

*Installation,
Operation, and
Functional Description
Manual*

MONITOR

(Relative to Mark 12.0 Release)

Burroughs

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Operation, and
Functional Description
Manual*

**B 1000 Systems
MONITOR**

*(Relative to Mark 12.0 Release)
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SECTION 1 INTRODUCTION

GENERAL

This manual describes the software/hardware requirements, operating procedures, and implementation of the B 1000 Systems MONITOR program. Throughout this manual, this program shall be referred to as the MONITOR program.

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: MONITOR Program Overview

Describes the features and capabilities of the MONITOR program for data processing managers.

Section 3: MONITOR Program Installation

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

Section 4: MONITOR Program Operation

Describes the MONITOR program operating instructions and the MONITOR program commands. This section is intended for the users of the MONITOR program.

Section 5: MONITOR Program Functional Description

Describes the MONITOR programs functions and screen displays. This section is intended for the users of the MONITOR program.

Appendix A: Syntax and Notation Conventions

Describes the syntax and notation conventions used in this manual.

RELATED DOCUMENTS

The following documents are referenced in this manual:

B 1000 Systems System Software Operation Guide, Volume 1, form number 1169000.

B 1000 Systems System Software Operation Guide, Volume 2, form number 1169091.

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 1168937.

B 1000 Systems SMCS Installation, Operation and Functional Description Manual, form number 5016488.

SECTION 2

MONITOR PROGRAM OVERVIEW

CAPABILITIES

The MONITOR program provides a comprehensive capability for monitoring performance of the B 1000 product line. This low-overhead, performance monitor provides an accurate analysis of the systems utilization of Disk, Memory, and Processor. It also provides an in-depth analysis of task activity. This information is presented to the user by way of meaningful, easy to read displays on a remote terminal.

Disk Utilization Monitoring

A graph displays the number of input/output operations per second, the number of bytes transferred per second, and the percentage of busy time. This information is available for the entire disk subsystem and also for each disk channel and each disk unit.

Memory Utilization Monitoring

Two graphs show memory utilization. The first graph divides memory into three major classes. The second graph divides memory into seven component usage categories. The total number of code and data overlays are also displayed for each interval of time.

Processor Utilization Monitoring

Two pairs of graphs offer the user several different views of processor utilization. Analysis is available for the total system processor usage and for user processor usage.

Task Activity

This MONITOR program function consists of three displays. The first display monitors all tasks running on the system or some user defined subset of those tasks. The second and third displays select individual tasks for a more detailed analysis of processor usage, file activity, and program attributes.

Ease of Use

The MONITOR program interfaces with any terminal that is compatible with the TD 830 terminal and also utilizes the advanced features of the ET 1000/2000 family of terminals. Through the use of the MENU display and complete online HELP facilities, the user can easily direct the desired combination of displays to any combination of terminal pages.

Efficient Operation

The MONITOR program is extensively supported by the B 1000 Master Control Program. This integration results in lower overhead for the MONITOR program, since the Master Control Program handles almost all aspects of the data collection phase.

SECTION 3

MONITOR PROGRAM INSTALLATION

The operating procedures used to install the MONITOR program are described in this section.

SYSTEM REQUIREMENTS

Central Processor:	B 1000 Systems with Cache Memory
Primary Storage:	28KB memory (excluding Master Control Program requirements)
Peripherals:	Remote terminal Disk subsystem

SOFTWARE REQUIREMENTS

The following software elements are required to execute the MONITOR program:

Operating System: Master Control Program II (MCP II)

Network Controller

The following software elements are optional:

Supervisory Message Control System (SMCS)

SYSTEM/MAKEUSER Program

Operating System

The Master Control Program (MCP) is an operating system that manages the demands and resources of a B 1000 system. It reduces 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 with a minimum of external intervention. Maximum system 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 the servicing of exception conditions. The network controller is defined by specifying the network attributes in NDL source code. These attributes include the physical devices in the network, the line disciplines to be used, the order and priority of line use and the grouping of stations into files.

Supervisory Message Control System (SMCS)

The SMCS program offers the functions 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:

- Approves or denies the opening of all remote files involving stations under control of the SMCS. After one or more stations are 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).
- Allows communication from a station to a station, from a station to the Operator Display Terminal (ODT), and from the ODT to a station.
- Designates stations that have limited access to MCP commands as workstations.
- Designates stations that have access to MCP commands and information about the status of the system as remote ODT stations.
- Designates stations as controller stations, enabling certain network reconfiguration commands from those stations.
- Allows expanded network reporting, either tailored to individual remote stations that are designated as restricted, or involving the whole network and the operating system for stations designated as unrestricted.
- Initiates system tracing, from controller stations or the system ODT, to take advantage of the debugging facilities provided by the B 1000 operating system.
- 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

The SYSTEM/MAKEUSER 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.

PRELIMINARY PROCEDURES

The following steps must be performed before the MONITOR program can be executed. Step 2 is required; the other steps are optional.

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

The preceding steps need to be performed only once before the first execution of the MONITOR 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 MONITOR 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 must be 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 must be 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".
```

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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

In the following example, the network controller symbolic code generates a network controller for use with the SMCS program and the MONITOR program.

Example:

```
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 MONITOR program is executed in conjunction with the SMCS program, the MONITOR program must be placed in the SMCS JOBS file in order for the SMCS program to automatically execute the MONITOR 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 MONITOR program.

Example:

```
$ MONITOR    EXCEPT  
              LOG-ON;  
EXECUTE MONITOR;
```

MONITOR PROGRAM FILES

The names of the files used by the MONITOR program are shown in table 3-1.

Table 3-1. MONITOR Program Files

Internal File Name	External File Name	Description of File
DEFAULT	MONITOR/DEFAULT	A disk file that contains the users' default menu selections.
TEACHFILE	MONITOR/ TEACHFILE	A disk file that contains the Teach Text used by the MONITOR program.
RMT	RMT	Remote file used to manage terminal input/output operations.

