

**Installation
Operation and
Functional Description
Manual**

**B 1000 Systems
EM3270/BSC**

(Relative to the Mark 11.0 System Software Release)
Copyright © 1984, Burroughs Corporation, Detroit, Michigan 48232

Burroughs cannot accept any financial or other responsibilities that may be the result of your use of this information or software material, including direct, indirect, special or consequential damages. There are no warranties extended or granted by this document or software material.

You should be very careful to ensure that the use of this software material and/or information complies with the laws, rules, and regulations of the jurisdictions with respect to which it is used.

The information contained herein is subject to change without notice. Revisions may be issued to advise of such changes and/or additions.

Correspondence regarding this publication should be forwarded using the Remarks form at the back of the manual, or may be addressed directly to Corporate Documentation-West, Burroughs Corporation, 1300 John Reed Court, City of Industry, California 91745, U.S.A.

LIST OF EFFECTIVE PAGES

Page	Issue
Title	Original
ii	Original
iii	Original
iv	Blank
v thru vii	Original
viii	Blank
1-1 thru 1-2	Original
2-1 thru 2-4	Original
3-1 thru 3-6	Original
4-1 thru 4-17	Original
4-18	Blank
5-1 thru 5-4	Original
A-1 thru A-3	Original
A-4	Blank
B-1 thru B-4	Original
1	Original
2	Blank

TABLE OF CONTENTS

Section	Title	Page
1	INTRODUCTION	1-1
	General	1-1
	Manual Structure	1-1
	Related Documents	1-2
	Burroughs Documentation	1-2
	B 1000 Software Manuals	1-2
	B 1000 Reference Cards	1-2
	Terminal Reference Manuals	1-2
	B 1000 Hardware Manuals	1-2
	IBM Documentation	1-2
2	EM3270/BSC OVERVIEW	2-1
	Hardware Requirements	2-2
	Memory Requirement	2-2
	Data Communication Hardware	2-2
	Line Adapters	2-2
	Display Terminals	2-2
	Printer Terminals	2-2
	Stations	2-2
	Software Requirements	2-3
	Operating System (MCP)	2-3
	Network Controller	2-3
	Supervisory Message Control System (SMCS)	2-3
	SYSTEM/MAKEUSER	2-4
	Display Formatting Limitations	2-4
3	EM3270/BSC INSTALLATION	3-1
	Preliminary Procedures	3-1
	Creating the (SYSTEM)/USERCODE File	3-1
	Compiling the Network Controller	3-1
	Network Controller Name	3-1
	Terminal Section	3-1
	Station Section	3-2
	Line Section	3-2
	File Section	3-2
	Example Network Controller	3-2
	Initializing the MCP Name Table	3-3
	Creating the SMCS JOBS File	3-3
	Program Switches	3-4
	System Initialization	3-4
	EM3270/BSC Files	3-6
4	EM3270/BSC OPERATION	4-1
	Program Execution	4-1
	ODT Execution	4-1
	Remote Execution	4-1
	SMCS Sign-On	4-1
	ODT Commands	4-1
	ATTACH	4-2

TABLE OF CONTENTS (Cont)

Section	Title	Page
	DETACH	4-3
	DUMP	4-4
	IOLOG	4-5
	STOP	4-6
	Terminal Operation	4-7
	?BYE	4-8
	?DUMP	4-9
	?HELP	4-10
	?INIT	4-11
	?IOLOG	4-12
	?REFRESH	4-13
	?RESET	4-14
	?STATUS	4-15
	?TEACH	4-16
	IBM 3278 Terminal Control Keys	4-17
5	FUNCTIONAL DESCRIPTION	5-1
	Binary Synchronous Line Discipline	5-1
	Special Data Communications Considerations	5-1
	Screen Translation	5-2
A	GLOSSARY OF TERMS	A-1
B	SYNTAX AND NOTATION CONVENTIONS	B-1
	Syntactic Variables	B-1
	Keywords	B-1
	Required Items	B-2
	Optional Items	B-2
	Loops	B-2
	Bridges	B-3
	Hexadecimal Character Notation	B-4

LIST OF ILLUSTRATIONS

Figure	Title	Page
2-1	EM3270/BSC System Configuration	2-1
3-1	Initialization Screen Format	3-5

LIST OF TABLES

Table	Title	Page
3-1	EM3270/BSC Files	3-6

SECTION 1 INTRODUCTION

GENERAL

This manual describes the software/hardware requirements, operating procedures, and implementation of the BSC 3270 Software Emulator Program. Throughout this manual, this program shall be referred to as the EM3270/BSC program.

The EM3270/BSC program provides a software interface between a Burroughs B 1000 series computer and any computer with the IBM 3270 binary synchronous (bisync) capability. While executing the EM3270/BSC program, the B 1000 system with TD 830 type display terminals and a line printer appears to a host system as an IBM 3274 control unit with IBM 3278 display terminals and IBM 328x printer terminals.

MANUAL STRUCTURE

This manual is intended for individuals with a working knowledge of the basic hardware and software functions of the B 1000 data processing system. A brief description of each section and appendix follows:

Section 1: Introduction

Describes the purpose and structure of the manual, and provides a list of related documentation.

Section 2: EM3270/BSC Overview

Describes the features and capabilities of the EM3270/BSC program for data processing managers.

Section 3: EM3270/BSC Installation

Describes the generation of the network controller and the EM3270/BSC program switches. This section is intended for the operations manager or any person who installs the EM3270/BSC program.

Section 4: EM3270/BSC Operation

Describes the EM3270/BSC program operating instructions which include the EM3270/BSC commands. This section is intended for the operators of the EM3270/BSC program.

Section 5: EM3270/BSC Functional Description

Describes the implementation of the EM3270/BSC program for systems programmers.

Appendix A: Glossary of Terms

Provides a glossary of terms used in this manual.

Appendix B: Syntax and Notation Conventions

Describes the syntax and notation conventions used in this manual.

RELATED DOCUMENTS

There is documentation available from Burroughs Corporation and IBM Corporation related to the B 1000 Systems EM3270/BSC Manual.

Burroughs Documentation

The following documentation is produced by Burroughs Corporation and is available from Literature Distribution.

B 1000 Software Manuals

B 1000 Systems System Software Operation Guide, Volume 1, form number 1151982.

B 1000 Systems System Software Operation Guide, Volume 2, form number 1152097.

B 1000 Systems Network Controller Installation Manual, form number 1152196.

B 1000 Systems Network Definition Language (NDL) Language Manual, form number 1152014.

B 1000 Systems NDL/LIBRARY Functional Description Manual, form number 1152246.

B 1000 Systems Data Communications Functional Description Manual, form number 1152030.

B 1000 Systems Message Control System (MCS) Functional Description Manual, form number 1152253.

B 1000 Systems EM3270/SNA Installation, Operation and Functional Description Manual, form number 1152345.

B 1000 Systems SMCS Installation, Operation and Functional Description Manual, form number 1152279.

