FDR2    RECEIVE     SIGNON MESSAGE RESPONSE
FDR3    TRANSMIT    * ..START LST (START LIST QUEUE OUTPUT WRITER)
FDR4    RECEIVE     OUTPUT (PROCEDURE LIBRARY-DIRECTORY) FROM POWER
                    LST QUEUE
FDR5    TRANSMIT    * ..SIGNOFF,XXX
FDR6    RECEIVE     SIGNOFF MESSAGE RESPONSE
```

Note: For all three of the above jobs:

XXX is the terminal ID, and
* . . in columns 1–4 indicates a terminal power command.

Disconnect Timeout Period

There are conditions when SYSBDCU posts a completion code to the status line requiring an operator response. An example of a condition is receiving multiple files from either the POWER list or punch queue.

Using values in the default communications configuration record (BSC 3780), the operator has 21 seconds to respond or the 5280 disconnects. However, the disconnect timeout period can be changed by entering a new value for SYSCCU prompt B23. The value entered for prompt B22 (receive timeout) is multiplied by the value entered for prompt B23 (receive timeout retry count) to determine the amount of time before a disconnect is sent to the host. For example, changing the value for B23 to 99 would change the disconnect time from 21 to 297 seconds.

Unique Data Sets

If, for your installation, terminal power commands can be entered from either the 5280 display station or a diskette, the recommended input method is diskette. Having unique data sets for most POWER commands has the following advantages:

- Decreased job session time.
- Elimination of operator input errors. Entering on invalid or incorrect terminal power command effectively forces a job function mismatch. This occurs because the host response is an unexpected message indicating the previous command was in error.
- Reduced link costs for switched lines.

Verification

It is recommended that a display of the output queues to the 5280 printer precede and immediately follow the receipt of data, prior to executing terminal power commands.

List Output

All POWER list queue data contains printer control characters. Therefore, it is recommended that list output be directed to either the 5280 printer or a diskette, but not to console.

Logon

Enter the following to logon:

```
* . . SIGNON XXX
```

where: XXX is the terminal ID.

Signoff

Enter the following to sign off a teleprocessing link:

```
* . . SIGNOFF XXX
```

where: XXX is the terminal ID.

SRJE/JES2

Host Generation Considerations

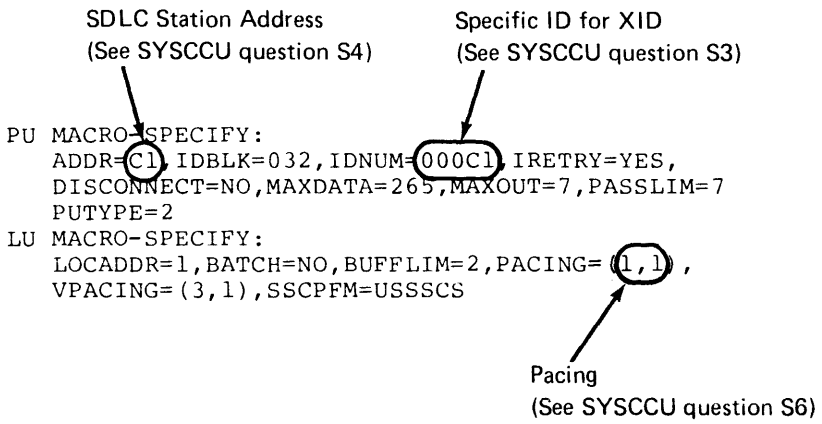
The 5280 is defined to VTAM as a secondary logical unit type 1 (SLU1).

The following is an example of the parameters for the logon mode table:

```
MODEENT LOGMODE=T5280,
      FMPROF=3,
      TSPROF=3,
      PRIPROT=X'A3',
      SECPROT=X'A3',
      COMPROT=X'7080',
      RUSIZES=X'8585',
      SSNDPAC=X'01'
      SRCVPAC=X'01'   } See SYSCCU question S6
      PSERVIC=X'01100000F100C10000010040'
```

VTAM Considerations

The following is an example of VTAM macro parameters that must be specified:



Note: The values for ADDR=, IDNUM=, and PACING= relate to values in the communications configuration record and are determined by your response to the applicable SYSCCU prompts.

Initialization Deck Parameters

The following is an example of initialization deck parameters:

```
LINE14 UNIT=SNA
RMT14 LUTYPE1,CONSOLE,COMP,TRANSP,BUFSIZE=256,
      DISCINTV=8160,NUMPR=1,NUMPU=1,NUMRD=1,SETUPINF,
      SETUPMSG,
R14.PR1 CLASS=AX,PRWIDTH=132,AUTO,COMP
R14.PU1 CLASS=B0,DRAIN,AUTO,COMP
R14.RD1 CLASS=D,START,MSGCLASS=A,PRIOLIM=5
```

Note: Do not use the MULTILEAVING parameter.

Logon Example for SYSSRJE

```
LOGON APPLID(JES2) LOGMODE(T5280)
      DATA=(RMT14)
```

where: JES2 is the name of the JES2 application.

RMT14 is the name of the initialization deck.

SRJE RES

Host Generation Considerations

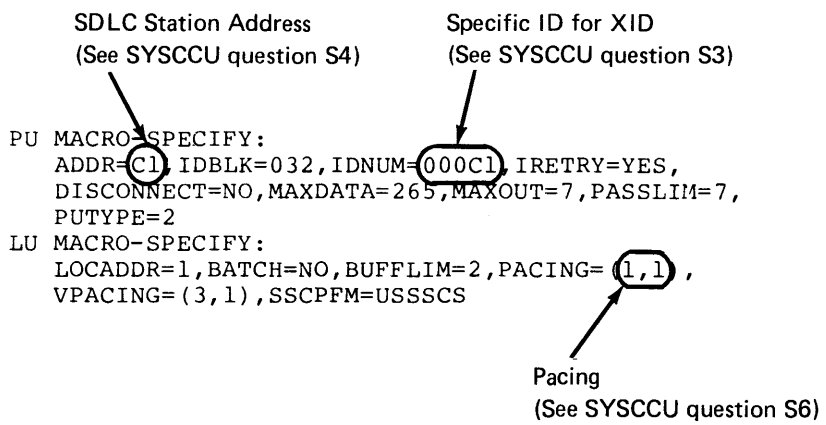
The 5280 is defined to VTAM as a secondary logical unit type 1 (SLU1).

Example of Logon Mode Table Entries

```
MODEENT LOGMODE=T5280,
      FMPROF=3,
       TSPROF=3,
       PRIPROT=X'A3',
       SECPROT=X'A3',
       COMPROT=X'7080',
       RUSIZES=X'8585',
       SSNDPAC=X'01'
       SRCVPAC=X'01'
       PSERVIC=X'01100000F100E00000010040'
```

VTAM Considerations

The following is an example of VTAM macro parameters that must be specified:



Notes:

1. The values for ADDR=, IDNUM=, and PACING= relate to values in the communications configuration record, and are determined by your response to the applicable SYSCCU prompts.
2. The value specified for VPACING must be nonzero for all RJE VTAM generations or the NCP can be easily overrun.

Example of RES Generation Parameters

The following is a RTAM description for RES system generation:

```
RTAM   TPBUF=18,CNMSGNO=20,TPPRINT=8,
       TPPUNCH=8,TPREAD=8,SNACOMP=YES,
       MXINTBR=856,PORTS=4,TPBFSIZ=1880
```

The following is a terminal description for an SNA work station.

```
TERMINAL TERMID=6,TDESCR=(3,8,5,3),
         VBUF=9,COMPRES=NO,BUFXSIZ=512,
         CNMSGNO=5,CONPR=1,PLGN=0,
         RDRS=1,PCHS=1,PTRS=1,SESSLIM=1,
         CPACTBL=NO
```

Note: TERMID=6 is referred to in the logon in the job definition record.

Logon Example

```
LOGON APPLID(RTAM) LOGMODE(T5280)
      DATA(RMT14) T(6) PROC(TRPROC)
```

where: RTAM is the application program defined in the RES generation.

T5280 is the logon mode table name.

Terminal 6 is defined in the terminal macro in the RES generation.

TRPROC is a procedure in the procedure library (PROCLIB) which is authorized to be executed by RMT14.

MRJE/JES2 BSC

Host Generation Considerations

The following are initialization deck parameters pertaining to the 5280:

```
LINE10 FDUPLEX,HISPEED,TRANSP,UNIT=086    TEL NO = 4996 201C
RMT10 SYSTEM/3,CONSOLE,FIXED,LINE=10,MULTI,TRANSP,NUMPU=1
R10.PR1 CLASS=AX,PRWIDTH=133
R10.PU1 CLASS=B0,DRAIN
R10.RD1 CLASS=D,MSGCLASS=A
```

Notes:

1. UNIT=086 is defined in the NCP generation and in system generation.
2. RMT10 is used in logon.
3. When the session is established, the punch is drained and should be started if punch output is expected.

Logon Example

Col. 1	Col. 16	Col. 25
/*SIGNON	RMT10	"password"

Sample Logoff

/*LOGOFF (which must be entered from the reader task)

MRJE/JES3 BSC

Host Generation Considerations

The following is an example of initialization deck parameters used to specify a 5280 on a switched line.

```
RJPLINE,N=LINECE,A=0CE,S=4800,F=DIAL,O=AUTO
```

where: N=LINECE is the name defined in NCP generation.

A=0CE is the address defined in system generation.

```
RJPTERM,N=BCGSD,T=SYS3,C=R,
        PR=1,PU=1,RD=1,0=BFIX,
        B=512,0=AUTR
```

where: BCGSD (the remote terminal ID) is used in logon.

T=SYS3 is the 5280 defined as a System/3.

One printer, one punch, and one reader are defined.

Buffer size is 512.

Logon Example

Col. 1	Col. 16	Col. 22	Col. 25
/*LOGON	BCGSD	A	"password"

Note: Column 22 specifies an automatic reader.

Programming Hint

If a minimum size partition is used for MRJE CAM, the trace table value must be zero (SYSCCU prompt C19).

MRJE RES BSC

Host Generation Considerations

The following is a description of the terminal macro for an MRJE work station in the RES system generation:

```
TERMINAL TERMID=4,TDESCR=(3,6,4,3),
         PTRS=3,PCHS=3,RDRS=3,
         CNMSGNO=5,CONPR=1,
         PLGN=0
```

Note: TERMID=4 is referenced in the logon in the job definition record.

Logon Example

```
LOGON   ABLE TERM(04) PROC(FSPROC)
```

Notes:

1. Terminal 4 is described in the terminal macro in the RES generation.
2. FSPROC is a procedure (member) in the procedure library (PROCLIB) which is authorized to be executed by ABLE.

SYSTEM/32 RPG BSC 3741 PROTOCOL

Host Programming Considerations

Application programs must be written for either a leased or switched environment. Multipoint is not supported because both the System/32 and the 5280 act as tributary stations. Therefore, column 15 of the T-specification must be coded as an "S" for switched, or a "P" for point to point nonswitched.

In writing a program for a switched environment, you must specify the connection type in column 20 of the T-specification. If M is coded, the System/32 user must dial to make the connection. You should be aware that System/32 sends the initial line bid. Therefore, the 5280 communication configuration record should specify that the host sends the initial line bid. If you code an "A" for auto answer or a "B" for manual answer, the System/32 expects the 5280 to send the initial line bid.

The System/32 can only transmit and receive single data sets from the 5280. Therefore, on the F-specification a maximum of one input and one output BSCA file is permitted.

Switched Line Example

In this example, the 5280 receives data from the System/32 over a switched line.

S32S02

```
H     012                                                              S32S02
F*************************************************************************
F* PROGRAM NAME - S32S02
F* DESCRIPTION - TRANSMIT FROM DISK
F*               - EBCDIC
F*               - SWITCHED
F*************************************************************************
FDSKFILE IPE F 128 128            DISK
FPUTONLY O   F 128 128    2       BSCA
TPUTONLY ST ENM                                 100
IDSKFILE NS  01
I                                          1 128 DATA
OPUTONLY D        01
O                        DATA     128
```

Receive and Transmit Example

In this example, the 5280 receives data from the System/32, then transmits data to the System/32 over a leased line.

```
H     012                                                              S32L04
F*****************************************************************************
F*  PROGRAM  ID - S32L04
F* DESCRIPTION - TRANSMIT FROM DISK, RECEIVE TO PRINTER
F*               - EBCDIC
F*               - LEASED PT TO PT
F*****************************************************************************
FDSKFILE IPE F 128 128            DISK
FGETFILE ISE F 128 128            BSCA
FPUTFILE O   F 128 128            BSCA
FPRINTER O   F 128 128     OF     LPRINTER
LPRINTER  66FL 60OL
TGETFILE PR EN                                    100  L
TPUTFILE PT EN                                    100
IDSKFILE NS  01
I                                          1 128 DATA1
IGETFILE NS  10
I                                          1 128 DATA2
OPUTFILE D         01
O                          DATA1    128
OPRINTER H  204    1P
O       OR         OF
O                                    6 'S32L04'
O        D  1      10
O                          DATA2    128
```

SYSTEM/34 RPG BSC 3741 PROTOCOL

Host Generation Considerations

The 3740 multiple file support should be specified to communicate with a 5280. You should enter the status command (STATUS COMM) to verify that MLTFL=Y. If it equals "NO," you can override this default by entering the OVERRIDE MLTFL=Y command.

Host Programming Considerations

Application programs must be written for either a leased or switched environment. Multipoint is not supported because both the System/34 and the 5280 act as tributary stations. Therefore, column 5 of the T-specification must be coded as an "S" for switched or "P" for point to point.

In writing a program for a switched environment, you must specify the connection type in column 20 of the T-specification. If "M" is coded, the System/34 user must dial to make the connection. You should be aware that the System/34 sends the initial line bid. Therefore, in the 5280 communications configuration record it should specify that the host sends the initial line bid. If you code an "A" for auto answer, or a "B" for manual answer, the System/34 expects the 5280 to send the initial line bid.

The System/34 user can transmit multiple files to the 5280 by defining the first disk input file as primary and the subsequent files to be transmitted as secondary. You define a file as primary by coding a "P" in column 5 of the F-specification. Secondary files are transmitted in the order they are coded on the form.

A System/34 user can receive multiple files from the 5280 by defining the first BSCA file to be received as primary, and subsequent BSCA files to receive data as secondary files. You define a file as primary by coding a "P" in column 15 of the F-specification. You define a secondary file by coding an "S" in column 15 of the F-specification.

An inquiry function is not recommended to System/34.

ICF Considerations

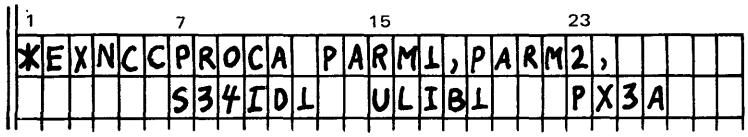
Configure a BSCEL subsystem taking the standard defaults with the exception of question 6.0. This question must be answered that the BSCEL partner is 'ATTR', so ICF commands are not sent to the 5280.

The S/34 ICF program can be written using the standard input/output commands. The 5280 cannot have a program evoked from the S/34.

The 5280 utility or DE/RPG program must initiate the ICF procedure on the S/34 by sending two 128 byte records using the following format:

*EXNCC procedure[data or parameters]
[user id] [library name] [password]

The following example illustrates the position each field must be in.



Switched Line Example

In the following example, the 5280 transmits to the System/34 over a switched line.

```
H     012                                                                S34S01
F*************************************************************************
F* PROGRAM  ID - S34S01
F* DESCRIPTION - RECEIVE TO PRINTER
F*             - EBCDIC
F*             - SWITCHED
F*************************************************************************
FGETONLY IPE F 128 128   2       BSCA
FPRINTER O   F 128 128    OF    LPRINTER
LPRINTER 066FL 60OL
TGETONLY SR ENB                                  100
IGETONLY NS  01
I                                          1 128 DATA
OPRINTER H  204   lP
O       OR        OF
O                                    6 'S34S01'
O        D  1     01
O                        DATA     128
```

Receive Multiple Files Example

In this example, the 5280 receives multiple files from the System/34 over a leased line.

```
H     012                                                                S34L14
F*************************************************************************
F* PROGRAM  ID  - S34L14
F* DESCRIPTION  - TRANSMIT FROM DISK, TRANSMIT FROM DISK
F*              - EBCDIC
F*              - LEASED PT TO PT
F*************************************************************************
FDSKFILE IPE F     128            DISK
FDSKFILE2ISE F     128            DISK
FPUTONLY O   F     128    2       BSCA
FPUTONLY2O   F     128    2       BSCA
TPUTONLY PT EN                                  100
TPUTONLY2PT EN                                  100
IDSKFILE NS  01
I                                        1 128 DATA1
IDSKFILE2NS  02
I                                        1 128 DATA2
OPUTONLY D        01
O                        DATA1    128
OPUTONLY2D        02
O                        DATA2    128
```

Transmit Multiple Files Example

In this example, the 5280 transmits multiple files to the System/34 over a leased line.

```
H     012                                                                S34L13
F*************************************************************************
F* PROGRAM  ID  - S34L13
F* DESCRIPTION  - RECEIVE TO PRINTER, RECEIVE TO PRINTER
F*              - EBCDIC
F*              - LEASED PT TO PT
F*************************************************************************
FGETONLY IPE F     128    2       BSCA
FGETONLY2ISE F     128    2       BSCA
FPRINTER O   F     128     OF    LPRINTER
LPRINTER 066FL 60OL
TGETONLY PR EN                                    100
TGETONLY2PR EN                                    100  L
IGETONLY NS  01
I                                      1 128 DATA1
IGETONLY2NS  02
I                                      1 128 DATA2
OPRINTER H  204   1P
O       OR        OF
O                                   6 'S34L13'
O        D  1     01
O                        DATA1    128
O        D  1     02
O                        DATA2    128
```

BSC 5265

Host Programming Considerations

5265 can communicate to the 5280 in the following modes:

Mode	Explanation
91	Transmit single data set
92	Transmit multiple data sets
93	Transmit single data set and receive single data set
94	Transmit multiple data sets and receive single data set
95	Receive single data set

Notes:

1. All data is nontransparent.
2. All records are 128 bytes long.

5280 Programming Considerations

Data to be processed by 5265 must be in the following format (character):

128 byte records

1st byte	C0 = negative credit
	C1 = price lookup
2nd byte	C0 = format record
	C1 = middle records
	C9 = last record

There must be one format record, followed by middle records, followed by one last record.

3741 BSC

Host Programming Considerations

The 3741 can only communicate to the 5280 in a switched or leased point to point environment, because both the 5280 and the 3741 act as tributary stations on a multiple line.

The 3741 user must use the FUNC SEL UPPER and COMM keys in the same manner that he selects these keys to communicate over a leased line when communicating over a switched line, and when the communications configuration record on the 5280 specifies that the host sends the initial line bid. However, prior to selecting T or R to transmit or receive, you must select M which specifies that the 3741 is going to send the initial line bid. Then, you select T or R and dial the telephone to make the connection.

Multiple Data Sets

The 3741 transmits from diskette all the data sets that do not contain a "B" in the bypass field of the header. This 3741 function corresponds to the 5280 multiple data sets function.

The 3741 can transmit and then receive from the 5280, but it cannot receive and then transmit to the 5280. During a transmit/receive operation, the 3741 transmits all the data sets on a diskette until it reaches a data set that has a "B" in the bypass field of the header. The 3741 then turns the line around, and receives to the data set that has the bypass field coded.

Example of 3741 Communication Procedure

This example is a procedure to receive data on the 5280 from the 3741 over a switched line.