MONITOR PROGRAM SWITCHES

The MONITOR program uses program switches 0 and 1. Reset (0) is the default. The switch options are described in table 3-2.

Table 3-2. MONITOR Program Switches

Switch	Value	Function
0	0	The MENU display is presented. Operational parameters are entered by the user.
0	1	If the MONITOR/DEFAULT file is present, the operational parameters are loaded and used. If the MONITOR/DEFAULT file is not present, and the terminal has 10 pages, standard default terminal pages are used. If the terminal has two pages, the MENU display with no defaults is presented.
1	0	All the MONITOR program displays use upper and lower case letters.
1	1	All the MONITOR program displays use upper case letters only.

SECTION 4

MONITOR PROGRAM OPERATION

PROGRAM EXECUTION

The MONITOR program can be initiated either by an Execute command or by signing on to it by way of the SMCS program. The MONITOR program must be run with the program attribute FREEZE selected. For best operation, it should be run with a priority of 14 or 15.

NOTE

The MONITOR program's Remote File must be the primary Remote File for the station using the MONITOR program. The MONITOR program cannot be accessed using the PASS mechanism.

If a terminal goes into local mode while the MONITOR program is attached to it, only one message is queued for the terminal. The MONITOR program continues to gather statistics, but it does not queue any more messages.

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 MONITOR program by entering the following:

```
EXECUTE MONITOR
```

SMCS Sign-On

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

```
ON MONITOR
```

USER INTERFACE

The MONITOR program provides the user with three methods for supplying execution parameters:

1. Default Parameters
2. A Menu Display
3. Direct Command Syntax

DEFAULT PARAMETERS

The use of the default parameters from a disk file is controlled by the setting of program switch 0. If program switch 0 is equal to 0 at beginning of job, the MENU display is presented and operational parameters are entered by the user.

If program switch 0 is equal to 1 at beginning of job, the MONITOR program checks for the presence of a parameter file titled MONITOR/DEFAULT on the System disk. On finding this file present, the MONITOR program reads the operational parameters and uses them for the current monitoring session. If the parameter file is not present, and the terminal has less than 10 pages, the MONITOR pro-

gram presents the MENU display and waits for the operational parameters to be supplied by the user. On ET type terminals that have 10 terminal pages, the terminal page numbers shown in table 4-1 are used by the MONITOR program if the MONITOR/DEFAULT file is not present.

Table 4-1. MONITOR Program Default Terminal Page Numbers

Page Number	Function Displayed
3	Memory Utilization
4	Total Processor Utilization
5	User Processor Utilization
6	Disk Utilization (1)
7	Mix Activity

MENU DISPLAY

The MENU parameters direct the operation of the MONITOR program. In addition to provisions for changing the operating parameters, the MENU display provides access to the MONITOR program HELP and EOJ functions. The MENU display also allows the user to create or change the MONITOR/DEFAULT file.

An example of the MENU display is shown in figure 4-1. The numbers shown under Page Number are the default terminal page numbers used by the MONITOR program.

```

XMT [ ]           Burroughs B1000 Systems MONITOR

                        Page Number

Memory Utilization      [3 ]
Total Processor Utilization [4 ]
User Processor Utilization [5 ]
Channel 9 DSC Statistics [ ]
Channel 10 DSC Statistics [ ]
Job Statistics (Since BOJ) [ ]
Job Statistics (Last Interval) [ ]
                        For Job Number [ ]
                        For Job Number [ ]

Disk Utilization (1)    [6 ]
Disk Utilization (2)    [ ]
                        Channel #      Channel #      All
                        [ ]            [ ]            [X]

Mix Activity            [7 ]
                        All            Invisible    Visible
                        [X]           [ ]          [ ]
                        Session #      (Usercode)   Job #
                        [ ]           [ ]          [ ]

Sampling Interval [ ]   Create Default [ ]   Help [ ]   EOJ [ ]
(10 to 830 Seconds)

                        All            Invisible    Visible
  
```

Figure 4-1. MENU Display

MENU Details

Entering a 0 or a blank in any Page Number field turns off the monitoring of the corresponding function. Entering a valid page number in any Page Number field turns on the monitoring of the corresponding function.

A description of valid responses for all fields in the MENU display follows.

XMT

The XMT field is the cursor location at which the cursor must be placed to guarantee that all screen data will be transmitted. This is the HOME cursor position for the MENU display.

Memory Utilization

A valid page number in the Memory Utilization field causes the total memory utilization to be monitored and displayed on the specified page number. A page number of 0 or blank inhibits the display.

Total Processor Utilization

A valid page number in the Total Processor Utilization field causes the total system processor utilization to be monitored and displayed on the specified page number. A page number of 0 or blank inhibits the display.

User Processor Utilization

A valid page number in the User Processor Utilization field causes the total user processor utilization to be monitored and displayed on the specified page number. A page number of 0 or blank inhibits the display.

Channel 9 DSC Statistics

A valid page number in the Channel 9 DSC Statistics field causes the Disk Subsystem Controller (DSC) statistics for channel 9 to be monitored and displayed on the specified page number. A page number of 0 or blank inhibits the display. This selection is only valid for B 1990 systems with DSC-3 firmware installed.

NOTE

If the DSC data collection function is not active, this MENU selection starts the function. Once started, the data collection continues until the next clear/start.

Channel 10 DSC Statistics

A valid page number in the Channel 10 DSC Statistics field causes the Disk Subsystem Controller (DSC) statistics for channel 10 to be monitored and displayed on the specified page number. A page number of 0 or blank inhibits the display. This selection is only valid for B 1990 systems with DSC-3 firmware installed.

NOTE

If the DSC data collection function is not active, this MENU selection starts the function. Once started, the data collection continues until the next clear/start.

Job Statistics (Since BOJ)

A valid page number in the Job Statistics (Since BOJ) field, in conjunction with a valid job number in the For Job Number field, causes job statistics since BOJ for the specified job number to be monitored and displayed. A page number of 0 or blank or a job number of 0 or blank inhibits the display.