B 1000 Systems Interactive SDL2 System Analyzer (ISSA), form number 1152055.

B 1000 Reference Cards

B 1000 Systems Network Controller Reference Card, form number 1152238.

B 1000 Systems Supervisory Message Control System (SMCS) Reference Card, form number 1152212.

Terminal Reference Manuals

TD 730/TD 830 System Reference Manual, form number 1093738.

MT 983/MT 985/MT 993 Display Terminals Reference Manual, form number 1118361.

B 1000 Hardware Manuals

B 1965/B 1995 Multiline Control-4 Manual, form number 1127478.

IBM Documentation

The following documentation is available from the IBM Corporation.

IBM 3270 Information Display System Component Description, form number GA27-2749-7.

SECTION 2 EM3270/BSC OVERVIEW

The EM3270/BSC program provides a software interface between the Burroughs B 1000 series computer and any computer with the IBM 3270 (binary synchronous) capability. While executing EM3270/BSC, the Burroughs B 1000 series computer with TD 830 display terminals and a line printer appears to a host system as an IBM 3274 control unit with IBM 3278 display terminals and IBM 328x printer terminals.

NOTE

Throughout this manual, MT 983/MT 985 and TD 830 terminals are referred to as TD 830 type terminals.

Figure 2-1 illustrates the relationship and interaction of the EM3270/BSC program with the B 1000 data communications software and hardware.

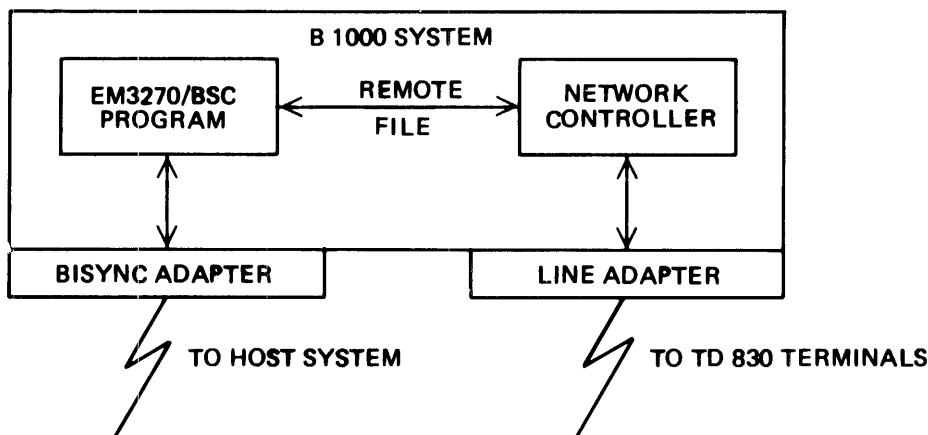


Figure 2-1. EM3270/BSC System Configuration

The EM3270/BSC program receives input from the host through a Burroughs BISYNC/EBCDIC adapter. The messages received from the host are translated into TD 830 type messages and written to a network controller remote file. From the remote file, the translated messages are delivered to the terminals by the network controller. The reverse is true for messages originating from the TD 830 terminals. The line discipline and screen translation are discussed in section 5.

Because of the hardware differences between Burroughs TD 830 Terminals and IBM Display Stations, complete emulation cannot be achieved.

The capabilities of EM3270/BSC can be logically divided into a line discipline segment and a screen translation segment.

HARDWARE REQUIREMENTS

The following hardware elements are required to execute the B 1000 EM3270/BSC program:

B 1800 (except B 1830) or B 1900 central processor

Multiline control or single-line control

One EBCDIC/BISYNC line adapter for each copy of the EM3270/BSC program

Line adapters as required

Disk storage

Operator Display Terminal (ODT)

Terminal Devices (one or more terminals from the following list):

MT 983 terminal

MT 985 terminal

TD 830 terminal

MEMORY REQUIREMENT

The memory requirement for the EM3270/BSC program is 128K bytes for static data space and up to 12K bytes for code space.

DATA COMMUNICATION HARDWARE

The data communications hardware requirements are described in the following paragraphs.

Line Adapters

The EM3270/BSC program directly interacts with the host system over a Binary Synchronous RS232 line. This line must be physically driven by a synchronous modem and is connected to the B 1000 system with a BISYNC/EBCDIC adapter.

Display Terminals

The EM3270/BSC program is designed to interact with TD 830, MT 983 or MT 985 display terminals.

Printer Terminals

The EM3270/BSC program is designed to emulate IBM 328x printer terminals by formatting and writing each printer record to a backup file.

Stations

Any station that is declared in the network controller may be a station in the EM3270/BSC system. Each copy of the EM3270/BSC program may contain up to 32 stations.

SOFTWARE REQUIREMENTS

The following software elements are required to execute the EM3270/BSC program:

Operating System (MCP)

Network Controller

Supervisory Message Control System (SMCS) (optional)

SYSTEM/MAKEUSER Program (optional)

Operating System (MCP)

The Master Control Program (MCP) is an operating system which manages the demands and resources of a B 1000 system. It reduces the programming effort by providing commonly needed functions and services. The MCP requires strict adherence to program structures and procedures in order that communication between different programs, interpreters, and the MCP can occur.

The primary function of the MCP is to optimize the productivity of a system. External intervention is held to a minimum, and maximum throughput is achieved by incorporating into the MCP the primary tasks of input/output control, file handling, multiprogramming, system interrupts, memory allocation, and operator interfacing.

Network Controller

The network controller is generated by the Network Definition Language (NDL) compiler. The network controller processes and supervises the flow of messages between application programs and the remote network (stations). It performs all data communication line discipline functions necessary for proper line/terminal control. The network controller handles the initiation and completion of data communication I/O and services exception conditions. The network controller is configured by symbolic specifications to the NDL compiler that are specific to the configuration of the system on which it is to be run.

Supervisory Message Control System (SMCS)

The SMCS program offers the capability of a message control system interface to the data communications network. The SMCS program is intended to be the supervisor for a data communications software system and provides the following functions:

1. Controls security through a log-on procedure, checks user security codes and grants access to user files.
2. Approves or denies the opening of all remote files involving stations under control of the SMCS. Once a station(s) is attached to a remote file, the SMCS program does not participate in the input/output message flow between the application program and the station(s).
3. Allows communication from a station to a station, from a station to the Operator Display Terminal (ODT), and from the ODT to a station.
4. Designates stations as workstations which have limited access to MCP commands.

5. Designates stations as remote ODT stations which have access to MCP commands and information about the status of the system.
6. Designates stations as controller stations, which enables certain network reconfiguration commands from that station.
7. Allows a user at a remote station, through the program-pass interface, to request a function of a program in the local system without signing on to the program.
8. Allows expanded network reporting, tailored to individual remote stations that are designated as restricted, or that involves the whole network and the operating system for stations designated as unrestricted.
9. Initiates system tracing, from controller stations or the system ODT, to take advantage of the debugging facilities provided by the B 1000 operating system.
10. Allows the user to create macro procedures that invoke MCP control strings or SMCS program commands without the need to enter lengthy control strings.