```
//*********************************************************************
//* SAMPLE 3741 COMMUNICATION PROCEDURE
//*
//* DESCRIPTION  - TRANSMIT OPERATION
//*              - EBCDIC
//*              - SWITCHED LINE
//*
//*********************************************************************

  .SELECT DATA SET = 'TRDAT128', WITH 128 BYTE RECORD LENGTH
  .PRESS 'FUNCT SEL' UPPER, 'COMM'
  .PRESS 'M', THEN 'T'
  .IF OPERATOR ID FEATURE ATTACHED, PRESS 'REC ADV'
  .DIAL PHONE
  .WHEN REMOTE IS READY, PUSH DATA BUTTON ON MODEM
```

SYSTEM/3 CCP

Host Programming Considerations

The 5280 is defined as a 3741 to the Communications Control Program. The following example defines the parameters for generating a Communications Control Program.

```
// LOAD $MAINT,F1
// RUN
// COPY FROM-READER,LIBRARY-S,RETAIN-P,NAME-$CG1GM,TO-R1
      $EIOD CARD-NO,            -- MFCU / 1442 / 'MFCU,1442' --
            PRINTR-1403,        -- 5203 / 1403 --
            N3741-YES,          -- YES --
            DISKS-'R2,F2',      -- R2 / 'R2,F2' --
            D5445-NO            -- D1 / 'D1,D2' --
      $EFAC MAXEUP-3,           -- 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 --
            DPF-YES,            -- YES --
            ESCAPE-'COMMAND',   -- 'CCCCCC' / X'XXXXXXXXXXXX' --
            PGMCNT-NO,          -- NO --
            FSHARE-YES,         -- NO --
            SYMFIL-YES,         -- NO --
            FORMAT-YES,         -- NO / PL1 --
            PRUF-YES,           -- YES --
            SORT-NO             -- YES --
      $EPLG LANG-RPGII,         -- COBOL / RPGII / FORTRAN / ASSEM --
            PPUNIT-F1           -- R1 / F1 / R2 / F2 --
      $EPLG LANG-FORTRAN,       -- COBOL / RPGII / FORTRAN / ASSEM --
            PPUNIT-F1           -- R1 / F1 / R2 / F2 --
      $EPLG LANG-ASSEM,         --COBOL / RPGII / FORTRAN / ASSEM
            PPUNIT-F1           --R1  /  F1  /  R2  / F2
      $ESEC SECURE-NO           -- CCP / USER --
      $EFIL SETS-10,            -- 2 - 25 --
            PROGS-10,           -- 1 - 255 --
            DFILES-10,          -- 1 - 50 --
            TERMS-2,            -- 2 - 254 --
            DUMPS-2,            -- 2 - 9 --
            CORE-96K,           --  48K / 64K / 80K / 96K --
            TRACE-3,            -- 2 - 20 --
            FLPACK-CCPGEN,      -- NAME OF PACK --
            FLUNIT-F2           -- R1 / F1 / R2 / F2 --
      $EBSC BSCA-2,             -- 0 - 2 --
            DA-YES,             -- YES --
            DIAL-YES,           -- YES --
            PP-YES,             -- YES --
            MP-NO,              -- YES --
            CS-YES,             -- NO --
            GETMSG-YES,         -- NO --
            ITB-YES,            -- YES --
            RECSEP-1E,          -- TWO HEX DIGITS --
            ASCII-YES,          -- YES --
            EBCDIC-YES,         -- NO --
            XPRNCY-YES,         -- YES --
            RESPOL-NO,          -- YES --
            BSYPRT-NO,          -- YES --
            AUTORS-NO           -- YES --
      $EBSD TYPE-3277M2         -- SEE SYSTEM REFERENCE MANUAL --
      $EBSD TYPE-3741
      $EBSD TYPE-CPU
      $EGEN DSUNIT-F1,          -- R1 / F1 --
            CCUNIT-F2,          -- R1 / F1 / R2 / F2 --
            WKUNIT-R2,          -- 'UNIT,UNIT,UNIT' --
            WKPACK-CCPWK,                  -- 'PACK,PACK,PACK' --
            DIUNIT-R1,          -- R1 / F1 / R2 / F2 --        CCP-PID
            MINRES-NO,          -- YES --
            CARD-NO             -- YES --
// CEND
// END
```

```
// IMAGE CHAR,60
1234567890XY/STUVWI:_",=JKLMNOPQR-Z(ABCDEFGHI+.)
%$*#&@<;¬'?>
// NOHALT
// CALL $SGINT,R1                    CLEAR F1
// RUN
*     BE SURE THE SYSTEM CONFIGURATION STATEMENTS HAVE BEEN MODIFIED BEFORE
*     CONTINUING.
*
***   SET RIGHTMOST ADDRESS/DATA SWITCH TO 0.
*     PRESS CONSOLE START --HALT/RESET IF YOU HAVE DPF SYSTEM-- TO CONTINUE.
// PAUSE
// CALL $SGEN,R1                     PROCESS THE SYSTEM CONFIGURATION STATEMENTS
// RUN
       $DCOR CORE-96KCCP           --48K OR 64K OR 80K OR 96K OR 80KCCP OR 96KCCP
       $DDPF DPF-YES               --YES--
       $DSK3 DSK33-'D1,D2'         --'D1,D2'--
       $DTUN TAPES-T1              --T1 OR 'T1,T2' OR 'T1,T2,T3' OR 'T1,T2,T3,T4'
       $DTDN DUALDN-NO             --T1 OR T2 OR T3 OR T4 OR   ...  'T1,T2,T3,T4'
       $DTRK TRACK7-NO             --T1 OR T2 OR T3 OR T4 OR   ...  'T1,T2,T3,T4'
       $DATE DATE-MDY              --MDY OR DMY--
       $DPRN PRINT-1403            --5203 OR 1403--
       $DWID WIDTH-132             --120 OR 132, 132 IF PRINT-1403 --
       $DUAL DUAL-NO               --YES--
       $DLIN LINE-68               --ANY NUMBER IN RANGE OF 01 TO 112
       $DCRD CARD-'MFCU,1442'      --MFCU OR 1442 OR 'MCFU,1442' OR NO
       $DDKT DSKET-3741            --3741--
       $DOUT DEV-3741              --NO OR MFCU1 OR MFCU2 OR 1442 OR 3741--
       $DKBD KEYBD-5471R           --5471 OR 5471R--
       $DAUX AUX-3741              --MFCU2 OR CONSOLE OR 1442 OR 3741 --
       $DCON CON-CONSOLE           --MFCU2 OR CONSOLE OR 1442 OR 3741 --
       $DINQ INQURY-YES            --YES-- VALID ONLY IF KEYBD-5471
       $DBSC LINE-'L1,DA'          --L1 OR 'L1,L2' OR ICA OR DA OR 'L1,...'
       $DMLP MLMP-YES              --YES, ONLY IF BSCA WAS SPECIFIED--
       $DMCR MICR-NO               --1255 OR 1419--
       $DCPR CKRS-NO               --YES--SUPPORT FOR CHECK POINT RESTART
       $DLKE OVLNK-YES             --YES--SUPPORT FOR OVERLAY LINKAGE EDITOR
       $DLVL PARTN-BOTH            --1 OR 2 OR BOTH--
       $DFRM DEFFN-STD             --NO COMMAS,QUOTES OR BLANKS--
       $DSPD SPDSK-D1              --D1 OR D2--
       $DSPF SPCYL-050             --001 TO 166--SPOOL FILE SIZE
       $DSPX SPEXT-04              --01 OR 02 OR 04 OR 05 OR 10--
       $DSPV ADD-0                 --256 OR 512 OR 768 OR 1024--
//     END
*
***   THE SYSTEM CONFIGURATION STATEMENTS HAVE BEEN PROCESSED.
*
// CALL $SGBLD,R1       BUILD OVERLAY LINKAGE EDITOR INPUT PROCEDURES
// RUN
*
// CALL $SGEN1,R1       PROCESS THE SYSTEM CONFIGURATION STATEMENT OUTPUT FILE.
// RUN
*
***  THE SYSTEM CONFIGURATION STATEMENT OUTPUT FILE HAS BEEN PROCESSED.
*
*
// CALL $SGLNK,R1                    BUILD THE NEW SUPERVISOR FOR THIS INSTALLATION
// RUN
// LOAD $MAINT,R1
*
*
```

(continued on next page)

```
***    THE ALLOCATION FOR OBJECT LIBRARY IS 170 TRACKS, FOR SOURCE LIBRARY
***    5 TRACKS AND FOR OBJECT DIRECTORY 4 TRACKS.  YOU SHOULD DETERMINE
***    THE ADEQUACY OF THESE ALLOCATIONS AND, IF NECESSARY, ALTER THE ALLOCATE
***    CONTROL STATEMENT WHICH FOLLOWS.
*
***    TO CONTINUE, SET RIGHTMOST ADDRESS/DATA SWITCH TO 0
***    PRESS CONSOLE START --HALT/RESET IF YOU HAVE DPF SYSTEM--.
// PAUSE
// RUN
// ALLOCATE TO-F1,OBJECT-300,SOURCE-50,SYSTEM-YES,DIRSIZE-4
// END
// CALL $SGCOM,R1                  BUILD REQUIRED SCP SYSTEM ON F1
// RUN
// CALL $SGOPT,R1                  BUILD OPTIONAL SCP SYSTEM FUNCTIONS ONTO F1
// RUN
// CALL $SGIPL,R1                  COPY CYLINDER 0 REQUIREMENTS TO F1
// RUN
*
***    THE SYSTEM CONTROL PROGRAMS HAVE BEEN GENERATED
*
***    NORMAL END OF SCP GENERATION
```

The following is an example of a program to transmit 128 bytes to the 5280:

```
// LOAD $RPG,F1
// COMPILE OBJECT-F2
// FILE NAME-$WORK,UNIT-R1,PACK-R1R1R1,RETAIN-S,TRACKS-20
// FILE NAME-$SOURCE,UNIT-R1,PACK-R1R1R1,RETAIN-S,TRACKS-20
// RUN
     F*************************************************************
     F*  PROGRAM NAME - TRTP01
     F*  FUNCTION - TRANSMIT 128 BYTES
     F*       TO THE               5280
    F*************************************************************
     H   C 006
     FDISKFIL IP  F 128 128           DISK
     FBSCAOUT O   F 128 128    2      BSCA
     FPRINTER O   F 132 132           PRINTER
     TBSCAOUT ST ENM                            99030
     IDISKFIL NS  01
     I                                     1 128 DATA
     C   01N99   COUNT     ADD  1         COUNT   30       COUNT RECORDS.
     C   99                SETON                   LR     LINE ERROR.
     OBSCAOUT D         01N99
     O                          DATA     128
     OPRINTER T         LRN99
     O                          COUNT 2    5
     O                                    25 'TOTAL RECORDS. '
     O                                    47 'SUCCESSFUL COMPLETION'
     O        T 2       99 LR
     O                          COUNT Z    5
     O                                    25 'RECORDS TRANSMITTED'
     O                                    55 'PERMANENT ERROR'
/*
/&
/.
/.
```

The following is an example of a program to receive fixed length records from the 5280:

```
H   C 005                                                          S03S01
F*****************************************************************
F*****************************************************************
F*****************************************************************
F*  PROGRAM NAME - S03S01                                          *
F*                                                                 *
F*  PROGRAM FUNCTION  - TO RECEIVE FIXED LENGTH RECORDS            *
F*        FROM THE 5280                                            *
F*                                                                 *
F*  PROGRAM OPERATION - THE 5280 MUST BE SETUP TO XMIT USING SYS*
F*        BDCU OR SYS BBTU. THIS PROGRAM WILL PROCESS 128 B.     *
F*        THE RECORDS TRANSMITTED TO THE SYSTEM/3 ARE COMPARED   *
F*        TO A 128 BYTE DISK FILE.                                 *
F*                                                                 *
F* EXPECTED RESULTS - IF ANY DISK RECORDS DO NOT COMPARE          *
F*        OR IF A NEGATIVE RETURN CODE IS RECEIVED A MESSAGE     *
F*        IS PRINTED ON THE SYSTEM/3 CONSOLE. ALL RECORDS WILL   *
F*        BE PRINTED ON THE LINE PRINTER.                          *
F*                                                                 *
F*                                                                 *
F*                                                                 *
F*****************************************************************
FGETREC  IPE F 142 142    2       SPECIAL       SUBR92
F                                                KAR1
FPRINT   O   F 132 132            PRINTER
FDISKFIL ID  F 128 128            DISK
FCONSL   O   F     100            SPECIAL       SUBR92
F                                                KAR2
E                    AR1     5   5  6               CCP PARM LIST
E                    AR2     5   5  6               CONSOL PARM LIST
IGETREC  AA  01   1 C0   2 C0
I                                          5   80LENGTH          60
I                                         15 142 DATA
I        AB  02   1 C0   2 C2
I        AC  03
I                                          1   20INRC        9291
IDISKFIL AC  03
I                                          1 128 RECORD
C   02                SETOF                    9291
C   02                SETON                    LR
C   02
COR 60                GOTO END
C   92
COR 91                EXCPT
C   92
5COR 91               SETON                    LR
C           COUNT     ADD  1          COUNT   20
C   01N88             READ DISKFIL                 88
C   01N88   DATA      COMP RECORD              5050

C   50                EXCPT
C   50                SETON                    LR
C           END       TAG
OPRINT   H  205   1P
O                                       24 'S03S01 - RECEIVE RECORDS'
O                                       47 ' FROM THE 5280'
O        D        01
O                          DATA     128
O                          COUNT    131
O        T 2         LR
O                          COUNT Z    3
O                                       20 'RECORDS RECEIVED'
```

(continued on next page)

```
     OCONSL   E          91
     O        OR         92
     O        OR         50
     O                                          4 '  CB'
     O                                          8 '42'
     O                                         14 'CONSOL'
     O                   N50       INRC        39
     O                    50                   34 'DATA RECORDS DO NOT'
     O                    50                   42 'COMPARE'
**
           A             143N3741
**
          CB             100CONSOL
/*
/&
```

The following is an example of a program to transmit fixed length 128 byte records to the 5280.

```
H   C 006                                                          S03S04
F*****************************************************************
F*****************************************************************
F*  PROGRAM NAME - S03S04                                          *
F*                                                                 *
F*  PROGRAM FUNCTION - TO TRANSMIT FIXED LENGTH RECORDS 128 B      *
F*       TO THE 5280                                               *
F*                                                                 *
F*  PROGRAM OPERATION - THE 5280 MUST BE SETUP TO RCV USING SYS*
F*       BDCU OR SYS BBTU. PROGRAM CASE WILL PROCESS 128 B.        *
F*                                                                 *
F*  EXPECTED RESULTS - IF ANY ERRORS OCCUR IN THE LINE             *
F*       OR IF A NEGATIVE RETURN CODE IS RECEIVED A MESSAGE        *
F*       IS PRINTED ON THE SYSTEM/3CONSOLE.  ALL RECORDS WILL      *
F*       BE PRINTED ON THE LINE PRINTER.                           *
F*                                                                 *
F*****************************************************************
F*****************************************************************
F*****************************************************************
FDISKFIL IPE F 128 128    2       DISK
FPUTREC  O   F 142 142    2       SPECIAL       SUBR92
F                                                KAR1
FPRINTER O   F 132 132            PRINTER
FCONSL   O   F 142 142            SPECIAL       SUBR92
F                                                KAR2
E                    AR1     5   5  6
E                    AR2     5   5  6
IDISKFIL AA  01
I                                          1 128 RECORD
C   01       COUNT     ADD  1          COUNT   20
C                      EXCPT
C                      MOVE AR1,1      RETCD   20
C            00        COMP RETCD                 9192
C   92
COR 91                 EXCPT
C   92
COR 91                 SETON                      LR
CLR                    EXCPT
OPRINTER H   205   1P
O                                        24 'S03S04 - TRANSMIT RECORD'
O                                        46 'S TO 5280'
O        T  1        LR
O                          COUNT Z        3
O                                        23 'RECORDS TRANSMITTED'
O        T        92
O       OR        91
O                                        33 'JOB CANCELED'
O        E        01
O                          RECORD   128




O                          COUNT    131
OPUTREC  E        01
O                                         4 'BB'
O                                         8 '142'
O                                        14 'N3741 '
O                          RECORD   142
OCONSL   E        LR
O                                         4 'CB'
O                                         8 '000'
O                                        14 'N3741'
```

The following is the assignment set for the 5280:

```
//SETX JOB PRIORITY-1
// LOAD $CCPAS,F2
// FILE NAME-$CCPFILE,RETAIN-P,UNIT-F2,PACK-CCPGEN
// FILE NAME-$CCPWORK,RETAIN-S,TRACKS-3,UNIT-F2,PACK-CCPGEN
// RUN
****************** SET X 5280 ************************************
// SET        ID-X,ACTION-REPLACE,DFLTEXEC-YES
// SYSTEM     MINUPA-22K,MINTPBUF-800,PRINTER-YES,PGMREQL-7
// TERMATTR   ATTRID-1,SWITCHED-MA,BLKL-1024,DATAFORM-RECORD
// BSCALINE   TYPE-SW,LINENUM-1
// BSCATERM   TERMID-N1,TYPE-3741,ATTRID-1,COMMAND-NO,
//            ADDRCHAR-*8787*,POLLCHAR-*C7C7*
// TERMNAME   NAME-N3741,TERMID-N1
// DISKFILE   NAME-DISKFIL,ORG-C,RECL-128
// DISKFILE   NAME-DISK001,ORG-C,RECL-1
// DISKFILE NAME-DISK080,ORG-C,RECL-80
// PROGRAM    NAME-S03S01,LANGUAGE-RPGII,PRINTER-YES,TERMS-N3741,
//            FILES-DISKFIL/CG/NOSHR,PGMDATA-N
// PROGRAM    NAME-S03S02,LANGUAGE-RPGII,PRINTER-YES,TERMS-N3741,
//            FILES-DISK080/CG/NOSHR,PGMDATA-N
// PROGRAM    NAME-S03S03,LANGUAGE-RPGII,PRINTER-YES,TERMS-N3741,
//            FILES-DISK001/CG/NOSHR,PGMDATA-N
// PROGRAM    NAME-S03S04,LANGUAGE-RPGII,PRINTER-YES,TERMS-N3741,
//            FILES-DISKFIL/CO/NOSHR,PGMDATA-N
// PROGRAM    NAME-S03S05,LANGUAGE-RPGII,PRINTER-YES,TERMS-N3741,
//            FILES-DISK080/CO/NOSHR,PGMDATA-N
// PROGRAM    NAME-S03S06,LANGUAGE-RPGII,PRINTER-YES,TERMS-N3741,
//            FILES-DISK001/CO/NOSHR,PGMDATA-N
/&
```

Glossary of Terms and Abbreviations

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ANSI definitions are identified by an asterisk in the margin.

addressing. In a multipoint network, the means by which the sending or control station selects the station to which it will send a message. Contrast with *polling*. In a multipoint network, the control station addresses tributary stations.

ASCII. American National Standard Code for Information Interchange. A standard 8-bit code used to represent data.

attended operation. The transmission and reception of messages at a station while an operator is present.

attenuation. A decrease in signal strength of a data signal on a communications channel.

auto-answer. The capability that permits a station to respond to a call it receives over a switched line without operator action.

background job. A job that is run in a partition which does not have immediate access to a keyboard/display.

basic telecommunications access method (BTAM). An access method that permits read/write communications with remote devices using BSC protocol.

batch. An accumulation of data to be processed at one time by the 5280 using the same program.

bind session. A session control function in SNA which establishes a session between two logical units and the protocol rules for that session.

bits per second (bps). In serial transmission, the instantaneous bit speed with which a device or channel transmits a character.

block. A collection of contiguous records recorded as a unit. Blocks are separated by interblock gaps and each block may contain one or more records.

bps. Bits per second.

BSC. Binary synchronous communications.

BTAM. Basic telecommunications access method.

CAM. Communications access method.

CCB. Communications control block.

CICS/VS. Customer Information Control System/Virtual Storage.

clocking. In binary synchronous communication, the use of clock pulses to control synchronization of data and control characters.

command file. In the 5280 MRJE and SRJE utilities, a file that can contain utility control statements and/or data records to be transmitted to the host system.

communications access method (CAM). A 5280 communications program that provides the necessary link between a communications application program and the communications line. It performs functions such as data formatting and link protocol.

communications configuration record. A record which describes the communications environment that is created by the Communications Configuration Utility.

communications control block (CCB). In 5280 communications, the control block which contains the information necessary for the communications microprocessing unit to perform input/output functions requested by the communications access method. It also contains status information and the results of functions performed by the communications microprocessing unit.

communications link. See *data link.*

compression. A technique for removing strings of duplicate characters and truncating trailing blanks before transmitting data.

concurrent. Pertaining to the occurrence of two or more activites within a given interval of time.

console. For 5280 communications, the keyboard/display used to enter data to be transmitted to a host system and to receive messages sent to the 5280.

contention. On a point-to-point communications line, the condition arising when two data stations attempt to transmit at the same time.

control station. In a multipoint network, the station that supervises polling and selection. The control station controls the sending and receiving of data to and from tributary stations.

Customer Information Control System (CICS/VS). A program product that enables transactions entered at remote terminals to be processed concurrently by user-written application programs.

data-directed format selection. Format selection determined by the data contained in the record.

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* American National Standard Institute

data file. In the 5280 MRJE and SRJE utilities, a file that contains only data records to be transmitted to the host system.

data flow. In SNA, any of four flows in a given session, characterized as either primary-to-secondary or secondary-to-primary, and either normal or expedited.

data link. The communications line, modem and communications controls of all stations connected to the line used in the transmission of data between stations. A communications line is the physical medium, for example a telephone wire or a microwave beam. A data link includes the physical medium, the protocol, and associated communications devices and programs. It is both physical and logical.

data link control. The means for controlling communications between two stations. It is accomplished by sending control characters, which indicate controls such as the beginning or end of a message, along with the data.

* **data logging.** The recording of data about events that occur in time sequence.

data set. An organized collection of related data records treated as a unit and existing on diskette.

data set name. The name associated with a data set.

data stream. Data transferred by stream-oriented transmission, as a continuous stream of data elements in character form.

DB/DC. Data Base/Data Communications.

default. The choice among exclusive alternatives made by the system when no explicit choice is specified by the user.

DE/RPG. Data Entry/Report Program Generator.

device address. Two or four characters used to identify a 5280 device such as a diskette drive or printer.

duplex. Pertaining to simultaneous, independent, two-way transmission (transmission in both directions). Contrast with *half duplex*.

EBCDIC. Extended binary-coded decimal interchange code. A coded character set consisting of 256 eight-bit coded characters.

EOD. End of data.

execution utility. In 5280 communications, a utility program that actually transfers data over a communications line.

foreground job. On the 5280, a job that is run in a partition which has immediate access to a keyboard/display.

---

* American National Standard Institute

half duplex. Pertaining to alternating one-way transmission (transmission in one direction at a time). Contrast with *duplex*.

hertz (Hz). A unit of frequency equal to one cycle per second.

hex. Hexadecimal.

host ID. On a switched point-to-point line using BSC protocol, the identification sequence assigned to the station other than the 5280 system. It is sent to the 5280 system as proof of identity while the line connection is being established. See *terminal ID*.

host computer. The primary or controlling computer in a data communications system.

host subsystem. For the 5280, software which executes on a host computer and which will accept input from the 5280, such as CICS/VS, OS/VS1 RES.

Hz. Hertz.

ICA. Integrated Communications Adapter.

IMS/VS. Information Management System/Virtual Storage.

Initialization. For the 5280 MRJE and SRJE utilities, the function which sets up the 5280 and host system communications characteristics and establishes the line connection.

input/output control block (IOB). In 5280 communications, the control block which contains the information necessary for the communications access method to perform input/output requests for an execution utility or user-written program. It also contains status information and the results of operations performed by the communications access method.

integrated modem. A modem that is built into a communications controller.

IOB. Input/output control block.

JCL. Job control language.

JES. Job entry subsystem.

job. One or several data transfer functions (transmit, receive, inquiry) which a 5280 execution utility performs as one unit of work while communicating with one system or host subsystem.

job description record. In 5280 communications, a record on a diskette data set which describes the communications job to be executed. It is created using the Data Communications Description Utility or the RJE Description Utility, and serves as input to an execution utility.

job entry subsystem (JES). A system facility for spooling, job queuing and managing I/O.

job stream. For the 5280 MRJE and SRJE utilities, a data stream which

consists of JCL and data sent to a host RJE subsystem for processing.

line bid. On a point-to-point communications line, an attempt by a station to gain control in order to transmit data.

link protocol. A set of rules for data communication over a data link in terms of a transmission code, transmission mode and control and recovery procedures.

logical record. A record independent of its physical environment. Portions of the same logical record may be located in different physical records, or several logical records or parts of logical records may be located in one physical record.

logical unit (LU). In SNA, one of three types of network addressable units (NAUs). It is the part through which an end user accesses function management in order to communicate with another end user.

logoff. The procedure by which a user ends a terminal session.

logon. The procedure by which a user begins a terminal session.

LU. logical unit.

LU–LU session. In SNA, a session between two logical units in the network. It provides communications between two end users, each associated with one of the logical units.

magnetic stripe reader. A 5280 feature which reads a badge with a magnetically coded stripe.

main storage. (1) General purpose storage of a computer. (2) All storage that can be addressed by programs, from which instructions can be executed, and from which data can be loaded directly into registers.

master station. The station that is transmitting data at any point in time. At a given instant, there can be only one master station on a data link. See *slave station.*

modem. (1) A device that connects a communications adapter to a communications line. (2) A functional unit that modulates and demodulates signals. One of the functions of a modem is to enable digital data to be transmitted over analog transmission facilities.

MRJE. MULTI-LEAVING Remote Job Entry.

MULTI-LEAVING support. Fully synchronized two-directional transmission of a variable number of data streams between a terminal and a computer using BSC facilities.

multipoint line. A communications line which interconnects several stations. Data is sent and received under control of the control station; all other stations on the line are tributary stations. See *control station* and *tributary station.*

NCP. Network control program.

nest. To embed subroutines or data in other subroutines or data at a different hierarchical level such that the different levels of routines or data can be accessed or executed in a re-entrant fashion.

network. In data communications, a configuration in which two or more terminal installations are connected.

network control program (NCP). A program, generated by the user from a library of IBM-supplied modules, that controls the operation of the communications controller such as a 3705.

non-switched line. A communications connection between stations that does not have to be made by dialing.

NRZI. Non-return-to-zero change-on-ones recording. NRZI is a method of recording data on a magnetized surface.

pacing. In data communications, a technique by which a receiving station controls the rate of transmission of a sending station to prevent overruns. It is used to prevent overloading a receiver with unprocessed requests when the sender can generate requests faster than either the receiver or the network can process them.

pad character. A character introduced to use up time or space while a function (usually mechanical) is being accomplished.

partition. An area of 5280 main storage in which a program can execute.

physical record. A record whose characteristics depend on the manner or form in which it is stored, retrieved, or moved. A physical record may consist of all or part of a logical record.

point-to-point line. A communications connection established between only two data stations.

physical unit (PU). In SNA, one of three types of network addressable units.

polling. In data communications, the process of inviting data stations to transmit, one at a time. In a multipoint network the primary station transmits a poll (request to send) to a specific secondary station.

preparation utility. In 5280 communications, a utility program that is used to prepare for or set up communications. A preparation utility does *not* transfer data over a communications line.

primary station. (1) On a point-to-point line using BSC protocol, the station that gains control and has the right to transmit if both stations are simultaneously contending for the line. (2) In SNA, the station on an SDLC data link that is responsible for the control of that data link. There must be only one primary station on a data link. All traffic on the data link is between the primary station and a secondary station.

prompt. A message issued by a program that requests either information or operator action to continue processing.

PU. Physical unit.

receive. To obtain a message transmitted from one station to another from the communications line.

record length. The number of words or characters forming a record.

remote job entry (RJE). Submission of job control statements and data from a remote terminal to a host system.

remote terminal. A terminal attached to a system through a data link.

request/response unit (RU). In SNA, the basic unit of information entering and exiting the transmission subsystem. It may contain data, acknowledgment of data, commands that control the flow of data through the network, or responses to commands.

RJE. Remote job entry.

RU. Request/response unit.

SDLC. Synchronous data link control.

secondary station. (1) On a point-to-point line using BSC protocol, the station that does *not* win the right to transmit if both stations are simultaneously contending for the line. (2) In SNA, any station on an SDLC data link that is not the primary station. It can exchange data only with the primary station; there is no data traffic from secondary station to secondary station.

send. To place a message on a line for transmission from one station to another.

session. In SNA, a logical connection established between two network addressable units (NAUs) to allow them to communicate. The session is uniquely identified by a pair of network addresses, identifying the origin and destination NAUs of any transmission exchanged during the session.

slave station. In data communications, the station that is receiving data (from a master station) at a given point in time.

SNA. Systems network architecture.

SNBU. Switched network backup.

SRJE. SNA Remote Job Entry.

station. One of the input or output points of a communications system.

status line. For the 5280, the first line on the display. It provides operational information.

subroutine. A common group of instructions that always returns control to the calling routine.

switched line. A communications connection between two stations that is

established by dialing.

switched network backup (SNBU). An optional facility that allows a user to specify, for certain types of stations, a switched line to be used as an alternate path (backup) if the primary line becomes unavailable or unusable.

synchronous data link control (SDLC). A discipline for managing synchronous, transparent, serial-by-bit information transfer over a communications line.

systems network architecture (SNA). The total description of the logical structure, formats, protocols and operational sequences for transmitting information units through the communications system. Communications system functions are separated into three discrete areas: the application layer, the function management layer, and the transmission subsystem layer. The structure of SNA allows the ultimate origins and destinations of information, that is, the end users, to be independent of, and unaffected by, the specific communications system services and facilities used for information exchange.

TCAM. Telecommunication access method.

telecommunication access method (TCAM). A method used to transfer data between main storage and remote or local terminals. Application programs use either GET and PUT or READ and WRITE macro instructions to request the transfer of data, which is performed by a message control program. The message control program synchronizes the transfer, thus eliminating delays for terminal input/output operations.

terminal ID. On a switched point-to-point line using BSC protocol, the identification sequence assigned to the 5280 system. It is sent to the other station on the line as proof of identity while the line connection is being established. See *host ID*.

timeout. A time interval during which a station waits for a certain operation to occur. Some timeouts are automatic hardware functions and some are program functions.

* **trace.** A record of the execution of a computer program; it exhibits the sequences in which the instructions were executed.

trace table. A storage area into which trace information is placed.

* **transfer.** To send data from one place and to receive the data at another place.

transaction code. A code used by CICS/VS or IMS/VS to associate the input transaction received with a user application program.