Job Statistics (Last Interval)

A valid page number in the Job Statistics (Last Interval) field, in conjunction with a valid job number in the For Job Number field, causes job statistics last interval for the specified job number to be monitored and displayed. A page number of 0 or blank or a job number of 0 or blank inhibits the display.

Disk Utilization (1)

A valid page number in the Disk Utilization (1) field causes the specified disk channel usage to be monitored and displayed on the specified page number. If Channel # is omitted, the default of All channels is assumed. Systems with multiple disk channels can be displayed on the same page (up to two channels per page) or on two separate pages for a maximum of four channels. A page number of 0 or blank inhibits the display.

Disk Utilization (2)

A valid page number in the Disk Utilization (2) field causes the specified disk channel usage to be monitored and displayed on the specified page number. If Channel # is omitted, the default of All channels is assumed. Systems with multiple disk channels can be displayed on the same page (up to two channels per page) or on two separate pages for a maximum of four channels. A page number of 0 or blank inhibits the display.

Mix Activity

A valid page number in the Mix Activity field, in conjunction with one of the following options, causes the mix activity to be monitored and displayed as specified. A valid page number, with no supporting options, selects the All option as the default. A page number of 0 or blank inhibits the display.

All

The letter X in the Mix Activity [All] field causes the activity of all running jobs to be monitored and displayed.

Visible

The letter X in the Mix Activity [Visible] field causes the activity of those jobs that do not have the INVISIBLE program attribute set to be monitored and displayed.

Invisible

The letter X in the Mix Activity [Invisible] field causes the activity of those jobs that have the INVISIBLE program attribute set to be monitored and displayed.

Session #

A valid Session number in the Mix Activity [Session #] field causes the activity of the job with the specified session number to be monitored and displayed. This display also includes the activity of spawned jobs and tasks associated with the specified session number.

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(Usercode)

A valid usercode in the Mix Activity [(Usercode)] field causes only those jobs with the specified usercode to be monitored and displayed.

Job #

A valid Job number in the Mix Activity [Job #] field causes the activity of the job with the specified job number to be monitored and displayed. This display also includes the activity of spawned jobs and tasks associated with the specified job number.

Other Fields

The following fields are used as described.

Sampling Interval

The Sampling Interval field is set to the sampling interval in seconds. All selected display screens are updated every <Sampling Interval> seconds. The value for <Sampling Interval> must be greater than 9 and less than 1660 for a single processor system, and less than 830 for a dual processor system. The sampling interval that the user selects is used as a target by the MONITOR program. The actual interval may vary from the specified interval depending on the number of jobs in the mix and the amount of information being processed.

Invoking the MENU display or putting the terminal into local mode causes the sampling interval to increase to maximum value. After the maximum interval is reached, the interval is reset and sampling from that interval is lost. No updates occur until the MENU response is transmitted, or some other transmission is sent (for example, a command) or the terminal is placed in a RCV condition.

Create Default

Entering the letter X in the Create Default field saves all MENU fields with their current information in a disk file labeled MONITOR/DEFAULT. The new file replaces any existing MONITOR/DEFAULT file.

Help

Entering the letter X in the Help field presents the MONITOR program Help/Teach display.

EOJ

Entering the letter X in the EOJ field terminates the MONITOR program.

MONITOR PROGRAM COMMANDS

In addition to using the MENU display, the operating parameters of the MONITOR program can also be changed by way of direct command input. A description of each MONITOR program command follows:

BYE

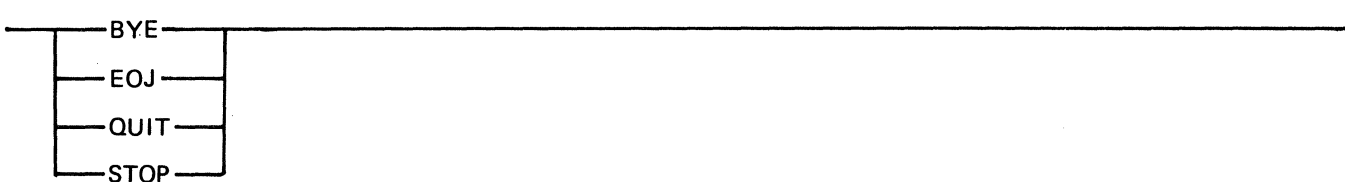
EOJ

QUIT

STOP

The BYE, EOJ, QUIT and STOP commands terminate the MONITOR program.

Syntax:



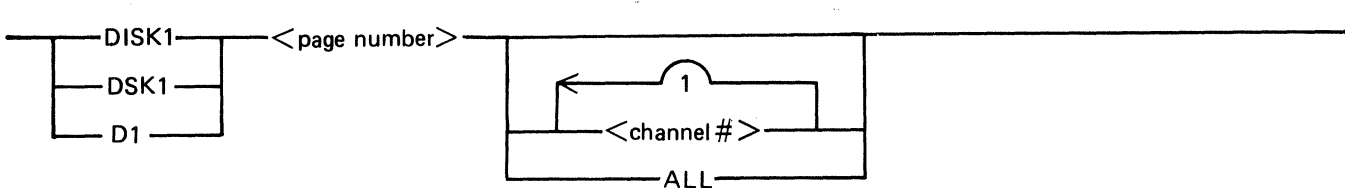
Examples:

BYE
EOJ
QUIT
STOP

DISK1

The DISK1 command presents the Disk Utilization (1) display on the specified <page number>. If <channel number> is omitted, the default of ALL channels is assumed. A <page number> value of 0 inhibits the display.

Syntax:



Semantics:

<page number>

The <page number> value specifies the terminal page on which to present the Disk Utilization (1) display.

<channel number>

The <channel #> value(s) specifies the disk channel(s) to be monitored by the Disk Utilization (1) function. A maximum of two channels can be specified.

ALL

The ALL keyword specifies that all disk channels are to be monitored by the Disk Utilization (1) function.