SYSTEM/MAKEUSER

This program is a utility program that creates, accesses, or modifies the system usercode file. A list of all valid usercode/password combinations is maintained in this file, which is named (SYSTEM)/USERCODE.

DISPLAY FORMATTING LIMITATIONS

The IBM 3278 and Burroughs TD 830 accomplish screen formatting in different ways. The major difference is in the screen control characters used to define, highlight, or secure a screen field. The IBM 3278 uses one character to specify one or all of these functions; the Burroughs TD 830 type terminals require one control character for each function. In the following situations, the EM3270/BSC program does not highlight or secure a screen field.

1. If an unprotected field is to be highlighted or secured and the last character of the previous field is non-blank, the unprotected field is not highlighted or secured.
2. If a protected field is to be highlighted or secured and the first character of that field is non-blank, the protected field is not highlighted or secured.

The TD 830 type terminals do not fully support the IBM screen wrapping concept; therefore, the last field of a formatted screen ends at the lower-right corner of the screen.

Finally, all data found on the IBM 3278 screen can modify the IBM 3278 device buffer when the ENTER key is pressed. However, when entering data through the TD 830, only data found between the home position and the cursor position can modify the device buffers of the EM3270/BSC program. If the cursor is in the first unprotected position when the screen is transmitted, all unprotected data is sent by the Burroughs terminal.

SECTION 3

EM3270/BSC INSTALLATION

The operating procedures used to install the EM3270/BSC program are described in this section.

PRELIMINARY PROCEDURES

The following steps must be performed before the EM3270/BSC program can be executed. One of the steps is required; the others are optional.

1. Create the (SYSTEM)/USERCODE file (optional).
2. Compile the network controller.
3. Initialize the MCP Program Table (optional).
4. Create the SMCS JOBS file when running with the SMCS (optional).
5. Set the EM3270/BSC program switches (optional).

The preceding steps need to be performed only before the first execution of the EM3270/BSC program.

Creating the (SYSTEM)/USERCODE File

The file security system implemented on the B 1000 system requires that a file labeled (SYSTEM)/USERCODE be in the system disk directory. The (SYSTEM)/USERCODE file contains a list of all valid usercode/password combinations and can be created or updated with the SYSTEM/MAKEUSER program. Refer to the B 1000 Systems System Software Operation Guide, Volume 2, for a detailed description of the (SYSTEM)/USERCODE file and operation of the SYSTEM/MAKEUSER program.

Compiling the Network Controller

Before executing the EM3270/BSC program, the user must generate the desired network controller. The network controller is compiled using the NDL compiler. Refer to the B 1000 Systems Network Controller Installation Manual for more information on generating the network controller.

Network Controller Name

The network controller name is specified by the user.

Terminal Section

The Terminal Section describes each type of remote device connected to the data communications subsystem. For TD 830 type terminals the following is specified:

TERMINAL MT985:	
TRANSMISSION	= 1.
ADDRESS	= 2.
TYPE	= 46.
BUFFERSIZE	= 2250.
REQUEST	= CANDEPOLTD: RECEIVE, CANDESELTD: TRANSMIT.

Station Section

The Station Section defines each remote device in the system. For a TD 830 type terminal the following station declarations are used. The station default, REMOTEODT, defines the station as a Remote ODT station to the SMCS program.

```
STATION DEFAULT REMOTEODT:
  RETRY           = 25.
  FREQUENCY       = 0,250.
  MYUSE           = INPUT,OUTPUT.

STATION SMITH:
  TERMINAL        = MT985.
  DEFAULT         = REMOTEODT.
  ADDRESS         = "S1".

STATION JONES:
  TERMINAL        = MT985.
  DEFAULT         = REMOTEODT.
  ADDRESS         = "S2".
```

Line Section

For TD 830 type terminals the following line declaration is used.

```
LINE TDLINE:
  ADDRESS         = 2:0:0.
  CONTROL         = CANDETDCTL.
  STATION         = SMITH,
                  JONES.
```

File Section

All stations are declared in the SMCS remote file, MCSREMOTE.

```
FILE MCSREMOTE:
  FAMILY         = SMITH,
                  JONES.
```

Example Network Controller

The following example is a network controller symbolic code that generates a network controller for use with the SMCS program and the EM3270/SNA program.

```
TERMINAL MT985:
  TRANSMISSION   = 1.
  ADDRESS        = 2.
  TYPE           = 46.
  BUFFERSIZE     = 2250.
  REQUEST        = CANDEPOLTD: RECEIVE,
                  CANDESELTD: TRANSMIT.
```


STATION DEFAULT REMOTEODT:
RETRY = 25.
FREQUENCY = 0,250.
MYUSE = INPUT,OUTPUT.

STATION SMITH:
TERMINAL = MT985.
DEFAULT = REMOTEODT.
ADDRESS = "S1".

STATION JONES:
TERMINAL = MT985.
DEFAULT = REMOTEODT.
ADDRESS = "S2".

LINE TDLINE:
ADDRESS = 2:0:0.
CONTROL = CANDETDCTL.
STATION = SMITH,
JONES.

FILE MCSREMOTE:
FAMILY = SMITH,
JONES.

Initializing the MCP Name Table

For the network controller program to be automatically executed by the MCP, the name of the network controller program must be given to the MCP. This is done by placing the name of the network controller program into the C slot of the MCP Name Table. To accomplish this, enter the following MCP command:

CM C <network controller program name>

The MCP responds with the following message:

NETWORK CONTROLLER CHANGED FROM "" TO
"<network controller program name>"

To verify that the C slot in the MCP Name Table contains the correct network controller program name, enter the following MCP command:

WW C

The MCP responds with the following message:

C = "<network controller program name>"

Creating the SMCS JOBS File

If the EM3270/BSC program is executed in conjunction with the SMCS program, the EM3270/BSC program can be placed in the SMCS JOBS file for the SMCS program to automatically execute the EM3270/BSC program or to attach multiple stations to the EM3270/BSC program.

The SMCS JOBS file is a file containing information about other programs to be run in conjunction with the SMCS program. If the SMCS JOBS file exists, the SMCS program checks the file at the beginning of job and when a SIGN ON or PASS operation occurs for a program. For a detailed explanation of the SMCS JOBS file and its creation, refer to the B 1000 Systems SMCS Installation, Operation and Functional Description Manual.

The following example shows the entry in the SMCS JOBS file for the EM3270/BSC program.

Example:

```
$ EMBSC          EXCEPT
                  LOG-ON;
EXECUTE EM3270/BSC;
```

PROGRAM SWITCHES

Two program switches are recognized at execution time of the EM3270/BSC program. These program switches have a default value of 0 (reset).