transmission code. A code for sending information over a communications line.

* **transmit.** To send data from one place for reception elsewhere.

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* American National Standard Institute

transparent text mode. A mode of binary synchronous transmission in which only transmission control characters preceded by DLE are acted upon as line control characters. All other bit patterns that happen to be transmission control characters are transmitted as data.

tributary station. In a multipoint connection, any data station other than the control station.

unattended operation. The transmission and reception of messages, through the use of automatic features, by a station at which an operator is not present.

utility control statements. Statements that are used to control MRJE and SRJE sessions. They are processed by the MRJE and SRJE utilities and are *not* sent to the host subsystem.

VTAM. Virtual telecommunications access method.

virtual telecommunications access method (VTAM). A set of programs that controls communication between terminals and application programs running under DOS/VS, OS/VS1 and OS/VS2.

XID. In SDLC protocol, an exchange identification command sent by the primary station to request that the secondary station identify itself.

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READER'S COMMENT FORM

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Distributed Data
System
Communications Reference Manual

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This Technical Newsletter, a part of Release 3 Modification Level 0 of the 5280 Communications Utilities Program Product, provides replacement pages for the subject publication. These replacement pages remain in effect for subsequent releases and modifications unless specifically altered. Pages to be inserted and/or removed are:

iii, iv	3-21	8-1 through 8-6
1-3 through 1-6	3-21.1, 3-21.2 (added)	8-6.1, 8-6.2 (added)
1-15, 1-16	3-22	8-9 through 8-12
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3-20.1, 3-20.2 (added)	3-29 through 3-32	

A technical change to the text or to an illustration is indicated by a vertical line to the left of the change.

Summary of Amendments

- The Forms Control Table Utility (SYSFORMS) has been added.
- Enhancements have been made to the MRJE Utility.

Note. Please file this cover letter at the back of the manual to provide a record of changes.

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Preface

This manual provides 5280 programmers with the information necessary to use the communications utilities and the 3270 emulation utilities and to write communications programs using DE/RPG, COBOL, and assembler language. It is intended for programmers who have experience in data communications programming and are familiar with data communications concepts and terminology.

This publication contains the following chapters:

Chapter 1. Introduction summarizes the functions of the Communications Utilities licensed program. It also discusses the BSC and SNA/SDLC support provided on the 5280, communications configurations, and the contents of the communications diskette shipped to you by IBM.

Chapter 2. Preparation Utilities describes how to use six utility programs to describe the communications environment, to describe communications jobs, and to load the communications access method.

Chapter 3. BSC Execution Utilities describes the functions of and how to run three utilities which transfer data using a BSC data link: the BSC Batch Transfer Utility, the BSC Data Communications Utility and the MULTI-LEAVING Remote Job Entry (MRJE) Utility.

Chapter 4. SNA Execution Utilities describes the functions of and how to run two utilities which transfer data in an SNA/SDLC network: the SNA Data Communications Utility and the SNA Remote Job Entry (SRJE) Utility.

Chapter 5. Data Communications Programming Using Assembler Language describes how to write a BSC assembler program and an SNA/SDLC assembler program. It includes explanations of assembler language instructions used in communications and sample BSC and SNA/SDLC programs.

Chapter 6. Data Communications Programming Using DE/RPG explains how to write a communications program using DE/RPG, and includes a sample program.

Chapter 7. Data Communications Programming Using COBOL describes how to code the COBOL statements that allow data exchange between two systems over a communications link.

Chapter 8. Concepts of Operation discusses some 5280 system considerations as they are implemented and used by communications, including diskette data sets, magnetic reader data format, partition considerations, function and command keys, the status line on the display, RJE messages, and error recovery procedures.

Chapter 9. Problem Determination Aids describes how to use the BSC Online Test Utility and the functions of the trace table.

This manual contains the following appendices:

Appendix A. Status Codes Sent by the 5280 to the Host

Appendix B. BSC Data Link Control Characters

Appendix C. BSC Utility/CAM Protocol

Appendix D. MRJE Link Protocol

Appendix E. 5280 SNA BIND Support

Appendix F. SNA Protocol Sequence Diagrams

Appendix G. Layouts of Records Created Using the Preparation Utilities

Appendix H. External Status and Completion Codes

Appendix I. Host Programming Considerations

Appendix J. Function Keys

Appendix K. BSC Multipoint Monitor

Appendix L. Gloassary of Terms and Abbreviations

CONVENTIONS FOR ILLUSTRATING STATEMENT AND INSTRUCTION FORMATS

Capitalized terms, brackets, and braces have special meanings in descriptions of utility control statements and instructions.

Capitalized terms must be entered as they are shown. Numbers and special characters within a capitalized term must also be entered as they are shown. You must replace terms that are not capitalized with appropriate values. For example, the statement

.. READFILE DSN-name

could be entered

.. READFILE DSN-PAYROLL

Brackets ([ ]) are not entered as part of the statement. Brackets indicate that the expression they enclose is optional. For example

[DATE-date]

means that you need not enter the expression.

- Communications Load Utility
- Data Communications Description Utility
- RJE Description Utility
- Forms Control Table Utility

The execution utilities transfer data to and from the 5280 Distributed Data System and another terminal or host computer over a communications line. Each execution utility operates in conjunction with a version of the CAM to perform data transfers. The execution utility and the CAM must reside concurrently in two separate partitions in main storage.

An execution utility executes a *communications job*. A communications job is one or several data transfer functions (such as transmit, receive, or inquiry) which the utility performs as one unit of work while communicating with one system or host subsystem. The Data Communications Description Utility or the RJE Description Utility must be used to describe and name a job before it can be executed. The execution utilities are:

- BSC Batch Transfer Utility
- BSC Data Communications Utility
- MULTI-LEAVING Remote Job Entry (MRJE) Utility
- SNA Data Communications Utility
- SNA Remote Job Entry (SRJE) Utility
- BSC Online Test Utility

The preparation and execution utilities are described in more detail below. Figure 1-2 shows the interrelationship of the preparation utilities, execution utilities and the CAMs. You may want to refer to this figure while reading about each utility.

Preparation Utilities

Communications Configuration Utility

The Communications Configuration Utility allows you to describe the communications environment to be used. By responding to a series of prompts, you select parameters to describe and control communications hardware and the CAM; you also describe characteristics of the system or terminal with which your 5280 system will be communicating. Your responses are saved on diskette as a *communications configuration record*. When you describe your communications job using the Data Communications or RJE Description Utility, you identify the communications configuration record to be used when your job is executed. For a program you have written, you identify the configuration record to be used with your program to the Communications Load Utility.

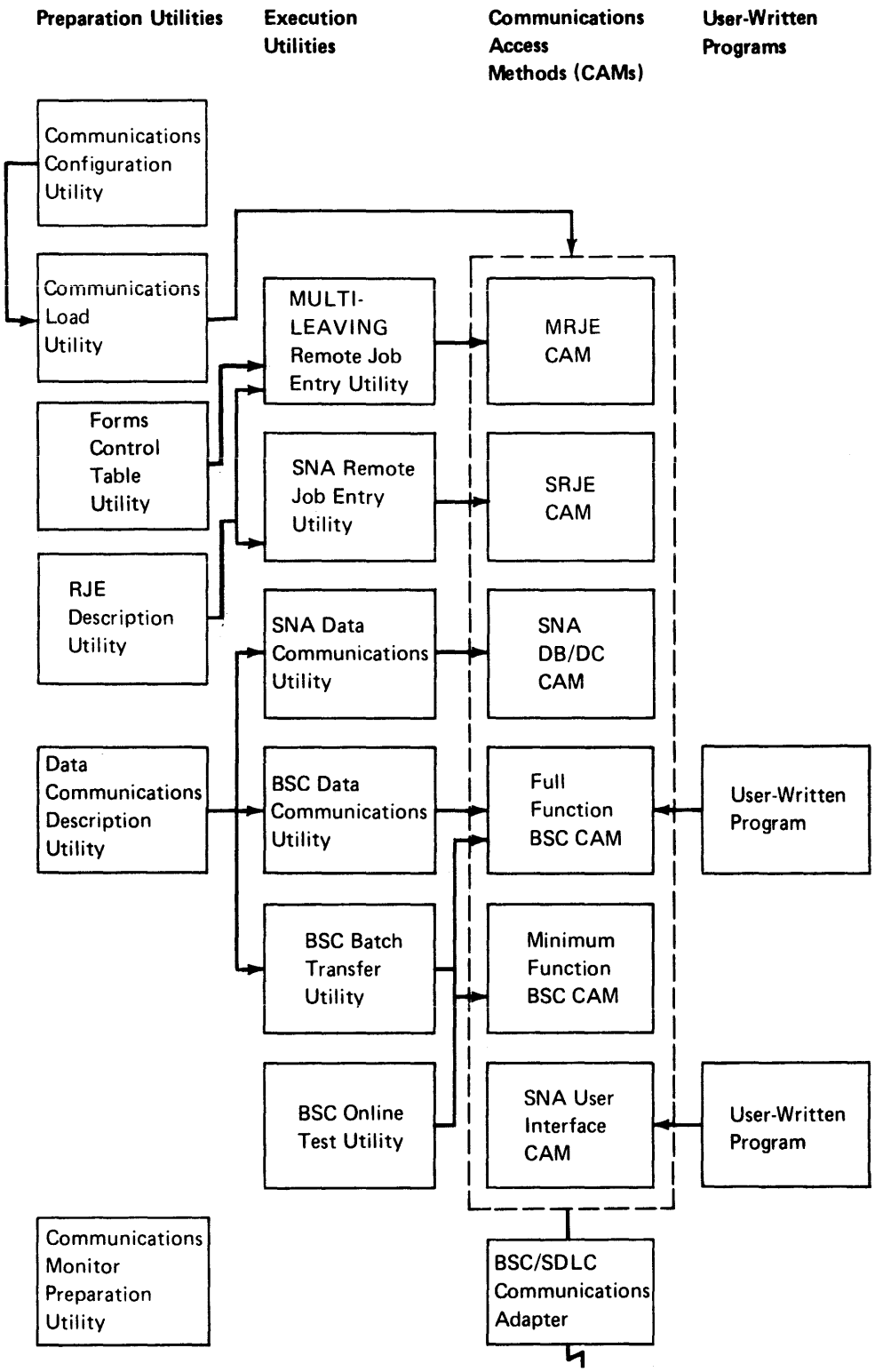


Figure 1-2. Interrelationship of Communications Programs

Communications Monitor Preparation Utility

The Communications Monitor Preparation Utility allows you to build a communications control block for the BSC multipoint monitor mode of the communications microcode and to copy the communications control block onto your IPL diskette. Your IPL diskette must contain a reserved area for this control block which you allocate at SYSCON time.

When you IPL your system with this diskette, the monitor mode is activated. Activation of the monitor mode enables the communications hardware to respond to any polls or selections that the host sends across the line, without a BSC communications access method being loaded.

Communications Load Utility

The Communications Load Utility loads the CAM into main storage. Each execution utility automatically invokes this utility to load the CAM into a partition. For a COBOL, DE/RPG, or assembler language communications program you have written, you need to use this utility to load the CAM. This utility is classified as a preparation utility because it does not transfer data over a communications line.

Data Communications Description Utility

The Data Communications Description Utility allows you to describe communications jobs to be executed by the BSC Batch Transfer Utility, the BSC Data Communications Utility, the SNA Data Communications Utility and the Batch Transfer Emulation Utility (3270 emulation). You respond to prompts on the display and your responses are saved on diskette as a *job description record* which you name. At execution time, you identify the job to the execution utility by its name.

The job includes the specific data transfer function to be performed (namely transmit, receive or inquiry) and the 5280 devices to be used (such as the diskette, printer or keyboard). One or many functions can make up a job, and the functions are executed in the sequence you define.

RJE Description Utility

The RJE Description Utility allows you to describe communications jobs to be executed by MRJE or SRJE. To describe a job, you respond to a series of prompts on the display. Your responses are saved on diskette as a *job description record* which you name. To execute a job, you identify it to MRJE or SRJE by its name.

Forms Control Table Utility

The Forms Control Table Utility allows you to describe records containing forms control information to be used by MRJE. To create a record, you respond to a series of prompts on the display. Your responses are saved on a diskette as a *forms control record* which you name.

Execution Utilities

BSC Batch Transfer Utility

The BSC Batch Transfer Utility provides entry level batch communications capability for the 5280 system. It and the minimum function BSC CAM can execute in the minimum system configuration for BSC communications. This utility can also execute using the full function BSC CAM.

This utility allows the 5280 to transmit and receive batch data to and from the diskette; the diskette drive is the only supported input/output device. Multiple transmit and receive functions can be chained together and executed as a single job. When this utility is executing, the 5280 system looks like a 3741 Data Entry Station to the communications network.

BSC Data Communications Utility

The BSC Data Communications Utility allows the 5280 to transmit and receive batch data and to send inquiries and receive replies. It executes in conjunction with the full function BSC CAM.

Data to be transmitted can originate at the diskette, keyboard or magnetic stripe reader. Data received from another system or terminal can be directed to the diskette, printer or display or a combination of two of these devices. Inquiries can be entered only from the keyboard. Multiple transmit, receive and inquiry functions can be executed as a single job, and multiple data sets can be transmitted and received.

When using this utility, the 5280 system can appear to the network like a 3741 Data Entry Station or 3780 Data Communications Terminal. The 3780 support enables the 5280 to interface to DOS/VSE/POWER only.

MULTI-LEAVING Remote Job Entry (MRJE)

The MULTI-LEAVING Remote Job Entry (MRJE) Utility enables the 5280 to submit, execute and obtain results of jobs from a host RJE subsystem using a BSC line. The 5280 serves as a remote job entry terminal to OS/VS1 RES, OS/VS2 JES2 and OS/VS2 JES3. These subsystems and the MRJE CAM, which is the CAM used by this utility, provide MULTI-LEAVING support, which is fully synchronized two-directional transmission of a variable number of data streams between two computers.

MRJE accepts data to be transmitted to the host subsystem from the diskette or keyboard. Output from the host RJE subsystem can be transmitted to the 5280 diskette, display and printer, sent to another RJE work station in the network, or directed to output devices at the host computer. Utility control statements are used to control the 5280 MRJE session. When MRJE is executing, the 5280 appears to the BSC network as a System/3 MRJE work station.

Utility Programs

Data Set Name	Contents
SYSCCU	Communications Configuration Utility
SYSDCDU	Data Communications Description Utility
SYSRJEDU	RJE Description Utility
SYSCLU	Communications Load Utility
SYSBBTU	BSC Batch Transfer Utility
SYSBDCU	BSC Data Communications Utility
SYSMRJE	MULTI-LEAVING Remote Job Entry Utility
SYSSDCU	SNA Data Communications Utility
SYSSRJE	SNA Remote Job Entry Utility
SYSBOLT	BSC Online Test Utility
SYSCMPU	Communications Monitor Preparation Utility
SYSFORMS	Forms Control Table Utility

Communications Access Methods

Data Set Name	Contents
SYSBSCBA	Minimum Function BSC CAM
SYSBSCEX	Full Function BSC CAM
SYSBSCR	MRJE CAM
SYSSNAD	SNA Data Base/Data Communications CAM
SYSSNAR	SRJE CAM
SYSSNAU	SNA User Interface CAM

The diskette also contains a data set named SYSDCCR which contains IBM-supplied communications configuration records.

Creating a BAckup Diskette

You should make a backup copy of the communications diskette. The Diskette Copy Utility of the IBM 5280 Utilities licensed program provides an image copy function; the program name is SYSCOPY. For information on how to execute SYSCOPY, see the *5280 Utilities Reference/Operation Manual.*

You may want to back up the entire diskette or only the data sets you plan to use. For example, if your installation will use only BSC communications, you would need to back up only the data sets used for BSC. The following chart shows which data sets to copy depending upon the type of communications network.

BSC	MRJE	SNA(DB/DC)	SRJE
SYSCCU	SYSCCU	SYSCCU	SYSCCU
SYSCLU	SYSCLU	SYSCLU	SYSCLU
SYSDCCR	SYSDCCR	SYSDCCR	SYSDCCR
SYSDCDU	SYSRJEDU	SYSDCDU	SYSRJEDU
SYSBSCBA	SYSMRJE	SYSSDCU	SYSSRJE
SYSBSCEX	SYSBSCR	SYSSNAD	SYSSNAR
SYSBBTU	SYSFORMS	SYSSNAU	
SYSBDCU			
SYSBOLT			
SYSCMPU			

Note: When copying the data set containing the communications configuration records (SYSDCCR), the data set copy function of the copy utility deletes the unused space in the data set which is reserved for your configuration records. Therefore, you should first allocate space on your diskette for your communications configuration data set using the SYSLABEL utility. Specify the number of 256 byte records so that your data set has enough space for your communications configuration recores and for the IBM - supplied records, if you want to copy them.

With SYSCCU you can use the IBM - supplied records from the 5280 Communications Utilities Program Product diskette as a guide when tailoring your communications configuration records. You can then use the SYSCCU to save them in your previously allocated user configuration data se. See Chapter 2 for additional information on SYSCCU and the IBM - supplied communications configuration records.

Chapter 2. Preparation Utilities

Six preparation utilities enable you to prepare for communications: Communications Configuration Utility, Communications Monitor Preparation Utility, Communications Load Utility, Data Communications Description Utility, RJE Description Utility, and the Forms Control Table Utility.

These preparation utilities are run before the execution utilities. Four of them create records which are saved on diskette and then used by the execution utilities; this is shown in Figure 2-1. The Communications Monitor Preparation Utility creates a monitor communications control block which is copied onto your IPL diskette. The Communications Load Utility must be run to load the CAM before a user-written communications program can be executed.

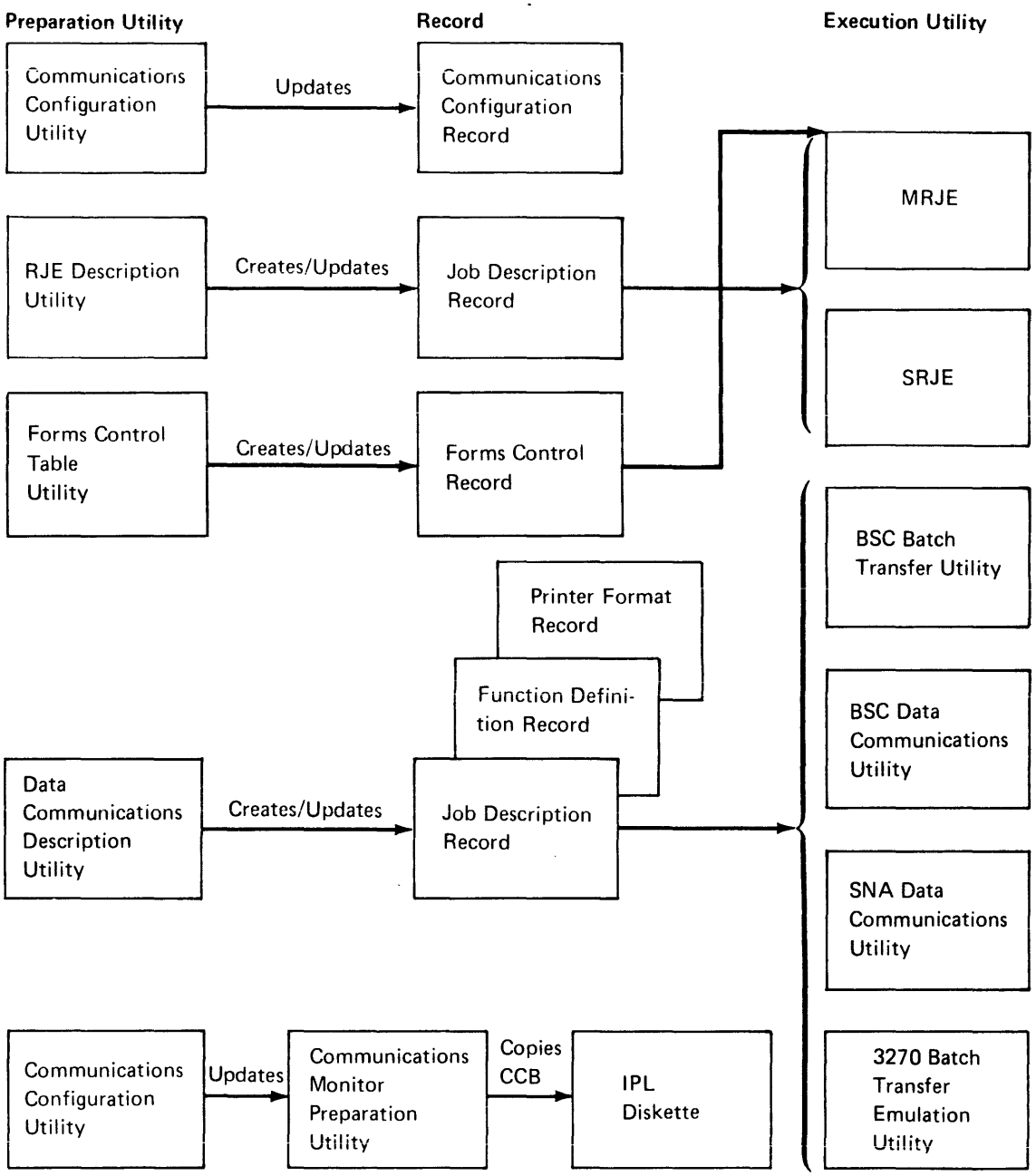
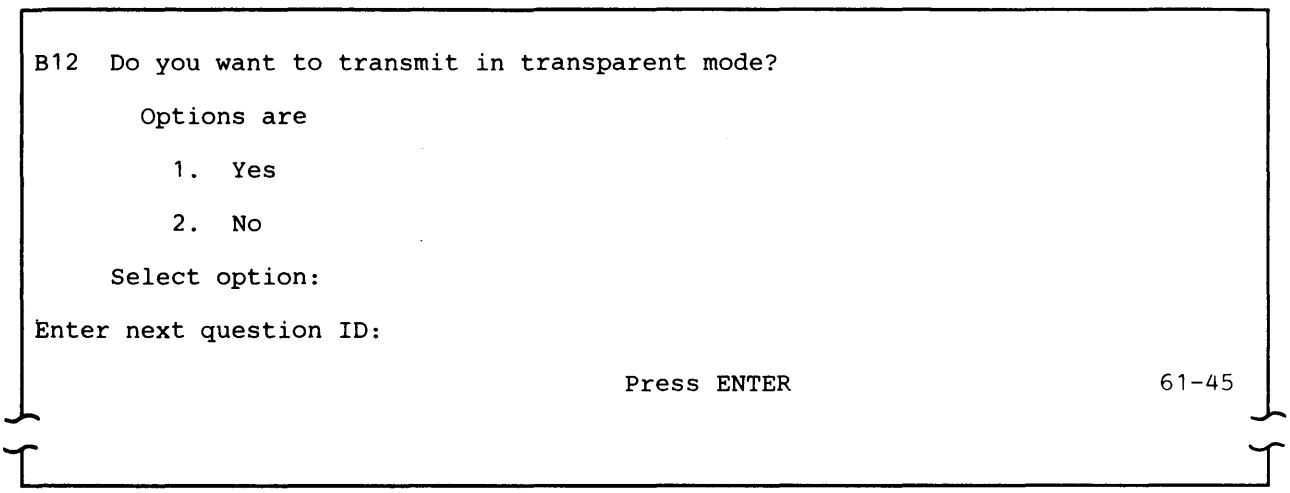


Figure 2-1. Records created using the Preparation Utilities

Enter the size of the largest data block to be transmitted; the maximum block size is 512 bytes. Include IRS characters in the block length. If ITB blocking is being used, the blocksize is the number of characters between STX and ITB.

The 5280 does not transmit spanned records, but can receive them, provided IRS characters are the separators. A spanned record is a logical record which is contained in two different blocks. A block size of zero is not permitted.

Note: This block size can be overridden by your application in the .COMM statement up to a limit of 1024 bytes.



This prompt appears only if the line code (prompt C18) is EBCDIC (option 2) and if the record format (prompt B8) is unblocked or, for blocked records, if IRS characters (prompt B10) are *not* to be used (option 2).

Transparent mode permits greater versatility in the range of coded data that can be transmitted. This is because all data, including the normally restricted data link control characters, are treated only as specific bit patterns. Transparent mode is particularly useful for transmitting binary data, floating point numbers, packed-decimal data, unique specialized codes, or object code computer programs. All data link control characters can be transmitted as transparent data without taking on control meaning; to be recognized as control characters, they are preceded by DLE. The 5280 will receive either transparent or non transparent data regardless of how this question is answered.

Select 1 if the 5280 is to transmit in transparent mode.

Select 2 if the 5280 is *not* to transmit in transparent mode.