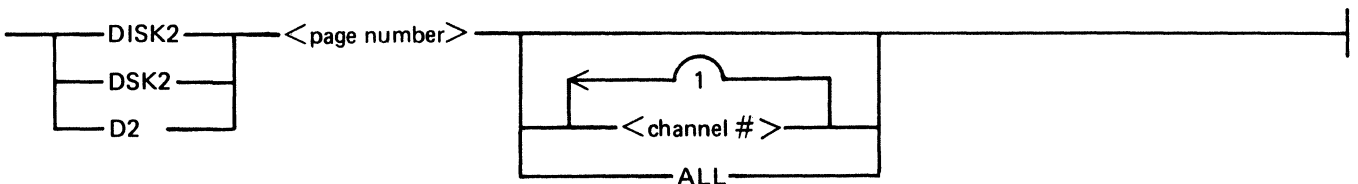
Examples:

```
DISK1 6 9  
DSK1 1 9 10  
D1 6
```

DISK2

The DISK2 command presents the Disk Utilization (2) display on the specified <page number>. If <channel number> is omitted, the default of ALL channels is assumed. A <page number> value of 0 inhibits the display.

Syntax:



Semantics:

<page number>

The <page number> value specifies the terminal page on which to present the Disk Utilization (2) display.

<channel number>

The <channel #> value(s) specifies the disk channel(s) to be monitored by the Disk Utilization (2) function. A maximum of two channels can be specified.

ALL

The ALL keyword specifies that all disk channels are to be monitored by the Disk Utilization (2) function.

Examples:

```
DISK2 6 9
DSK2 1 10
D2 6 ALL
```

DSC9

The DSC9 command presents the Disk Subsystem Controller (DSC) statistics for channel 9 on the <page number> specified. A <page number> value of 0 inhibits the display. This selection is only valid for B 1990 systems with DSC-3 firmware installed.

NOTE

If the DSC data collection function is not active, the DSC9 command starts the function. Once started, the data collection continues until the next clear/start.

Syntax:

— DSC9 — <page number> _____|

Semantics:

<page number>

The <page number> value specifies the terminal page on which to display the Channel 9 DSC Statistics.

Example:

```
DSC9 2
```

DSC10

The DSC10 command presents the Disk Subsystem Controller (DSC) statistics for channel 10 on the <page number> specified. A <page number> value of 0 inhibits the display. This selection is only valid for B 1990 systems with DSC-3 firmware installed.

NOTE

If the DSC data collection function is not active, the DSC10 command starts the function. Once started, the data collection continues until the next clear/start.

Syntax:

— DSC10 — <page number> _____|

Semantics:

<page number>

The <page number> value specifies the terminal page on which to display the Channel 10 DSC Statistics.

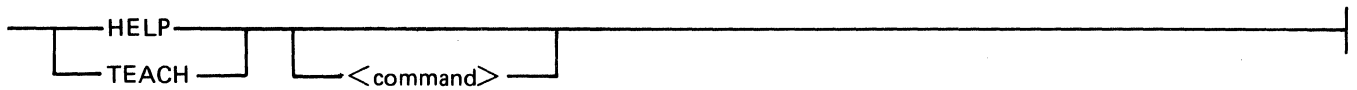
Example:

DSC10 1

HELP TEACH

The HELP and TEACH commands provide online help information for the MONITOR user. Entering HELP or TEACH, with no additional parameter, displays a list of all MONITOR program commands. Entering HELP or TEACH, with a command parameter, displays the proper syntax for using that command.

Syntax:



Semantics:

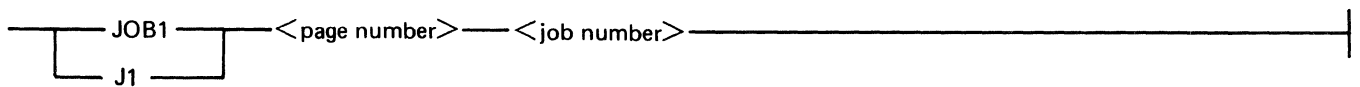
<command>

The <command> field specifies any valid MONITOR program command.

JOB1

The JOB1 command presents the Job Statistics (Since BOJ) for job <job number> on the <page number> specified. A <page number> or <job number> value of 0 inhibits the display.

Syntax:



Semantics:

<page number>

The <page number> value specifies the terminal page on which to present the Job Statistics (Since BOJ) display.

<job number>

The <job number> value specifies the job on which to gather data for Job Statistics (Since BOJ).

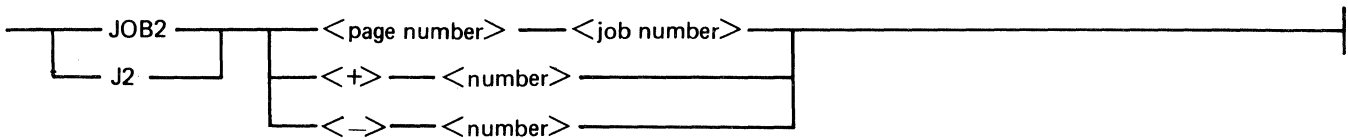
Examples:

```
JOB1 8 3679
J1 2 3690
```

JOB2

The JOB2 command presents the Job Statistics (Last Interval) for job <job number> on the <page number> specified. A <page number> or <job number> value of 0 inhibits the display.

Syntax:



Semantics:

<page number>

The <page number> value specifies the terminal page on which to present the Job Statistics (Last Interval) display.

<job number>

The <job number> value specifies the job on which to gather data for Job Statistics (Last Interval).

<+> <number>

<-> <number>

The maximum number of open files that can be shown on the Job Statistics (Last Interval) display is 12. The <+> <number> and <-> <number> options provide a means to scroll the display window and display those open files that could not be shown. Specifying <+> <number> causes the <number> of entries at the top of the display to be removed and a corresponding <number> of open files not shown added to the bottom of the display. Specifying <-> <number> causes the <number> of entries at the bottom of the display to be removed and a corresponding <number> of open files not shown added to the top of the display.