Program Switch 0

If program switch 0 is set, the EM3270/BSC program dispatches I/O descriptors which invoke the special 3270 routines in the multiline control-4 (MLC-4) firmware. Program Switch 0 is valid only for B 1990 systems.

Program Switch 7

If program switch 7 is set, the EM3270/BSC program logs all data communication line activity between the host system and the EM3270/BSC program.

SYSTEM INITIALIZATION

At beginning of job (BOJ), the EM3270/BSC program is initialized with information found in the EM3270 NIF file. The NIF file contains the physical address of the bisync adapter, the control unit number, line configuration name, input blocksize, and a list and description of the stations in the EM3270/BSC system.

If the EM3270 NIF file is not found, the EM3270/BSC program automatically builds the file through an interactive initialization routine. The initialization begins when the EM3270/BSC program detects

the attachment of the first TD 830 type user station. The screen shown in figure 3-1 is then sent to that station:

```

ENTER DATA AND TRANSMIT - OR PRESS 'SPCFY' TO EXIT

> <> <> < PORT(0-7):CHANNEL(0-15):ADAPTER(0-15) ADDRESS
      OF THE BISYNC ADAPTER
      > < CONTROL UNIT NUMBER (0-31)  DEFAULT=1
> < CONFIGURATION NAME (SOFT MLC ONLY)
      > < NUMERIC LOCK OPTION (Y/N) DEFAULT=Y
      > < INPUT BLOCKSIZE (256-2048 BYTES)

FOR EACH DISPLAY STATION, ENTER THE STATION NAME AND INDICATE THE
TYPE.
FOR EACH PRINTER STATION, ENTER ONLY 'P' UNDER TYPE.

      UNDER TYPE ENTER: 'T' FOR TD830s & MT985s, 'M' FOR MT983s,
      'P' FOR PRINTER.

DN   STATION  TYPE      DN   STATION  TYPE      DN   STATION  TYPE
00  >         <> <      01  >         <> <      02  >         <> <
03  >         <> <      04  >         <> <      05  >         <> <
06  >         <> <      07  >         <> <      08  >         <> <
09  >         <> <      10  >         <> <      11  >         <> <
12  >         <> <      13  >         <> <      14  >         <> <
15  >         <> <      16  >         <> <      17  >         <> <
18  >         <> <      19  >         <> <      20  >         <> <
21  >         <> <      22  >         <> <      23  >         <> <
24  >         <> <      25  >         <> <      26  >         <> <
27  >         <> <      28  >         <> <      29  >         <> <
30  >         <> <      31  >         <> <
  
```

Figure 3-1. Initialization Screen Format

The control unit number is the unique line position of the B 1000 system relative to other control units on the bisync line.

DN is the 3270 Device Number corresponding to the network controller station name which is entered in the next column to the right.

If NUMERIC FIELD OPTION is selected, the EM3270/BSC program performs a check on all numeric fields found on a TD 830 type terminal. If this check finds a non-numeric character in a numeric field, an error message is sent back to the terminal; no message is sent to the host.

During the initialization process, the EM3270/BSC program is not available to any other user. Once created, the EM3270 NIF file can be modified by any TD 830 station in the EM3270/BSC system. Refer to the ?INIT command in section 4 for more details.

If the EM3270 NIF file contains bad information which prohibits normal execution of the EM3270/BSC program, such as an erroneous physical address of the BISYNC adapter, the EM3270 NIF file must be removed and the initialization process repeated.

EM3270/BSC FILES

The files used by the EM3270/BSC program are shown in table 3-1.

Table 3-1. EM3270/BSC Files

Internal File Name	External File Name	Description of File
REMOTE3270	REMOTE3270	Remote file used to manage terminal input/output operations.
STA3270__QUEUE	STA3270__QUEUE	Disk file used to store messages bound for host.
IOLOG	DC/AUDIT3270	Disk file used to log I/O activity between the host system and the EM3270/BSC program.
PRINTER<0-31>	PRINTER<0-31>	Backup files used to store messages for printer stations.
FLASHFILE	FLASHFILE	Backup file containing the audit records written by the EM3270/BSC internal audit.
NIF3270	EM3270/NIF	Disk file containing initialization information for the EM3270/BSC program.

SECTION 4

EM3270/BSC OPERATION

PROGRAM EXECUTION

The EM3270/BSC program can be initiated through ODT execution, remote execution or SMCS sign-on.

ODT Execution

ODT execution is performed by entering the following command string from the ODT:

```
EXECUTE EM3270/BSC
```

If this method is selected, the EM3270/BSC remote file, REMOTE3270, must be declared or file-equated to a file in the File Section of the network controller. For example:

```
EXECUTE EM3270/SNA FILE REMOTEPU2 TITLE PAYROLL;
```

Remote Execution

If a TD 830 type station is currently controlled by a general Message Control System (MCS) such as the SMCS, the station can initiate the EM3270/BSC program by entering the following:

```
EXECUTE EM3270/BSC
```

SMCS Sign-On

If a TD 830 type station is currently controlled by the SMCS program and the EM3270/BSC program is included in the SMCS/JOBS file, a station can initiate or be attached to the EM3270/BSC program by entering the following:

```
ON EMBSC
```

ODT COMMANDS

The EM3270/BSC program accepts program input from the system Operator Display Terminal (ODT).

ODT input is performed by entering the ODT command prefixed by the EM3270/BSC mix number and the MCP Accept mnemonic as follows:

```
<EM3270/BSC mix number>AX <ODT command>.
```

The following ODT commands are accepted by the EM3270/BSC program.

ATTACH

The ATTACH command allows any station in the network controller that is also declared in the EM3270 NIF file to be attached to the EM3270/BSC program.

Syntax:

— ATTACH <station name> —|

Semantics:

<station name>

The <station name> is the name of a station in the network controller.

Example:

ATTACH SMITH

DETACH

The DETACH command detaches the specified station from the EM3270/BSC program.

Syntax:

— DETACH <station name> —|

Semantics:

<station name>

The <station name> is the name of a station in the network controller that is attached to the EM3270/BSC program.

Example:

DETACH JONES

DUMP

The DUMP command creates a program dump of the EM3270/BSC program. The program dump can be subsequently analyzed using the ISSA program.

Syntax:

— DUMP —|

Example:

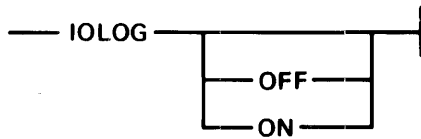
DUMP

IOLOG

The IOLOG command interrogates the status of the EM3270/BSC I/O trace facility and sets or resets the I/O trace facility. When the I/O trace facility is set, messages to and from the EM3270/SNA program are stored in a circular disk file, titled DC/AUDIT3270, for analysis by the DC/AUDIT program. The DC/AUDIT program is described in volume 2 of the B 1000 Systems System Software Operation Guide. The DC/AUDIT program is executed as follows:

EXECUTE DC/AUDIT FILE AUDIT TITLE DC/AUDIT3270;

Syntax:



Semantics:

<no option>

If no option is entered, the current status of the I/O trace facility is displayed.