```
B13  Do you want blank expansion?

       Options are

         1.  Yes

         2.  No

     Select option:

Enter next question ID:

                                    Press ENTER                    61-46
```

This prompt appears only if the device type (prompt B1) is 3741 or 3780 (option 1 or 2) and transparency (prompt B12) is no (option 2).

If the received data is being handled by the CAM and utility as print data, the blanks will be decompressed regardless of the selection made for this prompt. This is also true if the data is IRS blocked data (option 1 selected for prompt B10).

Select 1 if blanks are to be decompressed in data that is received. The first record received in a data set must *not* contain any compression.

Select 2 if blank-compressed data will not be received.

Note: The 5280 does not support blank compression for data to be transmitted, except MRJE in non transparent mode in which case blanks are always compressed.

Blank expansion is not supported for ASCII data.

For additional considerations when using the execution utilities, see the section on "Receiving Records using SYSBBTU/SYSBDCU" and "Diskette Data Sets" in Chapter 8.

Select 1 if the host subsystem is OS/VS1 RES.

Select 2 if the host subsystem is OS/VS2 JES2.

Select 3 if the host subsystem is OS/VS2 JES3.

```
What is the host system type?
  Options are
    1.  RES
    2.  JES2/JES3
    3.  DOS
Select option:
                                        Press ENTER                    68-04
```

This prompt appears only if SRJE is the execution utility.

Select 1 if the host subsystem is OS/VS1 RES.

Select 2 if the host subsystem is OS/VS2 JES2 or OS/VS2 JES3.

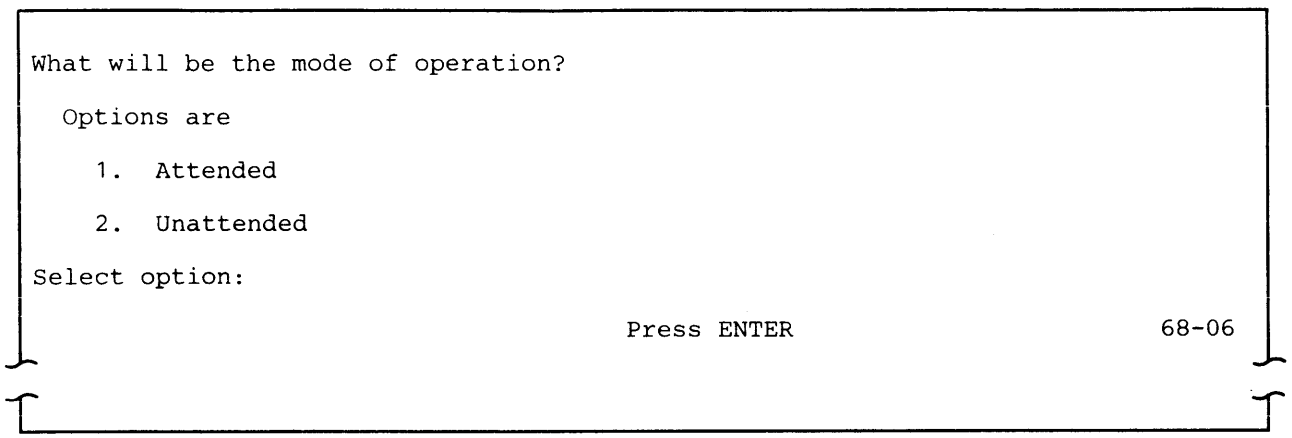
Select 3 if the host subsystem is DOS/VSE/POWER.

```
Specify logon information (optional).
Enter logon command:
                                        Press ENTER                    68-05
```

Logon (or signon) is a procedure required by most host subsystems to establish a session between the host and a terminal. If you respond to this prompt, the logon data is saved in the job description record; it can be up to 80 characters in length.

If you do not want to enter logon data to be saved in the record, press ENTER. In this case the RJE utility will request you to furnish it at execution time.

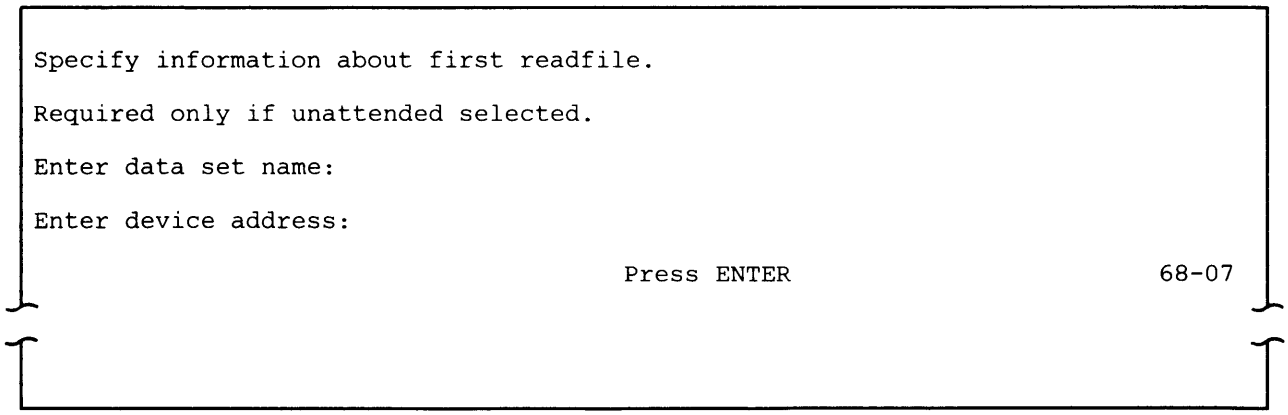
SYSRJEDU checks, for correct syntax, the values LOGON, SIGNON, and /*SIGNON. However, it does not check the variable logon data you enter. For the format of the appropriate logon, see the applicable host system manual. Some of the information in the logon is user determined and should be obtained from the systems programmer at the host location.



Select 1 if an operator will be present when this job is executed.

Select 2 if an operator will *not* be present when this job is executed. In unattended mode, host commands which require a response are routed to the host system console.

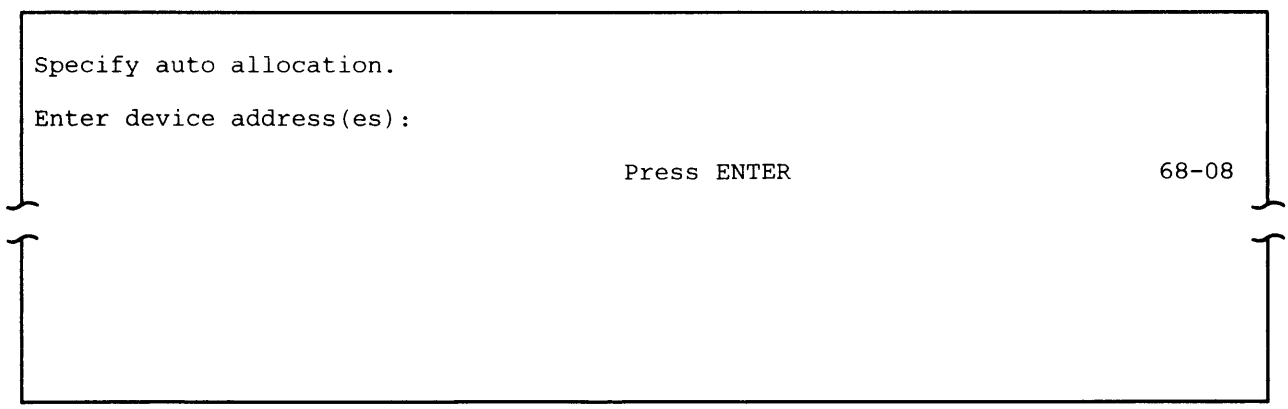
Note: Select 2 if you want to use keyboard/display detach. The 5280 keyboard/display is required for console messages, unless the MRJE user has chosen to detach the keyboard/display when running unattended in a background partition. For a further description, see Chapter 8 "MRJE Executing While Keyboard/Display is Detached".



If the job is to be executed in unattended mode, you must respond to this prompt. If the job is to be executed in attended mode, you may respond to the prompt or skip it by pressing ENTER. If, for attended mode, you do not specify the first READFILE now, you must enter it at execution time.

Data set name: Enter the name of the diskette data set which contains the READFILE to be processed by MRJE or SRJE.

Device address: Enter the address of the diskette drive which contains the above-named data set. Enter two characters for a logical device address or four characters for a physical device address.



If any data or data streams sent to the 5280 from the host are directed to diskette, you must respond to this prompt. The device address(es) indicate on which diskette drive(s) you will mount diskettes to receive data from the host. MRJE or SRJE allocates the data sets at execution time.

Enter the address(es) of diskette drives which contain diskettes which can be searched for space. The address(es) can be two characters for a logical device address or four characters for a physical device address. Up to eight unique addresses can be entered.

```
Specify name of forms control table (optional).

Enter data set name:

                                        Press ENTER                    68-10
```

This prompt appears only if MRJE is the execution utility.

Data set name: Enter the name of the diskette data set which contains the forms control record to be used by MRJE.

This data set is created using SYSFORMS. The forms control data set must reside on the diskette where the job description record resides.

If forms control support is not desired, this prompt can be skipped by pressing ENTER.

```
Job description record written

Specify end option.

  Options are

    1.  Exit

    2.  Describe another job

Select option:

                                        Press ENTER                    68-09
```

The first line of this prompt informs you that the record you just created or updated has been written to diskette. If the record was not written, the first line is "Record not written."

Select 1 to terminate SYSRJEDU.

Select 2 to describe another job using the RJE Description Utility. The utility then displays prompt 68-01 which requests job description information.

Forms Control Table Utility (SYSFORMS)

The Forms Control Table Utility (SYSFORMS) allows you to define forms control records to be used during execution of the MULTI-LEAVING Remote Job Entry Utility (MRJE).

To define a forms control record, you respond to prompts on the display. Each prompt is identified by a four-digit number in the lower right corner of the display. The first two digits, 78, identify the program as SYSFORMS.

Your responses to the prompts are saved on a diskette and are identified by the host forms type you provide. (For the layout of the forms control record, see Appendix G.).

REQUIREMENTS

This utility requires a partition size of 7K. A keyboard display is required for the prompts. You also need a pre-allocated EBCDIC diskette data set with a record length of 256 bytes to save the forms control records you create. The forms control table data set must be capable of containing deleted records.

CREATING A FORMS CONTROL RECORD

The following prompts will appear when you are running SYSFORMS.

```
SYSFORMS - Forms control table utility

Specify forms control information

Data set name:

Device address:

Host forms type:

                                    Press ENTER                    78-01
```

Data set name: Enter the name of the data set in which the forms control record is to be saved.

Device address: Enter the address of the diskette drive which contains the forms control table data set. Enter two characters for a logical device address or four characters for a physical device address.

Host forms type: Enter the name of the host forms type to be described. It must be one to eight characters with no imbedded blanks.

To create a new record, enter the name of a non existing host forms type. Prompt 78-02 contains defaults which you can change as needed to define your forms control record. These defaults are shown in the following prompts.

To update an existing forms control record, enter the name of an existing host forms type. The values in the existing record are displayed as defaults. To change any value in the record, key over the displayed default. The record you updated replaces the existing record. You cannot update a forms control record and save both the existing and updated records.

```
Enter or update forms control information

HOST:                                  LOCAL:                          DEV:
DSN:                                   L: 066                       BM: 066

Channel control characters.
1:  001   2:  000   3:  000   4:  000   5:  000   6:  000
7:  000   8:  000   9:  000  10:  000  11:  000  12:  00

                                       Press Enter                    78-02
```

HOST: Host forms type as was entered on prompt 78-01.

LOCAL: Local forms type. The local forms type is used for MRJE mount messages and data set names (see DSN below). It must be one to four characters with no embedded blanks. If the local forms type is not specified, it is set equal to the first 4 characters of the host forms type. If DSN is specified as *, SYSFORMS verifies that a valid data set name (as described under DSN below) can be created using the LOCAL parameter.

DEV: Device type, P-printer, D-diskette. Enter the device to which the output is to be written.

DSN: Data set name to be used when the output is directed to diskette. The name must be one of the following forms:

1. If the DSN field is blank and device type (DEV) is D, the data set will be named PUNCHsss or PRINTsss,

2. If '*' is specified for the data set name, the name is constructed at execution time of MRJE as follow:

   Asssxxxx — print data sets
   Bsssxxxx — punch data sets
   where sss — sequence number
   where xxxx — local forms type

3. User defined data set name. If a data set name is specified, it cannot be of the form PUNCHsss, PRINTsss, Asssxxxx, or Bsssxxxx where sss is a three digit number and xxxx is one to four characters.

L: Lines per page. The lines per page cannot exceed 255.

BM: Bottom Margin. The bottom margin cannot exceed the number of lines per page.

Channel control characters: Channel control characters cause the printer to skip to the line specified. A channel control character of zero causes the printer to space to a new line. All twelve channel control characters must be specified. These values overlay existing values when the forms control record is used. Line numbers associated with the channel control characters cannot exceed the number of lines per page.

The top margin is set equal to channel control character one.

To delete a record, the CMD delete record key is pressed while prompt 78-02 is displayed.

Information on prompt 78-02 is verified for correctness and compatability of entries; then the record is added or updated. Prompt 78-03 is then displayed.

```
Utility completed.
 Options are
   1.  Restart
   2.  Exit
Select option:
                                    Press ENTER                    78-03
```

Select 1 to define another forms control record. The utility then displays prompt 78-01. The data set name and device address fields on prompt 78-01 contains the value used in the previous record.

Select 2 to terminate SYSFORMS.

After an unrecoverable error or user requested termination, the termination prompt is displayed.

```
Utility terminated.
 Options are
   1.  Restart
   2.  Exit
Select option:
                                    Press ENTER                    78-04
```

Select 1 to restart SYSFORMS and enter/update additional forms control records.

Select 2 to terminate SYSFORMS.

MULTI-LEAVING Remote Job Entry (SYSMRJE)

The MULTI-LEAVING Remote Job Entry (MRJE) utility enables the 5280 system to submit jobs to an IBM host processor using a BSC data link. The 5280 serves as an MRJE work station in the network. Your jobs are processed by the host system, and the job output can be directed to your 5280 system, another RJE terminal in the communications network, or host system input/output devices.

MRJE supports communications with the following host subsystems:

- OS/VS1 Remote Entry Services (RES)
- OS/VS2 Job Entry Subsystem 2 (JES2)
- OS/VS2 Job Entry Subsystem 3 (JES3)

These host subsystems support a line discipline called MULTI-LEAVING. MULTI-LEAVING is fully synchronized, two-directional transmission of a variable number of data streams between two computers using BSC facilities. MULTI-LEAVING permits maximum overlapping of input and output operations at the RJE work station and the host system. Overlapping is achieved by intermixing input and output data streams on the data link.

MRJE does not conform to the conventional BSC line protocol. Many of the standard BSC control character functions are replaced by unique MRJE end-to-end control fields. For a description of MRJE usage of BSC control characters, see the *5280 Communications Support Logic Manual* LY34-0166.

For more information on MRJE line protocol, see Appendix D.

MRJE communicates with the host system using EBCDIC code and supports text transparency. Text transparency allows MRJE to send and receive data which contains all of the 256 characters in the EBCDIC code.

MRJE OPERATION

MRJE establishes the data link connection with the host system, sends and receives data to and from the host, and terminates communications with the host system, including disconnecting the line. It can execute in either attended or unattended mode. In attended mode, an operator should be present at the 5280 system while MRJE is running; this is the normal mode of operation.

MRJE transmits and receives data streams. A data stream is a contiguous stream of data elements in character form; it can consist of one or many related records or data sets. A job stream is a data stream which contains jobs to be executed at the host; it can originate at the 5280 diskette or keyboard. Job output from the host is sent to the 5280 as a print or punch data stream. A punch data stream is written to diskette, while a print data stream can be directed to either the diskette or printer. MRJE does not receive print and punch data streams simultaneously. A console data stream is used to send and receive commands and operator messages between the 5280 and the host. A console data stream received from the host is directed to the display, and can also be directed to the diskette or printer. The keyboard/display is

always the console device for MRJE; therefore, it should not be used to run other programs while MRJE is executing.

Utility control statements are used to control MRJE execution. They are processed by MRJE and are not part of the job stream transmitted to the host. These statements allow you to:

- Assign input/output devices on the 5280
- Identify diskette data sets to be transmitted
- Control some printer operations
- Specify the end of a job stream

MRJE provides statistics at the end of each MRJE session, which include the number of input records processed and the number of print and punch records written to output devices.

Note: While MRJE attempts to perform error recovery from all situations, there might be particular situations where recovery is not possible. You must cancel the session and might even be required to cancel the CAM (See "Removing CAM from a Partition" in Chapter 8).

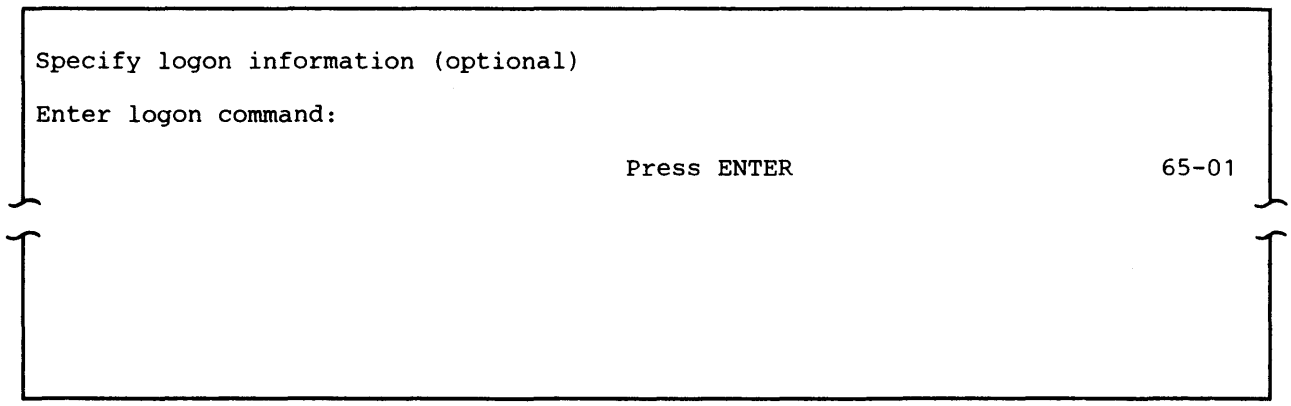
REQUIREMENTS

5280 System

MRJE operates in conjunction with the MRJE CAM (SYSBSCR) to perform data transfers. This CAM requires a minimum partition size of 11K; MRJE requires a minimum partition size of 26K, either foreground or background, and a keyboard/display. The partition size needed for SYSMRJE depends upon the sector size of the diskette(s) containing user data. If the sector size is 256 bytes or less, MRJE can execute in a 26K partition. If it is greater than 256, MRJE needs a 35K partition (see "Partition Considerations" in Chapter 8). If you choose to load the forms control data set into memory at MRJE startup, then the partition size needed must be increased by 256 times the number of records in the forms control data set.

To execute a job using MRJE, you must first have defined your communications environment (using the Communications Configuration Utility) and described the job to be executed (using the RJE Description Utility). Before loading MRJE into main storage, make sure that the following information is available:

- Communications programs (SYSMRJE, SYSCLU and SYSBSCR)
- Communications configuration record
- Job description record
- Diskette(s) for your data



This prompt appears only if signon/logon information is not contained in the job description record.

Some hosts do not require logon for MRJE work stations which communicate over a point-to-point non-switched line. If the host system does not require logon, press ENTER.

If the host system requires logon, enter the appropriate command, which can be up to 80 characters in length.

For the format of the appropriate command, see:

- For JES2, *Operator's Library: OS/VS2 MVS JES2 Commands* (GC23-0007) and *System Programming Library: Network Job Entry Facility for JES2* (SC23-0003)
- For JES3, *Operator's Library: OS/VS2 MVS JES3 Commands* (GC23-0008) and *OS/VS2 MVS System Programming Library JES3* (GC28-0608)
- For RES, *OS/VS1 RES Workstation User's Guide* (GC28-6879)

Note: Some of the information contained in the logon is user determined and should be obtained from the host system.

If the logon is invalid, a message is sent to the host system operator. The 5280 does not receive a message because it is not in two-way communication with the host until the host accepts the logon. MRJE displays an error message indicating that the host rejected the logon. If you cannot determine why the logon was not accepted, contact the host system operator for assistance.

For a point-to-point non-switched line, entering the logon command completes the initialization process. The message "Establish connection if necessary" appears briefly on the display; no action is required.

For a point-to-point switched line, after you enter the logon command, the line connection with the host must be established. The message "Establish connection if necessary" appears on the display. If the connection type is manual call, call the system with which the 5280 is to communicate, and place the modem in data mode. If the connection type is manual answer, answer the call and place the modem in data mode. If the connection type is auto answer, no action is necessary. If the line interface is a switched line integrated modem without an exclusion key, the message appears as prompt 65-03. Before you press the ENTER key, call the system with which the 5280 is to communicate. When the connection is established, press ENTER, but do not cradle the receiver until you are certain that data transmission has started.

After the line connection is made, MRJE sends the logon command and communication between the 5280 and the host system is established.