Examples:

```
JOB2 1 3672
J2 2 3695
```

MEMORY

The MEMORY command presents Memory Utilization information on the <page number> specified. A <page number> value of 0 inhibits the display.

Syntax:

— MEMORY —————> <page number> —————|
|
| — MEM —————|

Semantics:

<page number>

The <page number> value specifies the terminal page on which to present the Memory Utilization display.

Examples:

MEMORY 2
MEM 1

MENU

The MENU command presents the MENU display and suspends screen updates. While the MENU display is active, the sampling interval is set to the maximum value of 1660 seconds for a single processor system or to a maximum value of 830 seconds for a dual processor system. The normal sampling interval is resumed after any transmission from the terminal or when the terminal is placed in Receive mode.

Syntax:

— MENU —————|

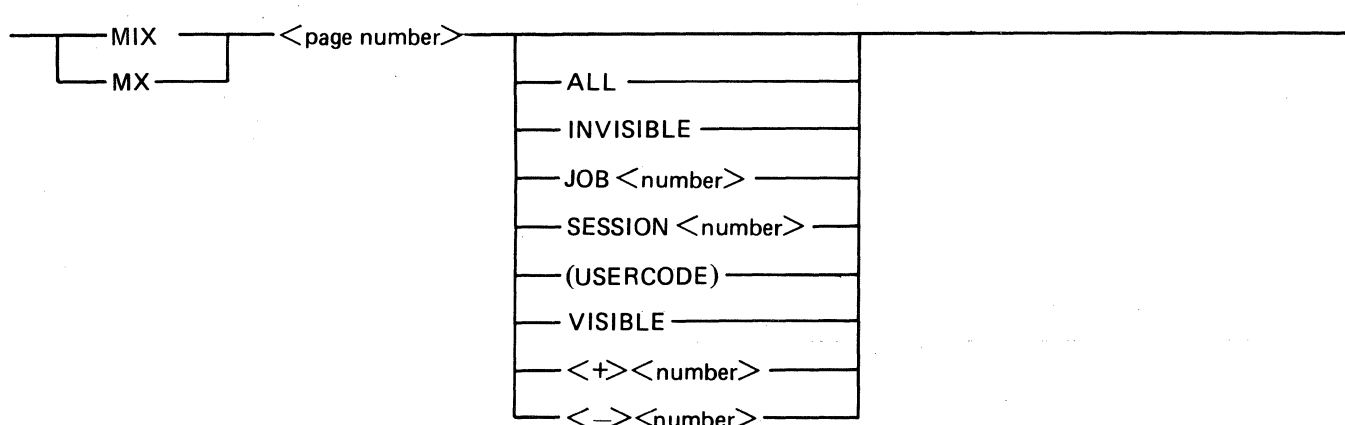
Example:

MENU

MIX

The MIX command presents the Mix Activity display on the <page number> specified for those jobs that fit the selected criterion. If only the <page number> parameter is supplied, the default of ALL jobs is assumed. A <page number> value of 0 inhibits the display.

Syntax:



Semantics:

<page number>

The <page number> value specifies the terminal page on which to present the Mix Activity display.

ALL

The ALL keyword specifies that all running jobs are monitored.

INVISIBLE

The INVISIBLE keyword specifies that only those jobs that have the INVISIBLE program attribute set are monitored.

JOB <number>

The keyword JOB, in conjunction with a valid job number in the <number> field, specifies that the activity of the specified job is monitored. This display also includes the activity of spawned jobs and tasks associated with the specified job number.

SESSION <number>

The keyword SESSION, in conjunction with a valid session number in the <number> field, specifies that the activity of the specified job associated with that session number is monitored. This display also includes the activity of spawned jobs and tasks associated with the specified session number.

(USERCODE)

A valid usercode enclosed in parentheses specifies that the activity of those jobs with the specified usercode are monitored.

VISIBLE

The VISIBLE keyword specifies that only those jobs that do not have the INVISIBLE program attribute set are monitored.

<+> <number>
<-> <number>

The maximum number of jobs that can be shown on the Mix Activity display is 22. The <+> <number> and <-> <number> options provide a means to scroll the Mix Activity display window and display those jobs that could not be shown. Specifying <+> <number> removes the <number> of entries at the top of the display and adds a corresponding <number> of jobs (not shown) to the bottom of the display. Specifying <-> <number> removes the <number> of entries at the bottom of the display and adds a corresponding <number> of jobs (not shown) to the top of the display.

Examples:

```
MIX 2
MX 7 ALL
MIX 1 JOB 3783
MX 2 VISIBLE
MIX 7 -5
```

PROC

The PROC command presents the Total Processor Utilization display on the <page number> specified. A <page number> value of 0 inhibits the display.

Syntax:

—PROC —<page number>—————

Semantics:

<page number>

The <page number> value specifies the terminal page on which to present the Total Processor Utilization display.

Example:

```
PROC 2
```

REFRESH

The REFRESH command rebuilds all page displays on the next transmission.

Syntax:

—REFRESH—————

Example:

```
REFRESH
```

TIME

The TIME command sets the sampling and display interval to the number of <seconds> specified. The value for <seconds> must be 10 or greater but less than 1660 for a single processor system, and less than 830 for a dual processor system.

Syntax:

—TIME—<seconds>

Semantics:

<seconds>

The <seconds> value specifies the number of seconds that the MONITOR program uses for the sampling interval.

Example:

TIME 15

UPROC

The UPROC command presents the User Processor Utilization display on the <page number> specified. A <page number> value of 0 inhibits the display.

Syntax:

—UPROC—<page number>

Semantics:

<page number>

The <page number> value specifies the terminal page on which to present the User Processor Utilization display.

Example:

UPROC 2

VERSION

The VERSION command displays the release level and the date and time that the MONITOR program was compiled.

Syntax:

—VERSION—

Example:

VERSION

ZDATA

The ZDATA command clears the Disk Subsystem Controller (DSC) statistics accumulators in the <channel number> specified.