OFF

The OFF option causes the EM3270/BSC program to stop logging I/O operations between the host system and the EM3270/BSC program and close the DC/AUDIT3270 file.

ON

The ON option causes the EM3270/BSC program to open the DC/AUDIT3270 file and begin logging all I/O operations between the host system and the EM3270/BSC program.

Examples:

IOLOG

IOLOG OFF

IOLOG ON

STOP

The STOP command causes the EM3270/BSC program to terminate.

Syntax:

— STOP —|

Example:

STOP

TERMINAL OPERATION

Unless a station is attached by means of the ODT ATTACH command, the station is not detected by the EM3270/BSC program until a message is received from that station. Once a station is attached to the EM3270/BSC program, all messages entered from a TD 830 type station that begin with the question mark (?) character are directed to the EM3270/BSC program. All other messages are sent to the host system.

For example, if a TD 830 type station sends the message ?HELP, the EM3270/BSC program returns a list of acceptable station commands. This message is not sent to the host system.

If the question mark (?) character is preceded by anything, including blank characters, the EM3270/BSC program does not recognize the message as a TD 830 station command message and transmits the message to the host system.

The following station commands are accepted by the EM3270/BSC program from TD 830 type stations.

?BYE

The ?BYE command causes the originating station to be detached from the EM3270/BSC program.

Syntax:

— ?BYE —|

Example:

?BYE

?DUMP

The ?DUMP command causes a program dump to be taken. The program dump can be subsequently analyzed using the ISSA program.

Syntax:

— ?DUMP —|

Example:

?DUMP

?HELP

The ?HELP command displays a list of the EM3270/BSC station commands. The ?HELP command performs the same function as the ?TEACH command.

Syntax:

— ?HELP —|

Example:

?HELP

?INIT

The ?INIT command causes the EM3270/BSC program to begin the interactive initialization routine. The ?INIT command is only processed if there are no other stations currently attached to the EM3270/BSC program.

Syntax:

— ?INIT —|

Example:

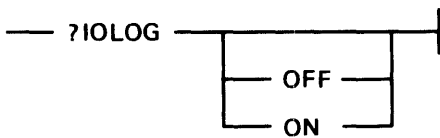
?INIT

?IOLOG

The ?IOLOG command interrogates the status of the EM3270/BSC I/O trace facility and sets or resets the I/O trace facility. When the I/O trace facility is set, messages to and from the EM3270/SNA program are stored in a circular disk file, titled DC/AUDIT3270, for analysis by the DC/AUDIT program. The DC/AUDIT program is described in volume 2 of the B 1000 Systems System Software Operation Guide. The DC/AUDIT program is executed as follows:

EXECUTE DC/AUDIT FILE AUDIT TITLE DC/AUDIT3270;

Syntax:



Semantics:

<no option>

If no option is entered, the current status of the I/O trace facility is displayed.

OFF

The OFF option causes the EM3270/BSC program to stop logging I/O operations between the host system and the EM3270/BSC program and close the DC/AUDIT3270 file.

ON

The ON option causes the EM3270/BSC program to open the DC/AUDIT3270 file and begin logging all I/O operations between the host system and the EM3270/BSC program.

Examples:

?IOLOG

?IOLOG OFF

?IOLOG ON

?REFRESH

The ?REFRESH command causes the last station buffer known by the host system to be displayed at the station.

Syntax:

— ?REFRESH —|

Example:

?REFRESH

?RESET

The ?RESET command logically resets a TD 830 type terminal. The ?RESET command is the functional equivalent of the IBM 3278 terminal reset key.

Syntax:

— ?RESET —|

Example:

?RESET

?STATUS

The ?STATUS command causes current station information to be displayed. The current status information includes the network controller Logical Station Number (LSN), the device address of the station for the remote system, whether the station is available (ready) to the remote system, the number of messages queued for the remote system, and the current line status.

Syntax:

— ?STATUS —|

Example:

?STATUS

?TEACH

The ?TEACH command displays a list of the EM3270/BSC station commands. The ?TEACH command performs the same function as the ?HELP command.

Syntax:

— ?TEACH —

Example:

?TEACH

IBM 3278 TERMINAL CONTROL KEYS

A simulation of Program Access (PA) keys 1-3, Program Function (PF) keys 1-24, the CLEAR key, and the SYS REQ key, as these keys are implemented on the IBM 3278 terminal, is provided by the EM3270/BSC program as follows.

PA KEYS

Simulation of a 3278 PA key is achieved by depressing the CTRL key, the zero key, <PA key number>, and the XMT key.

NOTE

The attention key is the PA key 1.

CLEAR KEY

Simulation of the 3278 CLEAR key is achieved by depressing the CTRL key, the zero key twice, and the XMT key.

SYS REQ KEY

Simulation of the 3278 SYS REQ key is achieved by depressing the CTRL key, the zero key, the four key, and the XMT key.

PF KEYS

Simulation of a 3278 PF key is achieved in two steps. The PF key simulation routine is initiated by depressing the SPCFY key. The EM3270/BSC program responds with the message PF KEY MODE ENTERED on the status line of the terminal. The CTRL, <PF key number>, and XMT keys are then depressed.

NOTE

The PF key number must be two digits in length. For example, the PF 1 key is simulated by depressing the SPCFY key, the CTRL key, the zero key, the one key, and the XMT key.

SECTION 5 FUNCTIONAL DESCRIPTION

BINARY SYNCHRONOUS LINE DISCIPLINE

Information on the 3270 multipoint binary synchronous (bisync) mode of operation is discussed in chapter 6 of the IBM 3270 Information Display System Component Description.

SPECIAL DATA COMMUNICATIONS CONSIDERATIONS

In the 3270 bisync mode, the host system generates two message poll sequences and two message select sequences. The following illustrates a 3270 poll and select sequence.

```
EM3270/BSC ← SYNs EOT PAD ← SYNs CPA CPA DA DA ENQ  
EM3270/BSC ← SYNs EOT PAD ← SYNs CSA CSA DA DA ENQ
```

The first sequence is a 3270 poll sequence and CPA is the control unit poll address. The second sequence is a 3270 select sequence and CSA is the control unit select address.

To avoid software intervention when receiving the first half of the poll or select sequence, a read operation with both the "poll bit" and the "terminate link on non-negative response bit" set is dispatched to the data communications device. This I/O descriptor is linked to itself. When the first half of the poll or select message is detected, the I/O descriptor links to itself and restarts the read operation. When the second half of the poll or select sequence is detected, the read operation is terminated and an exception condition of "linking terminated" is reported to the software.

Firmware routines in the multiline control-4 (MLC-4) have been implemented to handle the 3270 poll and select sequences. The B 1965/B 1995 Multiline Control-4 Manual provides a complete discussion on how to load the MLC-4 with firmware and configuration. While loading the configuration into a MLC-4 Quad adapter, the EM3270/BSC program must load configuration word 23 (@17@) with the control unit poll address and configuration word 24 (@18@) with the control unit select address. A configuration word consists of three bytes. The most significant byte contains the configuration word number. The remaining two bytes contain the appropriate control unit address.