```
Specify forms control information (optional)
Enter alternate forms control data set name:
Enter device address:
Where will forms control data set reside during MRJE operation?
    Options are
      1.  Diskette
      2.  Memory
    Select option:
Enter starting host type:
Enter starting sequence number:
                                        Press ENTER                    65-02
```

The forms control data set name allows you to specify a forms control data set other than the one in the job description record. This forms control data set is used for the current session only and the job description record is not updated.

The device address is of the diskette device which contains the alternate forms control data set. Enter two characters for a logical device address or four characters for a physical device address.

The forms control data set can reside on diskette or can be loaded into memory. The default is diskette. If diskette is chosen, the diskette must be accessible each time a forms type is needed.

The starting host forms type must be specified if the host has retained the forms name from a previous session and no new forms mount message will be sent from the host. This causes MRJE to set up printer forms control.

A sequence number is not used when your defined data set name is specified on the forms control record. The starting sequence number will be used to allocate all other print and punch data sets. If a duplicate sequence number exists, it will be incremented by one and allocation is tried again. If you know the next sequence number, it can be specified here rather than the search and increment method.

Input Processing

The three types of input to MRJE are:

- MRJE utility control statements
- OS/VS jobs (JCL and data) for submission to the host system
- Host system commands

MRJE processes utility control statements in the 5280. It transmits OS jobs (JCL and data) and host commands to the host system for processing. Input to MRJE can originate from a diskette data set or at the keyboard.

Diskette Data Set Input

MRJE transmits all records, regardless of their logical length, as 80 byte records. Command files must have a record length of 80 bytes, but data files can have a record length of up to 256 bytes on diskette. For example, a data set containing four 60-byte logical records is transmitted as three 80-byte records. If the last record to be transmitted has fewer than 80 bytes, it is padded with blanks. The host system user program, not RES, JES2, or JES3, is responsible for reassembling the data into the desired representation.

An input data set for MRJE is either a data file or a command file, as identified by the CMD parameter in the READFILE utility control statement.

MRJE transmits all records in a data file to the host system, and does not examine them before transmission. Therefore, a data file should contain only data to be sent to the host, namely JCL and data for the job. Do not include MRJE utility control statements in a data file; if you do, an error may occur when the host system attempts to process them.

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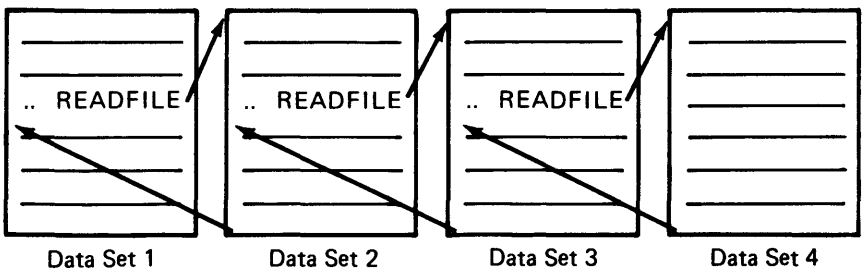
MRJE examines the contents of a command file to determine whether a record is to be sent to the host or processed by MRJE. A command file can contain JCL and data and host commands, which are transmitted to the host system, and MRJE utility control statements, which are processed by MRJE in the 5280.

MRJE looks at the first three bytes of each record in a command file. If the record does not begin with "..␣" (two periods and one blank), that is, it is not a utility control statement, MRJE sends it to the host. A command file must have a logical record length of 80 bytes, and must be contained on a single diskette volume.

The READFILE utility control statement identifies a diskette data set to be transmitted. It tells MRJE to retrieve a data set and insert it into the job stream to be sent to the host system. A data set identified by a READFILE statement may itself contain READFILE statements that direct MRJE to retrieve other data sets; this is called nesting. A nested READFILE is a READFILE encountered in a data set that was pointed to by another READFILE statement.

When MRJE encounters a nested READFILE, it stops reading from the data set containing the original READFILE, closes it, and begins reading the nested READFILE data set. After the nested READFILE data set is read, the original READFILE data set is reopened and read. MRJE supports seven levels of nested READFILEs; an example is shown below.



MRJE reads the data in the above four data sets in the following sequence: the beginning of data set 1, the beginning of data set 2, the beginning of data set 3, all of data set 4, the rest of data set 3, the rest of data set 2, and the rest of data set 1.

The maximum number of data sets that can be open at any given time is four: one forms control data set, one READFILE data set, one output data set (to receive punch or print data) and one syslog data set. A diskette which contains an open data set must remain mounted on the diskette drive.

Multivolume Input

MRJE provides multivolume support in three modes.

You indicate the first mode by omitting the SEQ keyword from the READFILE utility control statement. In this mode, the DRV keyword defines the sequence in which the drives are to be processed. All diskettes must be inserted in the appropriate drives before the READFILE statement is issued. No checking is done on the multivolume indicator (C or L) or the multivolume sequence number in the header label. In this mode, you cannot send more diskettes than there are drives.

The second and third modes provide a method of processing more diskettes than there are drives. In addition to checking the multivolume indicator and/or the multivolume sequence number, you indicate the second mode by specifying SEQ-N on the READFILE statement. In this mode, the DRV keyword in the READFILE statement defines the sequence in which the drives are to be processed. As each drive is processed, the multivolume indicator in the header label is checked. When a L is found, indicating the last volume, the reader is terminated. If a L is not found, after all drives have been processed, you are directed to insert a diskette into the last or only drive specified in the DRV keyword.

You indicate the third mode by specifying SEQ-Y on the READFILE statement. In this mode, the DRV keyword defines the sequence in which the drives are to be processed. As each drive is processed, the multivolume sequence number in the header label is checked to see if it is one greater than the previous sequence number processed. If it is not, you are directed to insert the proper diskette in that drive. As each drive is processed, the multivolume indicator in the header label is checked. When a L is found indicating the last volume, the reader is terminated. If a L is not found, after all drives have been processed, you are directed to insert the next sequential diskette into the last or only drive specified in the DRV keyword.

MRJE processes all drives one by one as specified for the DRV keyword of the READFILE statement until one of the following occurs:

1. A multivolume indicator 'L' is found in the header label. The reader is terminated.

2. All drives (or the only drive) have been processed and a multivolume indicator 'L' has not been found. MRJE gives an error message '5615' on the status line indicating end of volume has been reached. You must respond to the message in one of two ways:
   a. Insert a new diskette and press the RESET key. MRJE processes the next volume and terminates if this new volume has a multivolume indicator 'L' in the header; otherwise, MRJE re-issues the '5615' message which allows you to insert a new volume.

   b. If you want to terminate the reader and you do not have a data set with a multivolume indicator of 'L' in the header, you can open the drive door and press the RESET key. MRJE issues a drive door open message. Press the RESET key and MRJE will again issue the drive door open message. If the drive door remains open and the RESET key is pressed, the reader terminates.

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Keyboard Input

The keyboard from which MRJE accepts input is the keyboard of the keyboard/display used to load MRJE. This keyboard/display is the console device for MRJE. When the keyboard is the console (RDR-N), you can enter MRJE utility control statements and host commands at any time; this is the normal mode of operation.

To enter JCL and data, that is, a reader data stream, from the keyboard, use the MODIFY utility control statement to specify the keyboard as the reader (RDR-K). MRJE then reads data you enter at the keyboard as a command file; it checks the first three bytes of every record. If a record begins with "..ъ" MRJE processes it; if it does not, MRJE sends it to the host on the reader stream.

To use the keyboard for input, regardless of whether it is being used as a reader or console, you must first press the CMD key, and then hold down the shift key while you press Comm Attention. This key sequence must be used each time you want to enter any input from the keyboard. To make multiple successive entries from the keyboard, you must repeat the key sequence after you press ENTER for each new entry.

Reader and Console Data Streams

MRJE transmits data to the host RJE subsystem as either a reader or console data stream. A reader stream contains JCL and data, and some hosts also accept and process host commands received on the reader stream. A reader data stream can originate from either the 5280 diskette or keyboard (MODIFY RDR-K). A console data stream usually contains host commands and host operator messages, and can originate only from the console. Because host subsystems distinguish between reader and console data streams, you should determine and meet host subsystem requirements regarding the type of input that is expected on each data stream and how it is handled.

Output Processing

MRJE output can consist of one, all, or a combination of:

- Print data stream from the host system
- Punch data stream from the host system
- Console messages from the host system
- Operator message generated by MRJE

Job output from the host can also be directed to another terminal in the network or to input/output devices at the host system.

Print and Punch Data Streams

A print data stream can be directed to the 5280 diskette or printer, or can be specified to not be accepted from the host. The device default for a print data stream is the printer. This can be changed to the diskette or to do not accept using the MODIFY utility control statement.

A print data stream directed to the printer or diskette is written in the subset of standard character string (SCS) controls used by the 5280 system printers. Printer control characters in the print data stream are automatically converted as they are received from the line. When a print data stream which was stored on diskette is printed, the data is already in SCS form.

A punch data stream can be directed to the diskette or can be specified as do not accept; the default is do not accept. This can be changed to diskette using the MODIFY utility control statement. A punch data stream directed to diskette is written in decompressed form, that is, blanks are expanded. The data is written as 80-byte logical records.

If MRJE has received a mount message from the host and you have elected to use forms control, then the host forms type is used to obtain the forms information for that print or punch data stream. For print streams, you can, at the time the message is received, mount appropriate forms. When you issue the START utility control statement, MRJE signals the host to start sending the print data stream. For further explanation of forms control, see Chapter 8 'Concepts of Operations'.

Note: If you do not issue the START command for print and/or punch, no more data for that device is received. The START command is issued automatically when running in unattended mode.

If the host has a punch or print data stream ready to send to the 5280 and do not accept has been specified for that type of data stream, the host is not granted permission to transmit it. SYSMRJE informs you of this condition by displaying the message "OUTPUT DEVICE FOR XXXXX NOT ASSIGNED" and posting an error. You must provide for the disposition of the data stream before the host will accept signoff or logoff from the 5280. You enter a MODIFY statement to assign a device to receive the data stream at the 5280 or send a host subsystem command to hold, cancel, or redirect the data.

Using diskette data sets to receive job output allows the data to be processed after MRJE terminates. MRJE has no special provisions for handling output which requires special forms. Data should not be sent while output is waiting to be written to a diskette drive that is not available.

Note: The separator cards sent by some hosts in punch data stream are included in the output data set.

Messages

All messages to the 5280 operator, whether from the host system or MRJE, are shown on the display. Optionally, they can be logged on the diskette or printer. The log device is specified using the MODIFY utility control statement. Messages can be a maximum of 120 characters in length; those longer than 80 characters are shown on two lines on the display. For a description of the messages generated by MRJE, see "MRJE and SRJE Messages" in Chapter 8.

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Termination

A signoff/logoff command which conforms to host system requirements indicates to the host that the 5280 wants to terminate the MRJE session. For the format of the appropriate command, see the applicable host system manual.

When MRJE terminates, whether normally or abnormally, it closes all data sets and displays statistics for the session.

```
MRJE JOB STATISTICS
Read input records
Print output records
Punch output records
Press ENTER to continue termination
```

This message appears when MRJE terminates normally.

The previous message also appears if you enter the Comm Status command key sequence or if a non-recoverable error which does not permit MRJE to continue processing occurs.

The statistics for the above message reflect totals for all jobs in the session and are:

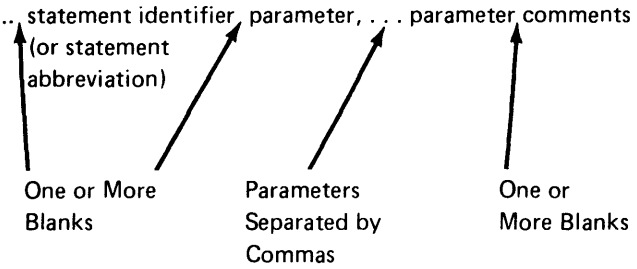
- Input records is the total number of 80-byte records read by the reader stream. This includes data records and JCL sent to the host.
- Print output records is the total number of 128-byte records passed to the printer or diskette.
- Punch output records is the total number of punch records written to diskette.

Note: These statistics represent the number of records read from or written to 5280 input/output devices, not necessarily the number of records transmitted or received.

MRJE UTILITY CONTROL STATEMENTS

MRJE utility control statements control the MRJE session. They can be entered from the console or from a command file on diskette. Each utility control statement must begin with "..␣" (two periods and one blank).

A utility control statement is composed of a statement identifier and parameters. The parameters contain values you supply to the utility. The general format is:



The statement identifier (or its one character abbreviation) is always the first word of the statement. One or more blanks are required between the identifier and the first parameter.

Parameters can be entered in any order. A comma is required to separate one parameter from another. A hyphen is required within each parameter to separate the parameter name and its value.

Comments can be included in any statement which contains parameters. One or more blanks are required between the last parameter and the comment.

READFILE

The READFILE statement describes a diskette data set to be transmitted to the host system. A READFILE statement may be nested, that is, a data set identified by a READFILE statement may itself contain READFILE statements that direct MRJE to retrieve and insert other data sets in the job stream. Seven levels of nesting are supported.

A data set retrieved by a READFILE statement is inserted into the job stream at the point where the READFILE occurs. After MRJE reads all the records in the data set, that is, end of file is reached, MRJE continues reading input from the diskette data set which contained the READFILE, or from the keyboard. A command file referenced by a READFILE must be contained on a single diskette volume.

The format of the READFILE statement is:

.. R [EADFILE] DSN–name, DRV–X[/X. . ./X] [, CMD–{N / Y}], [SEQ– {N / Y}]

DSN: Enter the name of the data set to be read.

DRV: Enter the address of the diskette drive on which the diskette containing the above-named data set is mounted. If this data set is a data file which spans multiple volumes which will be mounted on different diskette drives, you can enter multiple device addresses separated by slashes. If the READFILE statement is entered from the keyboard, a maximum of eight device addresses can be entered. If the READFILE statement is read from a diskette data set, a maximum of seven device addresses can be entered.

The format is DRV-X/X.../X where X is a two character logical or four character physical device address for a diskette drive. The addresses must be separated by slashes.

CMD: Specifies whether the data set is a data file or command file. Enter CMD-Y if the data set is a command file; this means MRJE will scan the file and process MRJE utility control statements when it encounters them. Enter CMD-N if the data set is a data file; MRJE transmits all records to the host, and does not process utility control statements. If you enter CMD-Y, enter only one device address for the DRV parameter. The default is CMD-N.

SEQ: Specifies if MRJE should process this data set as an off-line multivolume file. Enter SEQ-N if off-line multivolume indicators 'L' or 'C' are not used. The sequence number in the header label is not checked for ascending sequence.

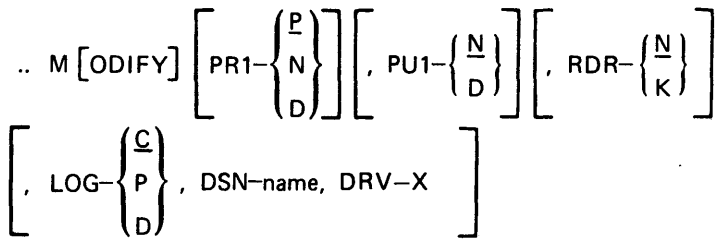
The SEQ parameter is not valid if CMD-Y is specified.

Enter SEQ-Y if off-line multivolume indicators 'L' or 'C' are used. The sequence number in the header label is checked for ascending sequence as each data set is processed. The first data set to be processed can have any sequence number. All others must be in ascending sequences from the first.

MODIFY

The MODIFY statement assigns and changes the devices to be used to transmit and receive data. If multiple changes are required, you can enter them using one MODIFY statement.

The format of the MODIFY statement is:



PR1: Specifies the destination of a print data stream sent to the 5280 by the host system. PR1-P assigns the printer to receive print data streams: this is the default. PR1-N indicates that the 5280 will not accept printer data from the host system.

PR1-D assigns the diskette to receive print data streams. MRJE allocates diskette data sets as they are needed during execution. The job description record identifies the device address(es) which contain diskettes to be searched for unused space (see prompt 68-08 of the RJE Description Utility). MRJE names the data set(s) either by the name in the forms control record or if none is specified as 'PRINTXXX' where XXX is the sequence number. The sequence number is given at MRJE initialization or if none was specified, 001 is the default. PRINTXXX is incremented by one for each new print data stream.

MRJE supports only one printer. It can be used either to receive a print data stream from the host (PR1-P) or as a syslog device (LOG-P). Therefore, if you specify PR1-P, you cannot specify LOG-P.

PU1: Specifies whether or not punch data streams will be accepted. PU1-N indicates that the 5280 will not accept punch data from the host; this is the default.

PU1-D assigns the diskette to receive punch data streams. A punch data stream directed to diskette is written in decompressed form, that is, blanks are expanded. MRJE allocates diskette data sets as they are needed during execution. The job description record identifies the device address(es) which contain diskettes to be searched for unused space (see prompt 68-08 of the RJE Description Utility). MRJE names the data set(s) either by the name in the forms control record or if none is specified as 'PUNCHXXX' where XXX is the sequence number. The sequence number is given at MRJE initialization or if none was specified, 001 is the default. PUNCHXXX is incremented by one for each new punch data stream.

Note: If duplicate PRINTXXX or PUNCHXXX data sets exist, MRJE continues to increment and attempts to allocate until there is no more space on the diskette.

If a MODIFY statement with the PR1 or PU1 parameter is entered while the 5280 is receiving a print or punch data stream, the device assignment is not changed until the data stream being received is completed.

RDR: Specifies the device from which the job data stream to be transmitted to the host is read. RDR-N is the normal mode of operation and is the default. When RDR-N is specified, only utility control statements and host commands can be entered from the keyboard.

RDR-K assigns the keyboard as the input device for the job stream to be transmitted. All data entered at the keyboard is treated as a command file when RDR-K is specified.

Note: When the EOF statement, MODIFY RDR-N, or a READFILE statement is encountered, RDR-K is reset to RDR-N, thus terminating the keyboard as the reader device.

LOG: Specifies the output device for MRJE utility control statements, host console messages, input entered at the keyboard and error/informational messages. LOG-C indicates that this information will be displayed; this is the default. LOG-P specifies that this information is also to be printed. If you specify LOG-P, you cannot specify PR1-P.

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LOG-D specifies that the information is to be displayed and also written on a diskette data set. When LOG-D is specified, it must be accompanied by DSN and DRV parameters. DSN is the name of the log data set; DRV is its device address.

Note: If MRJE is unattended in a background partition and the LOG is set to P or D when the ATTN key is pressed to go to a foreground partition, logging does not continue to be displayed. Logging continues to diskette or printer.

CARRIAGE

The CARRIAGE statement is used to:

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

The format of the CARRIAGE statement is:

```
.. C[ARRIAGE]   [L–nnn] [, BM–nnn] [,Ccc–mmm]. . .[,Ccc–mmm]
```

L: Specifies the length of the forms, that is, the number of print lines per page. The maximum length is 255; the default is 66.

BM: Specifies the line number of the bottom margin. Valid values are less than or equal to the number of lines per page (L). The default 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 cc-mmm combination can be specified for all 12 channel control characters. If values are not entered for all 12 combinations, 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 cc-mmm combinations are entered, previously entered or default values are used.

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

Notes:

1. Leading zeros are not required on any CARRIAGE parameter.
2. Check the host system (using host system commands) for the status of the output queues before entering a CARRIAGE statement. See the appropriate host manual for the command to use.

EOF

The EOF (end-of-file) statement signals the end of the input stream to the host system; the host system then queues the job for execution. If the RDR parameter of the MODIFY statement is RDR-K, EOF causes it to be reset to RDR-N.

If MRJE is transmitting one job to the host system, the job must be followed by EOF. If MRJE is transmitting more than one job, only the last job can be followed by EOF. The host system recognizes // JOB statements in the input stream which cause jobs to be queued for execution.

The format of the EOF statement is:

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

There are no parameters for the EOF statement.

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

START: The START statement, keyed in response to a local forms mount message, signals MRJE to transmit (with appropriate parameters) a RJE START command to the host system.

The format of the START statement is:

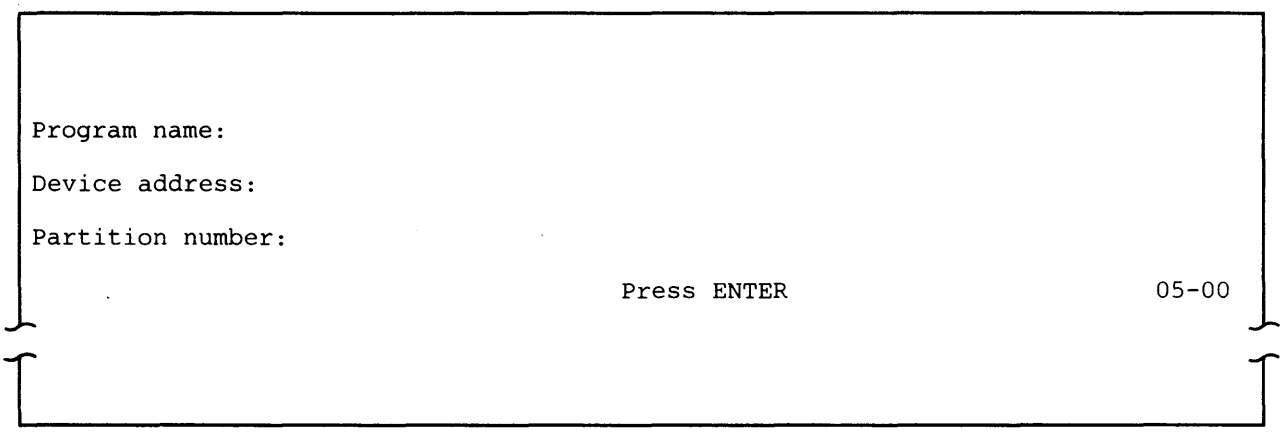
```
..S[TART]
```

There are no parameters for the START statement.

Chapter 8. Concepts of Operation

LOADING A COMMUNICATIONS UTILITY

Each communications utility is loaded using the system load prompt, shown below.



Program name: Enter the name of the utility to be run.

Device address: Enter the address of the diskette drive on which you have mounted the diskette which contains the above-named program. Enter two characters for a logical device address or four characters for a physical device address.

Partition number: Enter the number of the partition into which the utility should be loaded. The valid entries are 0–7. The default is the partition to which the keyboard is currently attached.

After you press ENTER, the utility is loaded and the first utility prompt appears.

LOADING A COMMUNICATIONS ACCESS METHOD (CAM)

When you are using one of the execution utilities (except SYSBOLT), the utility will automatically load the appropriate CAM into the partition specified in the job description record. However, you must use SYSCLU (see Chapter 2) to load the CAM prior to entering the first prompt on the execution utility when you want to load the CAM into a foreground partition or when you want to override the partition number in the job description record.

In all cases, when you are running a DE/RPG, COBOL, assembler communications program or SYSBOLT, you must use SYSCLU to load the CAM prior to loading your program.

PARTITION CONSIDERATIONS

Foreground and Background Partitions

There are two kinds of partitions: foreground and background. Each foreground partition is associated with a keyboard/display as defined during system configuration. The number of foreground partitions your system can have is equal to the number of keyboard/displays which are installed; the maximum is four.

A background partition is associated with the keyboard/display used to load a program into it. A program running in a background partition accesses a keyboard/display only when necessary. When a program in a background partition needs a keyboard/display, a solid rectangle appears on the right side of the display. Use the ATTN function key to detach the foreground partition from the keyboard/display and thereby allow the requesting background partition to use it.

The communications utilities can execute in either a foreground or background partition. However, consider the following factors when deciding whether to load a program into a foreground or background partition:

- Amount of expected use of the keyboard/display
- Input/output devices used by a communications job
- Mode of operation for a job
- Length of execution time for a job
- Size of available partitions

The preparation utilities interact with the operator and use the keyboard/display throughout their execution and therefore should normally be executed in a foreground partition; they are SYSCCU, SYSDCDU, SYSRJEDU, SYSBOLT, and SYSFORMS. Programs that do not interact with the operator should normally be run in a background partition; these include all the CAMs as well as SYSCLU (because the SYSCLU is overlaid by the CAM it loads).

It is advisable that you execute communications jobs in a foreground partition if you frequently use the keyboard/display as an input/output device, although this is not a requirement. Since SRJE and MRJE use the keyboard as either the reader or console device and use the display for console messages, you might want to execute them in a foreground partition; however, MRJE allows the keyboard to be detached if running unattended in a background partition. See "MRJE Executing While Keyboard/Display is Detached" in this chapter for a further description.

SYSBDCU supports the magnetic stripe reader as a device from which to transmit data. If the job uses the magnetic stripe reader, SYSBDCU *must* be executed in a foreground partition; otherwise an error occurs.

Unattended mode assumes that an operator is not present at the system during program execution. When using SYSBBTU, SYSBDCU and SYSSDCU in unattended mode, a keyboard/display is not required until the job is ready to terminate or to display errors; therefore, unattended jobs are suited for execution in a background partition.

If a communications job requires several hours to execute, it may be desirable to execute it in a background partition so that the keyboard/display can be used for other work. However, the input/output devices and mode of operation are more critical determining factors than length of execution time.

Depending upon the size of the program and of available partitions, it may be necessary to execute a communications program in a background partition. Background partitions are usually larger than foreground partitions. If a foreground partition of the needed size is not available, you can run a communications program in a background partition while no program is running in the foreground partition. (You could use SYSCLU to load the CAM into the foreground partition if the partition is big enough.) In this instance you can attach the background partition to the keyboard/display and it will execute the same as if it were in the foreground.

Summary of Partition Sizes

The following chart shows the partition sizes needed to execute the communications utilities and the CAMs. The sizes given for the execution utilities and CAMs are the *minimum* amount of storage required; see the following sections to determine the actual size needed. The communications utilities and CAMs run with any of the common functions options. For a total storage calculation, be sure to include the size of the common function area.

Communications Utility	Minimum Partition Size (in K)
SYSCCU	25
SYSCLU	12
SYSDCDU	17
SYSRJEDU	7
SYSBDCU	21
SYSBBTU	11
SYSMRJE	26
SYSSDCU	22
SYSSRJE	22
SYSBOLT	6
SYSCMPU	8
SYSFORMS	7

3270 Emulation Programs	Minimum Partition Size (in K)
SYSBDEU	26
SYSBPEU	26
SYSBTEU	42
SYSSDEU	25
SYSSPEU	30
SYSDECU	16

Communications Access Method (CAM)	Minimum Partition Size (in K)
SYSBSCBA	15
SYSBSCEX	21
SYSBSCR	12
SYSSNAD	25
SYSSNAR	24
SYSSNAU	25

3270 Communications Access Method (CAM)	Minimum Partition Size (in K)
SYSBSCE	14
SYSSNAE	29

Execution Utility Partition Sizes

The execution utilities support Basic, H and I exchange diskettes with physical sector sizes of up to 256 bytes in the minimum partition sizes. These utilities support I exchange data sets with block and physical sector sizes up to 1024 bytes if the partition contains an additional 3K (for SYSBBTU, SYSBDCU and SYSSDCU) or 7.5K (for SYSMRJE and SYSSRJE). The preparation utilities support diskettes with a physical sector size of up to 1024 bytes in the minimum partition sizes.

The dump/trace diskette data set cannot have a physical sector size block length greater than 256 bytes.

CAM Partition Sizes

The size of the partition needed for successful execution of a communications access method depends upon factors which vary for each particular CAM. Use the following formulas to calculate the partition size needed for the CAM to be used.

SNA CAMs (SYSSNAD, SYSSNAR, and SYSSNAU)

Partition size (in bytes) = C + (20 x T) + (350 x L) + (274 x B) + 1480

C = CAM object code size. The object code sizes of the SNA CAMs are:

- SYSSNAD (used by SNA Data Communications Utility) – 21,504
- SYSSNAR (used by SRJE) – 20,480
- SYSSNAU (used by user-written program) – 21,504

T = number of entries in trace table. Use the number you entered in response to prompt C19 of the Communications Configuration Utility.

L = number of concurrent LU-LU sessions. Use the number you entered in response to prompt S8 of the Communications Configuration Utility. For the SRJE CAM (SYSSNAR), the value of L is always 1.

B = minimum buffer requirement, as follows: B = ((P + 5) x L) + 2. For P, use the larger of the receive pacing count or the send pacing count, as entered in prompt S5 or S6 of the Communications Configuration Utility. L is the number of concurrent LU-LU sessions.

An additional 512 bytes should be added to the above formula if ASCII line code was entered in response to prompt C18 of the Communications Configuration Utility.

After you use the formula to calculate the partition size (in bytes), divide by 1024 and if you have a remainder, round up to the next whole number. This is the smallest size partition in K bytes which is required for the CAM.

BSC CAMs (SYSBSCBA and SYSBSCEX)

Partition size (in bytes) = C + (20xT) + B + 768

C = CAM object code size. The object code sizes of the BSC CAMs are:

- SYSBSCBA (used by BSC Batch Transfer Utility) – 14,052
- SYSBSCEX (used by BSC Data Communications Utility) – 20,196

T = number of entries in trace table. Use the number you entered in response to prompt C19 of the Communications Configuration Utility.

B = minimum buffer requirement, as follows: B = N x (S + 5). N is the number of buffers and S is the buffer size, in bytes. The value for N is 4 or three times the ITB blocking factor, that is, at least four buffers are required. For S, use the number you entered in response to prompt B17 of the Communications Configuration Utility.

For running SYSBBTU or SYSBDCU the minimum size for S is two greater than the largest record size being used for the input or output data sets. For SYSBOLT the minimum size for S is 302 bytes. For user-written programs the minimum buffer size is the maximum block size plus 2 to be transmitted or received.

After you use the formula to calculate the partition size (in bytes), divide by 1024 and if you have a remainder, round up to the next whole number. This is the smallest size partition in K bytes which is required for the CAM.

MRJE CAM (SYSBSCR)

Partition size (in bytes) = C + (20 x T) + B

C = CAM object code size. Use 42 sectors. A sector is 256 bytes.

Note: For planning purposes, due to possible enhancements in future releases, MRJE may require a maximum of 61 sectors.

T = number of entries in trace table. Use the number you entered in response to prompt C19 of the Communications Configuration Utility.

B = minimum buffer requirement, as follows: B = 4 x (S + 7). There are four buffers. For S, use the number you entered in response to prompt B17 of the Communications Configuration Utility.

When using ITB transmission format, the number of buffers required is three times the ITB blocking factor.

After you use the formula to calculate the partition size (in bytes), divide by 1024 and if you have a remainder, round up to the next whole number. This is the smallest size partition in K bytes which is required for the CAM.

3270 BSC CAM (SYSBSCE)

To find out the program sizes, run SYSLIST and do a directory list of the 3270 BSC utilities and CAM. To find the size of the program use the following algorithm.

For Utilities (#REC-UNUSED) *LRECL + 256

For SYSBSCE (#REC-UNUSED) *LRECL + 1400 + T
T = Number of trace entries *20 bytes.

Round this number upward to the next K. The 1400 is for fixed system control blocks.

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to be transmitted, or data sets that are opened to receive data. When a utility completes its use of a data set, it closes the data set; it can then be opened by another program.

For more information on diskettes and diskette data sets, see the *IBM 5280 System Concepts*.

Using Diskette Data Sets for Communications

For detail information on SYSBTEU, see the "Interactive Batch Data Transfer Utility" in the *5280-3270 Emulation Reference Manual*, SC34-084.

A single data set is one data set. Multiple data sets are more than one data set that are treated as a group by the execution utility. Each data set of multiple data sets has its own header (or data set label). Multiple data set names are always 8 characters in length and consist of a prefix and suffix. The prefix is the first five or six characters of the name and is the same for each data set. The first character of the name (of the prefix) must be alphabetic. The suffix consists of two or three digits and differs for each data set. The names of multiple data sets cannot contain embedded blanks.

SYSBDCU and SYSSDCU use multiple data set names that consist of a six character prefix and a two digit suffix. For example, PAYROL01, PAYROL02, PAYROL03, and PAYROL04 are multiple data sets; PAYROL is the prefix.

SYSMRJE and SYSSRJE use multiple data set names that consist of a five character prefix and a three digit suffix. For example, PRINT001, PRINT002 and PRINT003 are multiple data sets; PRINT is the prefix. In addition, SYSMRJE uses other data set names when running forms control. See the section on "MRJE Forms Control" in this chapter for further explanation.

All of the execution utilities except SYSBOLT support transmitting and receiving single data sets. SYSBDCU and SYSSDCU can transmit multiple data sets; SYSBDCU, SYSSDCU, SYSMRJE and SYSSRJE can receive multiple data sets.

A data set to be transmitted can be multivolume, that is, it can be contained on more than one diskette volume. If the data set is multivolume, the data set label should contain C (for continued) or L (for last) for the multivolume indicator (position 45) and a volume sequence number (positions 46–47) from 00 to 99. To transmit multiple data sets which are multivolume, make sure that the label for the last data set to be transmitted is marked as continued.

A single data set to be transmitted is identified to SYSBBTU, SYSBDCU or SYSSDCU by its name. A data set to be transmitted by MRJE or SRJE is identified by the DSN parameter of a READFILE utility control statement.

SYSBDCU and SYSSDCU are the only execution utilities which transmit multiple data sets. To transmit multiple data sets, you specify only the prefix. The execution utility transmits only those data sets with the specified prefix which have suffixes in ascending order, beginning with 01. The utility stops transmitting when it cannot find a data set with a suffix one greater than that of the last data set transmitted. If a multiple data set has a bypass indicator (B) in position 41, the data set is not transmitted.

The diskette logical records lengths supported for data sets to be transmitted are:

Utility	**Logical Record Length**
SYSBBTU	≤ 128
SYSBDCU (3741)	≤ 512
SYSBDCU (3780)	80
SYSSDCU	≤ 512
SYSMRJE	≤ 256
SYSSRJE	≤ 256

SYSSDCU,SYSMRJE and SYSSRJE always reformat the records and pass them to the CAM as 80 byte records and the host will receive them as card data stream. It is the host program's responsibility to reformat the records if necessary. SYSBBTU and SYSBDCU pass each diskette logical record to the CAM without any reformatting. Each logical record in a data set must be the same length. When SYSBSCEX is loaded in its minimum partition, SYSBDCU must transmit records with logical record lengths equal to or less than 128.

Note: When the execution utility is loaded in its minimum partition, the only physical record lengths allowed are 128 and 256. For physical record lengths of 128, valid logical record lengths are equal to or less than 385 or equal to 512. For physical record lengths of 256, valid logical record lengths are equal to or less than 257 or equal to 512. For detail information on SYSBTEU, see the 'Interactive Batch Data Transfer Emulation Utility' in the *5280-3270 Emulation Reference Manual,* SC34-0384.

Receiving Diskette Data

An important consideration when receiving diskette data is how the data set is allocated. All of the execution utilities except SYSBOLT can automatically allocate, at execution time, the data set(s) needed to receive data. If multiple data sets are to be received, or if the execution utility is MRJE or SRJE, you *must* allow the utility to allocate the data set(s). The only instance in which data can be written to a pre-allocated data set is when a *single* data set is to be received by SYSBBTU, SYSBDCU or SYSSDCU.

When receiving data to a pre-allocated data set the following diskette logical record lengths are supported:

Utility	**Logical Record Length**
SYSBBTU	≤ 128
SYSBDCU (3741)	≤ 512
SYSBDCU (3780)	128 for print data
SYSBDCU (3780)	80 for punch data
SYSSDCU	≤ 512 for print, punch or console data

All records must have the same record length. The logical record length of the data set must be equal to the length of the first record received in SYSBDCU and SYSBBTU. SYSSDCU assumes the following record lengths for data received: 80 bytes for punch data, 128 bytes for print and and 120 bytes for console data. When receiving data to a preallocated data set, SYSSDCU reformats and writes the data to diskette using the record length of the data set.