Syntax:

—ZDATA—<channel number>—————|

Semantics:

<channel number>

The <channel number> value specifies the disk channel for which the statistics are cleared.

Example:

ZDATA 9

SECTION 5

MONITOR PROGRAM FUNCTIONAL DESCRIPTION

INFORMATION DISPLAY

The MONITOR program and its supporting code in the operating system collects performance information and groups related information into different display formats. Performance information is collected for a user-specified period of time, known as a "sampling interval" or alternatively as a "cycle." This performance information is displayed by group on a terminal as specified during the MENU selection or by way of MONITOR program commands.

The user may request that each of the groups of information be displayed upon a different page of the terminal, subject to the number of pages available on the particular terminal. Each of the available MONITOR program display formats is described in this section.

DISK UTILIZATION

The Disk Utilization display provides performance information for the disk subsystem. Information is provided for each disk channel connected to the system and for each disk unit that is connected to that channel. Figure 5-1 presents an example of the Disk Utilization display taken from a system equipped with disk controls on channels 9 and 10.

The Disk Utilization display allocates one horizontal line on the screen for each channel and each unit on the system. Each horizontal line provides three elements of performance information for each channel or unit. These three elements of information form the vertical columns shown on the display.

The OPERATIONS PER SECOND column, titled Op/s in the figure, provides the average number of operations per second performed on the channel or unit during the last sampling interval. Notice that the information is "operations per second" and not "operations per sampling interval." This makes it possible to compare data from different samples without regard for the sampling interval selected.

The KILOBYTES PER SECOND (Kb/s) number shows the data transfer rate to and from the disk device during the last sampling interval.

The "Busy" information shows in bar graph form the percentage of the last sampling interval that the unit or channel was busy. The bar graph is preceded by an integer that quantifies the information that is being displayed in the bar graph. If the length of the bar is short, the integer may not be included. Notice that a disk unit is busy from the time it receives an I/O descriptor to the time the operation is completed. A disk channel is busy only from the time the unit signals that a SEEK operation is complete (the heads have stopped moving) to the time the operation is completed. In other words, the unit is busy during the SEEK period and during the data transfer period. Consequently, the percentage of time that a channel is busy is not the summation of the percentages of time that its associated units were busy.

During a disk access, a "slip" occurs when the disk controller does not have a buffer available for the next sector data transfer. On a Read operation, a slip occurs when all of the buffers are full and a transfer in is required. On a Write operation, a slip occurs when all of the buffers are empty and a transfer out is required. Each time that a slip occurs, at least one additional disk rotation is required to process the Read or Write operation. The MONITOR program detects the occurrence of slips and displays the word "Slips" followed by the number of slips on the Disk Utilization screen.

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Some systems in the B 1000 series may be equipped with as many as four disk channels. The Disk display allows a maximum of two channels per screen. For this reason, the user can ask that two different Disk displays be transmitted to two different terminal pages. For example, if a system has disk controls on channels 8, 9, 10 and 11, the user can request that the Disk display on page 1 of his terminal contain performance information for channels 8 and 9 and that the Disk display on page 2 contain performance information for channels 10 and 11. Hence, a maximum of four channels can be displayed per system at any time.

An example of the Disk Utilization display is shown in figure 5-1.

Disk Utilization			
Unit	Op/s	Kb/s	Busy
Channel 9	48.5	40.4	67[XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX]
System	10.7	2.2	7[X]
System	.1	.2	[X]
CANDE	33.4	36.0	70[XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX]
DC			
<DPE>			
<DPF>			
DARRYL			
QWIK disk	4.2	1.8	[X]
Channel 10	34.7	60.1	15[XXXXXX]
MISC			[X]
TWELVE			15[XXXXXX]
<DPJ>			
<DPK>			
QWIK disk			
Totals	83.2	100.5	

Figure 5-1. Disk Utilization Display

NOTE

nn[XXXX--X] represents a bar on the graph. The integer "nn," if provided, gives the percentage that the bar represents. The integer "nn" is not displayed if the Busy percentage is too small to warrant it.

MEMORY UTILIZATION

The Memory Utilization display has two parts. The first part occupies about the top one-third of the screen; the second part occupies the remainder. Each part of the display consists of a bar graph. The top portion contains some additional numeric information.

Figure 5-2 presents an example of the Memory Utilization display. A number in the upper right corner of the top portion of the display, symbolized by <x> in the example, provides a numeric value for the rate of MCP code overlays, in overlays per second, that were performed on the system during the last sampling interval. Immediately below the rate of MCP code overlays another number, symbolized by <y>, presents the rate of all code overlays, those attributable to both the MCP and the user, during the last sampling interval. A numeric value in the upper left corner of the screen, symbolized by <z>, presents the number of data overlays per second that were performed on the system during the last interval. All three of these rates are specified in overlay operations per second.

The bar graph presented in the upper portion of the display provides the average relative percentage of memory that was marked as Save, Overlayable and Available during the last sampling interval. Save memory is that which must not be overlaid for any purpose. Overlayable memory generally consists of code segments, an exact copy of which is readily available on disk. Available memory is memory space that is not currently allocated for any purpose.

The bar graph presented in the lower portion of the display also represents the total amount of memory on the system. The bars on the graph represent the amount of memory on the system that is allocated to the MCP, program data areas, user file areas, MCP and user code segments, DMS buffers and structures, ISAM buffers and structures and areas that were marked as Available during the last sampling interval. Each bar represents a percentage of the total memory on the system.

An example of the Memory Utilization display is shown in figure 5-2.