For example:

```
Control Unit Poll Address = B  
Control Unit Select Address = S  
  
Poll Configuration Word = @17C2C2@  
Select Configuration Word = @18E2E2@
```

Two EM3270/BSC program data structures are accessed directly by these Quad adapter firmware routines. These data structures are as follows:

```
POLL__MAP BIT(256),  
SELECT__MAP BIT(256).
```

NOTE

It is vital that SELECT__MAP be declared just after POLL__MAP.

If an EM3270/BSC program station has queued a message for the host, the EM3270/BSC program uses the IBM device address of the station to index into POLL_MAP and sets the corresponding bit.

NOTE

If any messages are queued for the host, the @7F@ bit of POLL_MAP must also be set. (@7F@ is the general poll address).

If an EM3270/BSC program station is able to accept a message from the host, the EM3270/BSC program uses the IBM device address of the station to index into SELECT_MAP and sets the corresponding bit.

To invoke the 3270 MLC-4 routines, an accept operation is dispatched to the Quad adapter. The operation code field of the accept operation is shown below.

0001 0001 0000 0000 0000 UUUU

The C-Field of the I/O descriptor must always contain the absolute memory address of POLL_MAP.

When the accept operation receives the second half of a poll or select sequence, the Quad firmware compares the control unit address with the poll address found in configuration word 23 (@17@). If the addresses match, the Quad adapter adds the device address to the value in the C-Field and reads the bit found at this location in main memory. If this bit is a 1, the accept operation completes with a result of "linking terminated." If this bit is zero, the Quad sends the host an EOT character and continues the accept operation.

If the control unit address does not match the poll address, the Quad adapter compares the control unit address with the select address found in configuration word 24 (@18@). If these addresses match, the Quad adapter adds the device address to 256 plus (the value in the C-Field) and reads the bit found at this location in main memory. If this bit is a 1, the accept operation completes with a result of "linking terminated." If this bit is zero, the accept operation is restarted.

SCREEN TRANSLATION

Information on the 3270 data message and a discussion of all the 3270 commands and orders are contained in chapter 3 of the IBM 3270 Information Display System Component Description Manual.

The EM3270/BSC program translates terminal bound messages from the 3270 format to the Burroughs terminal format and host bound messages from the Burroughs terminal format to the 3270 format. In order to accomplish these translations, the EM3270/BSC program maintains the following data structure for each terminal device.

RECORD SCREEN_RECORD

FIELD (250)	SCREEN_FIELD_RECORD,
SCREEN_BUFFER	CHARACTER(1920),
SCREEN_POSITIONS	BIT(1920),
CBA	FIXED, % CURRENT BUFFER ADDRESS
LAST_POS_TOUCHED	FIXED,
FIELD_NUMBER	FIXED, %NUMBER OF FIELDS CURRENTLY DEFINED
WCC	WRITE_CONTROL_CHARACTER,
PATCH_NEEDED	BIT(1);

In this implementation, a formatted screen may contain a maximum of 250 fields. The FIELD array is of type SCREEN_FIELD_RECORD. This data structure maintains a detailed description of each field of a formatted screen.

```
RECORD SCREEN_FIELD_RECORD
  PRESENT          BIT(1),
  POS              FIXED,
  ATT_CHAR         ATTRIBUTE_CHARACTER,
  FIELD_LENGTH     FIXED;
```

The PRESENT bit is set if the attribute character of the field is defined in the formatted screen. The PRESENT bit is reset if the field is not defined or if the attribute character of the field is overwritten. The POS field is the position of the attribute character of the field. This field may contain values 0 through 1919; (the value 0 refers to the upper-left corner of the screen and the value 1919 refers to the lower-right corner of the screen). The ATT_CHAR contains a description of the field. The ATT_CHAR structure is shown below.

```
RECORD ATTRIBUTE_CHARACTER
  FILLER           BIT(2),
  PROTECTED        BIT(1),
  NUMERIC          BIT(1),
  DISPLAY_TYPE     BIT(2),
  FILLER           BIT(1),
  MDT              BIT(1);
```

The host sends an attribute character for each field of a formatted screen. The attribute character follows the SF character (Start Field, @1D@) in data messages sent by the host. This attribute character is stored directly into the ATT_CHAR field. On an actual 3270 display terminal, the attribute character is stored in the screen buffer of the device. The screen position where the attribute character is stored marks the beginning of the newly defined field. This screen position does not contain a printable character if the field is defined. The EM3270/BSC program uses this screen position to insert forms delimiters when needed.

The host may decide to send the field declarations out of positional order; in this case, the fields are sorted by the EM3270/BSC program. After the fields are in order, the FIELD_LENGTH can be calculated. The FIELD_LENGTH field is defined as the screen space between the attribute character of the current field and the attribute character of the next field. The FIELD_LENGTH field of the last declared field is the screen space between its attribute character and the lower-right corner of the screen.

The SCREEN_BUFFER field contains an image of the terminal screen as known by the host system. Station Commands do not update the SCREEN_BUFFER. The SCREEN_POSITIONS array is a bit map of the screen. When a field is defined, the position of the attribute character of the field is used as an index into the SCREEN_POSITIONS array and that bit is set. This array provides an effective and efficient method of determining if the attribute character of a field has been overwritten. Once the attribute character of a field has been overwritten, the field is no longer defined.

The CBA field contains the current buffer address of the screen. The CBA field is incremented by every display character and attribute character received from the host. The host can also change the

value of CBA through the Set Buffer Address order. The LAST_POS_TOUCHED field contains the last SCREEN_BUFFER position updated by the host. Terminal stations are updated with data contained between position 0 and the value in the LAST_POS_TOUCHED field of SCREEN_BUFFER. The contents of the FIELD_NUMBER field is the number of currently defined fields of a formatted screen. If the screen is unformatted, the FIELD_NUMBER field contains 0. The WCC field is the last Write Control Character or last Copy Control Character received by this station. The format of the WCC field is shown below.

RECORD WRITE_CONTROL_CHARACTER	
FILLER	BIT(2),
PRINT_FORMAT	BIT(2),
START_PRINTER	BIT(1),
ALARM	BIT(1),
RESTORE	BIT(1),
RESET_ALL_MDT	BIT(1);

Write control characters are contained in terminal bound messages which contain write commands. The write control character is located just after the write command character. The bit format of the WCC field is identical to the write control character sent by the host.

The PATCH_NEEDED field is set if the host defined a field which is not in positional order or if the host overwrote a previously defined field. Once a write message has been translated and the PATCH_NEEDED bit set, the EM3270/BSC program recalculates the value of FIELD_LENGTH for all the defined fields.

APPENDIX A

GLOSSARY OF TERMS

application program A program that processes data and is usually unique to one type of application.