If a pre-allocated data set is not large enough, the utility marks the diskette which is currently mounted as multivolume, and then notifies you that it is attempting to allocate another volume. You should mount another diskette.

When the execution utility allocates a data set, it first allocates all available space on the diskette for the data set to be received. After the data has been received, the unused space is released; this means that the end of extent is set to one less than the end of data in the header. If a permanent error occurs during execution, the unused space is not released.

When SYSBBTU and SYSBDCU receive data for a pre-allocated data set, the logical record length of the data set must equal the record length of the first record received. If the utility must allocate the data set, then the logical record length of the data set being allocated is set to the record length of the first record received. The first record received by the utility must not be truncated by the host.

When SYSBBTU and SYSBDCU allocate a data set at execution time, it allocates an I exchange data set with the logical record length equal to the length of the first record received. SYSSDCU, SYSMRJE and SYSSRJE always allocate 'I' exchange data sets with logical record lengths as indicated below. The following logical record lengths are supported:

Utility	Logical Record Length
SYSBBTU	≤ 128
SYSBDCU (3741)	≤ 512
SYSBDCU (3780)	128 for print data
SYSBDCU (3780)	80 for punch data
SYSSDCU	128 for print data
SYSSDCU	80 for punch data
SYSSDCU	120 for console data
SYSMRJE,SYSSRJE	80 for punch data
SYSMRJE,SYSSRJE	128 for print and exchange data
SYSMRJE,SYSSRJE	120 for log data

The block length is set equal to the physical sector size. All records must have the same logical record length. When SYSBSCEX is loaded in its minimum partition, SYSBDCU must receive records with logical record lengths equal to or less than 128.

For SYSBDCU and SYSSDCU, you must specify the prefix for multiple data sets to be received. The first data set received is named with the prefix and a suffix of 01; the suffix for each succeeding data set received is incremented by one.

SYSSRJE does not allow you to name a data set to be received; the utility names it according to the type of data stream, namely punch or print. The name of the first data set received is "PUNCH001", "PRINT001" or "EXCHA001" (SRJE only). If more data streams of the same type are received, the three-digit suffix in the name is incremented by one for each new data stream.

SYSMRJE allows you to name a data set to be received. This is described in this chapter under "MRJE Forms Control". If you choose not to name the data set, then it will be named according to the type of data stream, namely punch or print. The first data set received is "PUNCH001" or "PRINT001" unless you specified a sequence number at startup. If a sequence number was specified, the DSN will be PUNCHSSS or PRINTSSS, where SSS is the sequence number. The three-digit suffix in the name is incremented by one for each new data stream.

Note: When the execution utility is loaded in its minimum partition, the only physical record lengths allowed are 128 and 256. For physical record lengths of 128, valid logical record lengths are equal to or less than 385 or equal to 512. For physical record lengths of 256, valid logical record lengths are equal to or less than 257 or equal to 512. When SYSBSCEX is loaded in its minimum partition, SYSBDCU must receive records with logical record lengths equal to or less than 128. For detail information on SYSBTEU, see the 'Interactive Batch Data Transfer Emulation Utility' in the *5280-3270 Emulation Reference Manual,* SC34-0384.

Receiving Records Using SYSBBTU/SYSBDCU

Your data can be received over the BSC communications link in blocked format if either ITB or IRS characters are used as logical record delimiters. Transmission blocks without logical record delimiters (ITB/IRS) can not be received by SYSBBTU or SYSBDCU. When using IRS delimiters, the 5280 can receive 512 bytes of your data per transmission block. The IRS characters are not counted as your data.

When receiving (using 3741 protocol) records that have truncated blanks, SYSBBTU and SYSBDCU require that the first logical record be the correct logical record size; that is, no truncated blanks can be contained in the first logical record of a data set.

Distributing Programs, Records and Data on Diskettes

Because the 5280 is a diskette-based system, you should plan the best way to distribute various types of data on diskettes. This minimizes the number of times that diskettes need to be mounted while an execution utility is running, and therefore contributes to more efficient utilization of your system. However, the following restrictions apply:

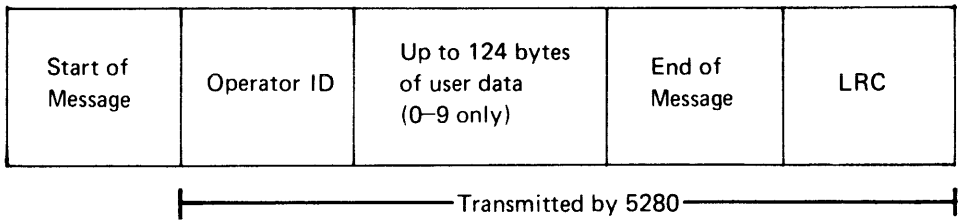
- The Communications Load Utility (SYSCLU), the CAM to be loaded, and the communications configuration record to be used *must* be on the same diskette.

- If a job is to be executed in unattended mode by SYSBBTU, SYSBDCU, or SYSSDCU, the diskette(s) containing the job data set and the data set(s) to be used to transmit from or receive to *must* remain mounted throughout execution of the job.

The location of the job data set(s) should be kept consistent at your facility. You may want to place the job data set(s) and your data on the same diskette or to keep them on your communications diskette.

Magnetic Stripe Data Format

If the protocol type is 3741, SYSBDCU can transmit up to 128 bytes from the magnetic stripe in the following format:



The 5280 transmits the operator ID, user data, end of message character and the longitudinal redundancy check (LRC). The start of message character is not transmitted. The user data can consist only of digits 0-9 and must have even parity. Each digit (0-9) of the user data is transmitted in EBCDIC format (X'F0'-X'F9'). Hex digits A-F are transmitted as shown in the following chart:

Hex Digit	Transmitted as Hex	Character	Meaning
A	7A	:	operator ID
B	7B	#	
C	7C	@	start of message
D	7D	/	
E	7E	,	
F	7F		=end of message

In World Trade countries the above characters may be different. The LRC is also transmitted in EBCDIC if 0-9 or using the above table if A-F.

Note: The magnetic stripe message must not be more than 44 characters when transmitting to CICS.

To receive a magnetic stripe record before the data, you need to have defined a separate function definition record. When the 5280 receives the magnetic stripe reader data, SYSBBTU or SYSBDCU posts a 5602 error (heading text, received). Then the error recovery prompt (see prompt XX-29 in Chapter 8) is displayed. Select option 6 in SYSBDCU or option 3 in SYSBBTU (continue current function) and SYSBBTU or SYSBDCU will write the magnetic stripe reader data to the diskette data set specified in the function definition record and then continue to the next function definition.

MRJE FORMS CONTROL

MRJE examines each console message to determine if it is a forms mount message. If a forms mount message is found, the forms control table data set is searched for the host forms type requested. (The forms control table data set was previously created by the SYSFORMS utility.)

If no forms control table data set was specified in the job description record and no forms contorl table data set was specified on the start up screen (65-02), or if no record with the specified host forms type is found, the forms message is displayed. You must then issue any necessary CARRIAGE statement and start the print/punch output using a host start command.

If a match is found in the forms control table, the host mount message is logged and MRJE sets up all necessary forms control information. Channel control characters in the forms control record overlays all existing values.

Punch data cannot be printed by MRJE. If the data coming from the host is punch data and there is a match in the forms control table, but device (DEV-P) specified is P, then the P is ignored. If DSN is blank, a DSN is allocated as PRINTXXX or PUNCHXXX with the incrementing feature if a duplicate data set exists. If DSN is a user defined data set, the incrementing feature is not used.

If the output device is the diskette, (either punch stream or a printer stream with DEV-D in the forms control table), the start print or punch command is sent to the host by MRJE without your intervention. The DSN field in the forms control table is interrogated to determine the data set name. If the DSN is blank, it is constructed as PRINTXXX or PUNCHXXX. If the DSN field contains an *, the data set name is constructed as follows:

BYTE	
1	A—print data B—punch data
2–4	Sequence number—This number is incremented by 1 each time a new print/punch data set is allocated.
5–8	Local forms type

If the output device is the physical printer (DEV in forms control record is a P) and mode of operation is attended, a 5280 MRJE forms mount message is issued. The MRJE forms mount message specifies the local forms type. If mode of operation is unattended, no message is issued and PR1 is set to P, unless LOG is PR1 in which case PR1 is set to D. If unattended, MRJE sends a start command to the host.

The following message appears on the line used for entering input to MRJE using the CMD-COMM ATTN key. It remains there until you take an action to clear, but it does not stop MRJE processing.

MOUNT FORMS—XXXX ON PRINTER—XXXX

If the log is not assigned to the printer, PR1 is set to P. You must then key the START utility control statement to start the print job. You can key the host start command in lieu of the START utility control statement if desired, but it must contain the necessary parameters.

If the log is assigned to the printer, a conflict message is issued.

CONFLICT BETWEEN LOG AND PRINT

You can then take the following actions and expect the corresponding results:

1. If you enter a START statement with no modify statement, preceding it, then print stream is directed according to current setting of PR1 either D or N.

2. If you modify the log to not be the printer, then PR1 is set to P.

3. If you modify the log to not be the printer and set PR1-N, then PR1 remains unassigned.

4. If you modify the log to not be the printer and set PR1-D or only modify PR1-D, then PR1 is left as D.

In cases 2–4, you must either enter the START statement for MRJE to send the start command or enter the start command to the host with the appropriate parameters.

MRJE Executing While Keyboard/Display is Detached

This allows you to detach the keyboard/display from MRJE. Another partition can be attached to the keyboard/display while MRJE is executing. To do this, unattended mode of operation must have been selected when creating the job description record with SYSRJEDU. MRJE must be loaded into a background partition. Before the keyboard/display can be detached, the connection must be established.

First the MODIFY utility control statement is used to change the log device to printer (P) or diskette data set (D), then the log entry is made to the display and the printer or diskette. Once the ATTN key is pressed, the following occurs.

1. The keyboard is detached.

2. The load prompt is given in the foreground partition. You can load a program into another partition.

3. MRJE continues processing.

4. Logging to the display stops, but logging continues to either the printer or diskette.

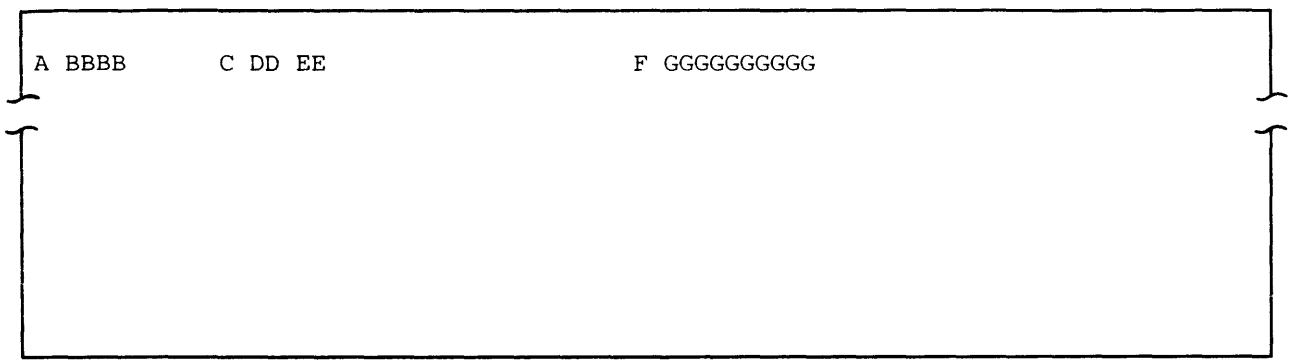
When the diskette data set specified for the log is full, the data set is closed, reopened and an overwrite occurs without intervention. A message SYSLOG wrapping is logged meaning the oldest entry is replaced with the most current entry.

When you attach the background partition with MRJE to the keyboard using the console function CMD key, C, B, numeric partition number, the logging goes to the display again starting with the next entry to be logged. Logging to the printer or to the diskette continues.

STATUS LINE

The top line of the display is the status line. It displays information about the program which is executing in the partition attached to the keyboard/display. If an error occurs, information to help you recover from the error is displayed; in this situation, the status line flashes until you press RESET.

When a communications utility is running, the status line appears as follows:



A (position 1) is the partition number.

BBBB (positions 3–6) is the position of the cursor on the display.

C (position 13) is the shift mode of the keyboard.

DD (positions 15–16) is the number of remaining positions in the field in which you are entering data, including the cursor position.

EE (positions 18–19) is the hexadecimal value of data currently in the cursor position of the field.

Note: Positions 3 through 19 are displayed only when you are entering data at the keyboard.

F (position 41) is the type of data transfer function which is executing, either T (transmit), R (receive) or I (inquiry).

GGGGGGGGGG (positions 43–52) display a solid rectangle as data is being transmitted or received. The rectangle moves from one position to another, from left to right. Each move of the rectangle represents two logical reads transmitted or received.

Note: Positions 41 through 52 are displayed only when SYSBDCU or SYSSDCU is executing a job and the utility is attached to a keyboard.

AUTO ALLOCATE FAILED ON DRIVE NNNN:* The error code indicates the reason why data set allocation on diskette drive NNNN failed. If the error code is 3228 and the data set name on the status line is the name of a previously allocated data set, the diskette is full. Mount another diskette.

CAM LOAD FAILED:* The RJE utility was unable to load CAM in the requested partition.

CANCEL COMPLETE: This message appears for SRJE only. It indicates that a CANCEL request was received from the host and has been completed.

CONFLICT BETWEEN LOG AND PRINT DEVICE: This message appears for MRJE only. This message occurs when using forms control and the print stream is directed to the printer, and the printer is currently assigned to the log. Modify the log if desired or key in the START statement.

DISCONNECT RECEIVED: This message appears for MRJE only. Following LOGOFF, this is a normal condition. At any other time, it indicates that the host system has terminated the session.

EOF MUST BE IN READER STREAM: An EOF statement was entered from the keyboard while the keyboard was not assigned as the reader device. To assign the keyboard as the reader, enter a MODIFY statement with RDR-K.

INCORRECT JOB NAME: The job description record specified to be used was not created for the RJE utility you are executing. Check the job name and the name of the execution utility (see prompts 68-01 and 68-03 of the RJE Description Utility) to ensure they are correct.

INVALID AUTO ALLOCATE DEVICE:* The device address in the job description record is invalid for auto allocation.

INVALID DEVICE ADDRESS:* An invalid device address was entered.

LOGON FAILED:* The error code indicates the reason why logon failed.

NO AUTO ALLOCATE DEVICE:* The job description record does not contain a device address for automatic allocation of a diskette data set, but diskette output has been requested.

OUTPUT DEVICE FOR YYYYY NOT ASSIGNED: The value of YYYYY is either PUNCH, PRINT or EXCHANGE. This message indicates that a device has not been assigned for the data stream type punch, print or exchange (SRJE only). Enter a MODIFY statement to assign a device to receive the data stream.

READER INHIBITED BY HOST: The host response to logon indicated that no reader input would be accepted.

READER TERMINATED: The RJE utility has read an EOF utility control statement or encountered the physical end of data set for the last READFILE. This means that there is no more data to be sent to the host in this reader stream. If the keyboard was the reader (MODIFY RDR-K) for this reader stream, it has automatically been reset to RDR-N.

READFILE ACTIVE QUEUE OVERFLOW: The maximum number of nested diskette READFILE statements after the first READFILE is eight. This message means that the maximum has been exceeded. The job terminates.

READFILE PENDING QUEUE OVERFLOW: The maximum number of pending nested READFILE statements entered from the keyboard is eight. This message means that the maximum has been exceeded, and the last READFILE entered was not accepted.

READFILE REQUIRED: The RJE utility cannot find the data set specified in a job description record.

READY FOR INPUT: This message appears when initialization is complete. Press the CMD key, and then hold down the shift key while you press Comm Attention. The keyboard can now be used to enter input.

SHUTDOWN COMPLETE: This message appears for SRJE only. It indicates that a request shutdown command was received from the host and has been completed.

SYSLOG WRAPPING:* The syslog data set is full. Insert another diskette with the same data set name for the syslog data set, or press RESET and the data currently in the syslog data set will be overlaid.

UTILITY COMMAND ACCEPTED: The RJE utility has read and accepted the last utility control statement you entered.

UTILITY COMMAND ERROR: The RJE utility has read a utility control statement (that is, a record starting with "..ъ"), but it contains an invalid entry or a device assignment conflict. Correct and re-enter the last utility control statement shown on the display.

In the following four messages, XXXXXXXX is the name of a diskette data set.

XXXXXXXX ALLOCATED: The RJE utility has allocated the above-named data set to receive a punch, print or exchange data stream from the host.

FORMS CONTROL RECORD CREATED USING SYSFORMS

The forms control record describes forms information to be used by MRJE. The record is created using the Forms Control Table Utility (SYSFORMS). All data contained in the forms control record is in EBCDIC format.

Positions	Field Length	Description
1–8	8	Host forms type
9–11	3	Contains the header 'PFR'
12–14	3	Maximum number of lines (up to 255) per page
15–17	3	Line number of top margin
18–20	3	Line number of bottom margin
21–161	141	Reserved
162–197	36	Line number for channel control character (12)
198	1	Device for output
199–214	17	Data set name for diskette output
215–218	4	Local forms type
219–256	37	Reserved