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```
Memory Utilization      <x>  MCP Code Overlays/s
<z> Total Data Overlays/s      <y> Total Code Overlays/s

Save
28[XXXXXXXXXXXXXXXXXXXX]

Overlayable
41[XXXXXXXXXXXXXXXXXXXXXXXXXXXX]

Available
30[XXXXXXXXXXXXXXXXXXXX]

-----

MCP
3[X]

Program
22[XXXXXXXXXXXXXXXXXXXX]

Files
3[X]

Code
40[XXXXXXXXXXXXXXXXXXXXXXXXXXXX]

DMS

ISAM

Available
30[XXXXXXXXXXXXXXXXXXXXXXXXXXXX]
```

Figure 5-2. Memory Utilization Display

TOTAL PROCESSOR UTILIZATION

The Total Processor Utilization display provides two bar graphs that describe processor time utilization. An example of the Total Processor Utilization display is shown in figure 5-3.

The Total Processor Utilization display consists of two portions. The bar graph in the upper portion of the display presents the amount of processor time allocated to user programs, the amount required by system overhead and the amount of time the processor was idle. All times are presented as a percentage of the total time available during the last sampling interval. Overhead is defined as the time required for system services not logically attributable to any one user. Some examples of overhead requirements are the time that is required by the MCP to prepare certain ODT responses and the time that is required to roll programs into and out of memory.

Unlike the Memory Utilization display, the bar graph in the lower portion of the Total Processor Utilization display has a direct relationship with the graph in the upper portion. The graph in the lower portion presents the time allocated to all user interpreters and the amount of Micro MCP (MMCP) and SMCP processor time that is directly attributable to a user. Hence, the total of these three percentages should approach the percentage displayed as User time in the upper portion.

The bar graph in the lower portion of the display also presents the amount of time allocated to GISMO, which is always classified as overhead, and the amount of SMCP time that is not attributable to user programs. Hence, the total of the two overhead categories in the lower portion of the graph should approach the amount displayed as overhead in the upper portion.

On dual processor systems, the lower portion of the display presents the amount of time that the master processor was idle and the amount of time that the slave processor was idle. The sum of these two percentages should approach the idle percentage presented in the upper portion of the display. On single processor systems, this bar is the same as the idle bar in the upper portion of the display.

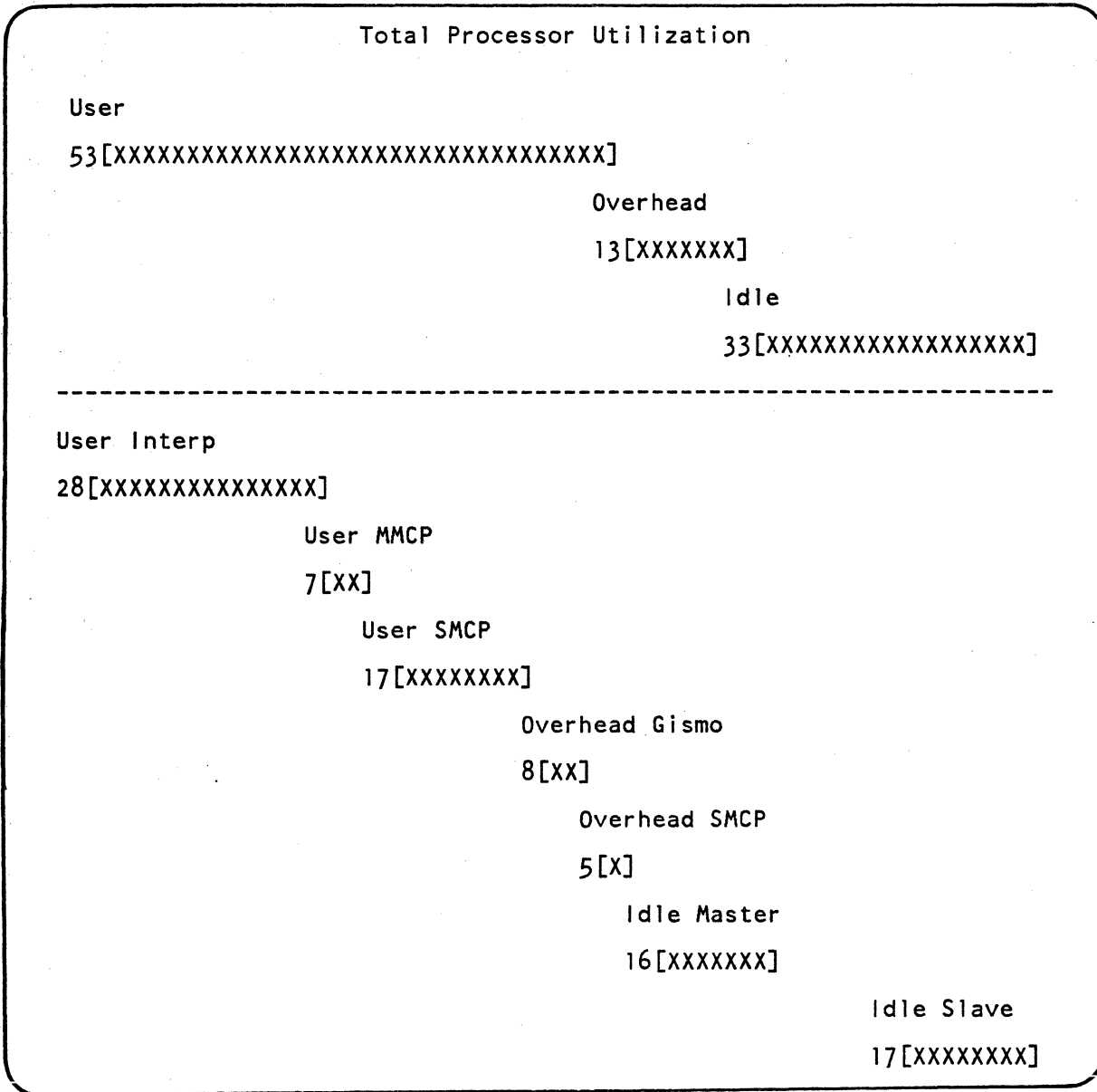


Figure 5-3. Total Processor Utilization Display

USER PROCESSOR UTILIZATION