Automatic Calling Unit (ACU) A device that can be furnished by a communications carrier that allows a business machine to automatically establish a dialed link over the communications network.

binary synchronous (bisync) A method of data transmission which allows sending or receiving of data streams. The data streams can contain bit patterns which would normally be detected as control character sequences. Therefore, data streams containing object program code can be transmitted. The transmission is always synchronous.

bisync An abbreviation for binary synchronous.

bit A bit is the smallest unit of information in a binary system.

buffer A buffer is a temporary storage area that is used during the transfer of data from one device to another. It is also used to compensate for the variations in data flow rates or timing of events within a system.

character A set of elements arranged in orderly groups to represent digits, symbols, or letters. Represented in two language forms: 1) for use by computers, business machines, communications facilities, and so forth, usually in groups of binary bits; and 2) for use by people in conveying an understandable form of decimal digits, alphabetic characters, punctuation, or other special symbols. Characters are represented by using groups of bits. These groups are commonly five, six, seven, or eight bits in size.

control character, data communications A functional character intended to control or facilitate transmission of information over communication networks.

data communications The transfer of encoded information by means of electrical transmission systems.

data set A circuit termination device used to provide an interface between a data communications circuit and a data terminal. A modulation and demodulation function or both is typically performed by a data set.

dial-up The use of a dial or pushbutton telephone to establish a station-to-station telephone contact.

file equate The equating of an internal file name to a specific external file name.

format The predetermined arrangement of characters, fields, lines, page numbers, punctuation marks, and so forth, used to transfer data from one location to another. This refers to input, output, and files.

glass TTY A term used to describe a display terminal with a glass screen which operates like a hardcopy TTY terminal.

header A sequence of characters that can precede the text of a message to provide the information necessary to route the message to any number of ultimate destinations. A message header can also contain communications relating information other than routine instructions.

headers An option on a remote file which allows system control functions and provides a 50-byte header on all data messages moving through that remote file.

identification A process using a sequence of characters to identify a station. It is normally used during the establishment of a connection. Also, for a variety of reasons, identification is sometimes necessary after the connection is established.

I/O A mnemonic abbreviation for input/output.

leased line A dedicated line that exists for the specific purpose of connecting two or more peripheral devices.

line adapter A line adapter consists of a logic card used to interface a data set or communications line into a multiline or single-line I/O control.

MCS A mnemonic abbreviation for Message Control System.

message A sequence of characters arranged in a form suitable for the purpose of conveying information from an originator to one or more destinations or addresses. It contains the information to be conveyed (called the text) and can, in addition, contain communication information to aid in the routing or handling of the message (called the header).

Message Control System (MCS) Any program which opens a remote file with the headers option and thereby controls the stations in that remote file.

message format Rules for the placement of such portions of a message as message header, address, text, and end of message.

modem Same as data set.

multiline control (MLC) The multiline control is an I/O control that provides the functional control between the computer system and the line adapters. This is an integral part of a multiline data communications subsystem.

NDL A mnemonic abbreviation for Network Definition Language.

network The ensemble of equipment through which connections are made between terminal installations. This equipment operates in real time and does not introduce, store, or forward delays. A switched telephone network is the network of telephone lines normally used for dialed telephone calls. A private network is a network of communication channels reserved for the use of one customer.

network controller The program generated through compilation of a network controller symbolic code. The network controller handles the line discipline for the data communications devices of a system and for the interface queue between an MCS and the operating system.

Network Definition Language (NDL) A descriptive, free-form language for defining and implementing a data communications network. The NDL compiler analyzes the input statements and generates a custom network controller.

ODT A mnemonic abbreviation for Operator Display Terminal.

remote file A file declared in a program which, in conjunction with the network controller, provides input, output, or I/O with a set of data communication devices.

single-line control (SLC) The single-line control is an I/O control that provides the functional control between a computer system and a line adapter. The SLC is an integral part of a single-line data communications subsystem.

station An input/output device designed to both receive and send source data in an environment associated with the job to be performed. Also, it is capable of sending entries to, and obtaining output from, the system of which it is a part.

switched line A non-dedicated line connecting two or more peripheral devices.

synchronous transmission A transmission process in which there is always an integral number of unit intervals between any two significant instants.

APPENDIX B

SYNTAX AND NOTATION CONVENTIONS

Railroad diagrams show how syntactically valid statements can be constructed. Traversing a railroad diagram from left to right, or in the direction of the arrowheads, and adhering to the limits illustrated by bridges produces a syntactically valid statement. Continuation from one line of the diagram to another is represented by a right arrow (→) appearing at the end of the current line and the beginning of the next line. The complete syntax diagram is terminated by the vertical bar (|).

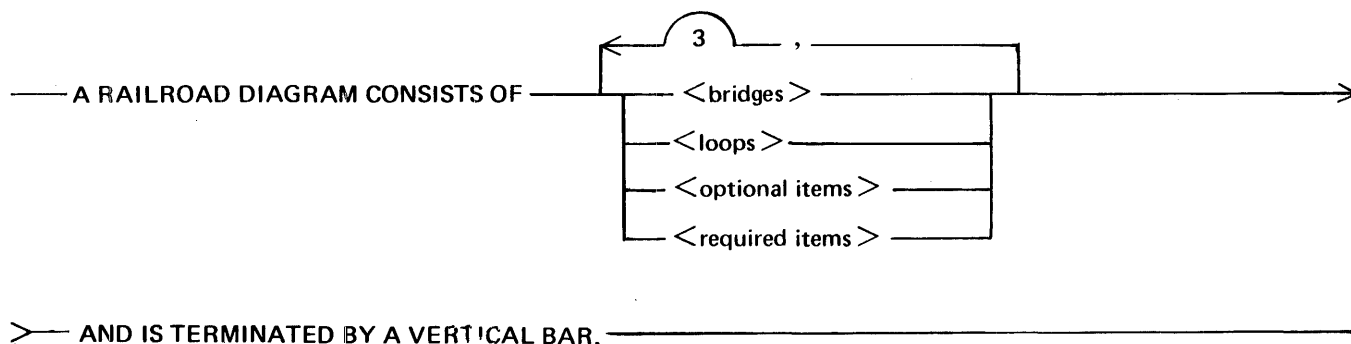
SYNTACTIC VARIABLES

Items contained in broken brackets (< >) are syntactic variables that must be further defined or for which the user is required to supply the information requested.

KEYWORDS

Upper-case items are keywords and must appear literally. The minimum abbreviation for a keyword is underlined.

Example:



G50051

The following syntactically valid statements can be constructed from the above diagram:

A RAILROAD DIAGRAM CONSISTS OF <bridges> AND IS TERMINATED BY A VERTICAL BAR.

A RAILROAD DIAGRAM CONSISTS OF <optional items> AND IS TERMINATED BY A VERTICAL BAR.

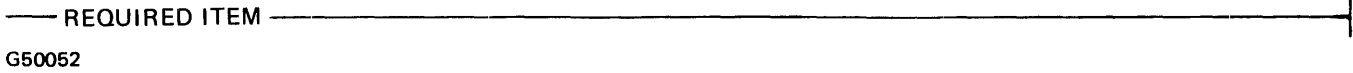
A RAILROAD DIAGRAM CONSISTS OF <bridges>, <loops> AND IS TERMINATED BY A VERTICAL BAR.

A RAILROAD DIAGRAM CONSISTS OF <optional items>, <required items>, <bridges>, <loops> AND IS TERMINATED BY A VERTICAL BAR.

REQUIRED ITEMS

No alternate path through the railroad diagram exists for required items or required punctuation.

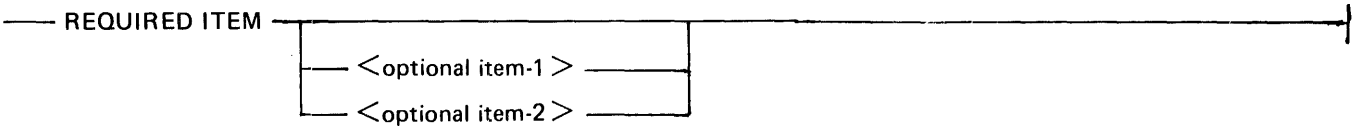
Example:



OPTIONAL ITEMS

A vertical list of items indicates that the user must make a choice of the items specified. An empty path through the list allows the optional item to be absent.

Example:



G50053

The following valid statements can be constructed from the above diagram:

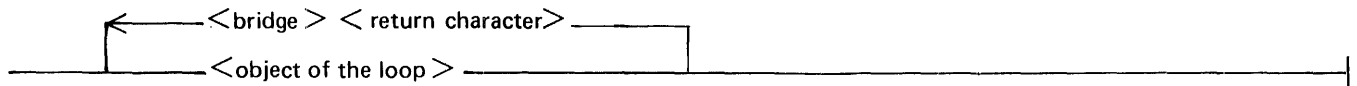
REQUIRED ITEM

REQUIRED ITEM <optional item-1>

REQUIRED ITEM <optional item-2>

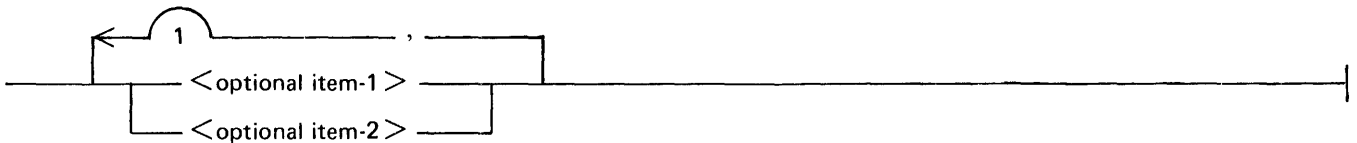
LOOPS

A loop is a recurrent path through a railroad diagram and has the following general format.



G50054

Example:



G50055

The following statements can be constructed from the railroad diagram in the example.

- <optional item-1>
- <optional item-2>
- <optional item-1>,<optional item-1>
- <optional item-1>,<optional item-2>
- <optional item-2>,<optional item-1>
- <optional item-2>,<optional item-2>

A loop must be traversed in the direction of the arrowheads, and the limits specified by bridges cannot be exceeded.

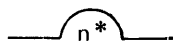
BRIDGES

A bridge illustrates the minimum or maximum number of times a path can be traversed in a railroad diagram.

There are two forms of <bridges>.

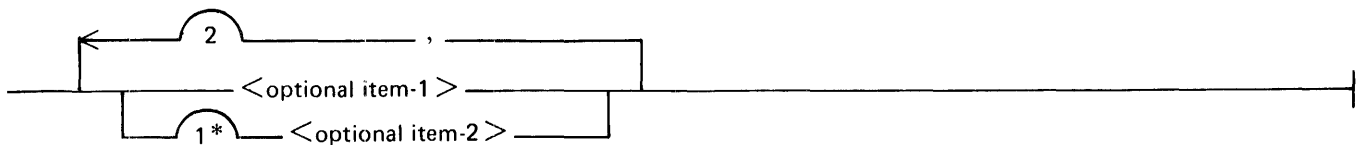


n is an integer which specifies the maximum number of times the path can be traversed.



n is an integer which specifies the minimum number of times the path must be traversed.

Example:



G50057

The loop can be traversed a maximum of two times; however, the path for <optional item-2> must be traversed at least one time.

The following statements can be constructed from the railroad diagram in the example.

- <optional item-1>,<optional item-2>
- <optional item-2>,<optional item-2>,<optional item-1>
- <optional item-2>

HEXADECIMAL CHARACTER NOTATION

Characters contained between "at signs" (@) represent hexadecimal characters. Each character consists of four bits and can have a value of 0 through 9 or A through F.

Example:

@F3@ is the hexadecimal representation of the EBCDIC character 3.

INDEX

?BYE command 4-7
?DUMP command 4-8
?HELP command 4-9, 4-16
?INIT command 3-6, 4-11
?IOLOG command 4-12
?REFRESH command 4-13
?RESET command 4-14
?STATUS command 4-15
?TEACH command 4-10, 4-16
ATTACH command 4-2
CLEAR key 4-17
DETACH command 4-3
DUMP command 4-4
Hardware requirements 2-2
IBM 3278 Terminal Control Keys 4-17
IOLOG command 4-5
Master Control Program 2-3
MCP 2-3
MCP name table 3-3
Memory requirement 2-2
MT 983 terminal 2-1, 2-2
MT 985 terminal 2-1, 2-2
network controller 2-3
NIF file 3-4, 3-6
ODT Execution 4-1
Operating System (MCP) 2-3
PA keys 4-17
PF keys 4-17
Program Access (PA) keys 4-17
Program Function (PF) keys 4-17
Remote Execution 4-1
SMCS 2-3, 2-4, 3-3
SMCS JOBS file 3-1, 3-3
SMCS Sign-On 4-1
Software requirements 2-3
STOP command 4-6
Supervisory Message Control System (SMCS) 2-3
SYS REQ key 4-17
System initialization 3-4
SYSTEM/MAKEUSER 2-4
TD 830 terminal 2-1, 2-2, 2-4

Documentation Evaluation Form

Title: B 1000 Systems EM3270/BSC
Installation, Operation and Functional Description Manual

Form No: 1152337
Date: February 1984

Burroughs Corporation is interested in receiving your comments and suggestions, regarding this manual. Comments will be utilized in ensuing revisions to improve this manual.

Please check type of Suggestion:

- Addition Deletion Revision Error

Comments:

From:

Name _____

Title _____

Company _____

Address _____

Phone Number _____ Date _____

Remove form and mail to:

Burroughs Corporation
Corporate Documentation – West
1300 John Reed Court
City of Industry, CA 91745
U.S.A.