The User Processor Utilization display presents the amount of processor time attributable to user programs in greater detail. An example of the User Processor Utilization display is shown in figure 5-4.

This display consists of two parts. The top portion of the display shows information about DMS and IBASIC applications. The first bar in the top portion of figure 5-4 shows the sum of the processor time allocated to user program interpreters, plus the amount of Micro MCP time, plus the amount of SMCP time spent for user program services. The other bars in the top portion of the graph are dedicated to the percentage of time spent performing DMS access routines and the percentage of time spent in the IBASIC interpreter. The total of the values presented by all three bars should approach 100 percent. This total is considered to be the total time allocated to the user during the last sampling interval.

The six bars in the second portion of figure 5-4 provide a more detailed view of the information described above. Here, the percentage of time allocated to user programs is further subdivided into user interpreter time, program Micro MCP time and program SMCP time. Similarly, the percentage of time allocated to DMS access routines is further subdivided into interpreter time and SMCP time. The percentage of time allocated to the IBASIC interpreter cannot be further subdivided and is presented as the same percentage as shown in the first portion of the display.

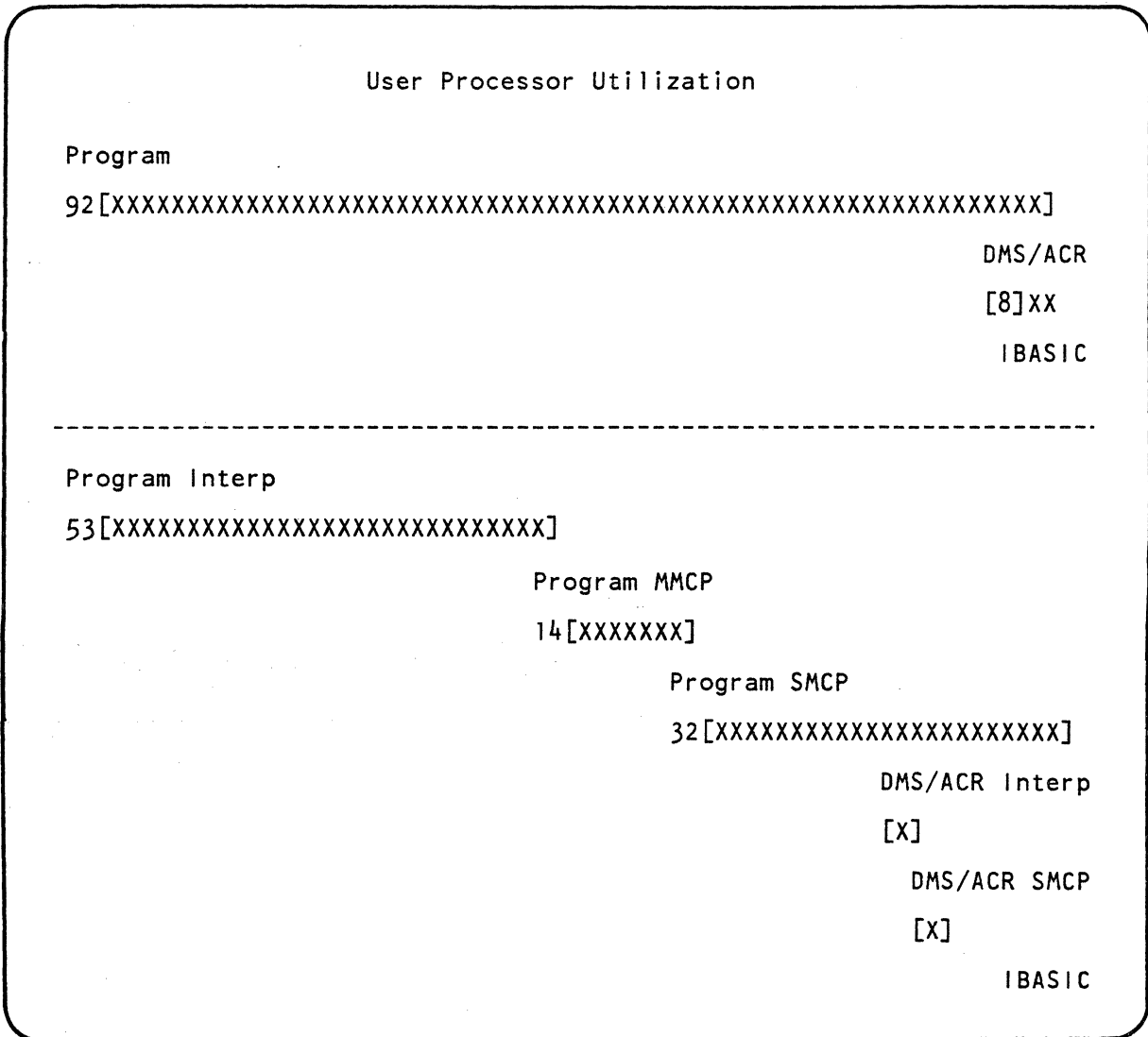


Figure 5-4. User Processor Utilization Display

MIX ACTIVITY

The Mix Activity display presents information that pertains to programs that are currently executing on the system. The user can select all jobs, visible jobs only, invisible jobs only, jobs which were executed under a specified usercode, jobs that are associated with a specified session number or a single specified job and its associated tasks.

The following information is provided for each job presented in the Mix display. An example of the Mix Activity display is presented in figure 5-5. The items in the heading on figure 5-5 are described in the table below. Some items that appear in the heading are self-explanatory.

Column Heading	Description
MX#	Job Number
PP	Processor Priority
MP	Memory Priority
CPU TIME	Cumulative Processor (CPU) Time
OVLV	Cumulative Overlay Count
M	Media 1 - Job is in memory. 0 - Job is "rolled out" to disk.

Three percentages are presented in the heading for the Mix display. These are the percentages of available processor time that were allocated to User, Overhead and to Idle time during the last sampling interval. These percentages correspond to the first three bars of the Total Processor Utilization display. The sum of the three percentages approaches 100 percent.

On dual processor systems, it is more difficult to relate these three percentages to real quantities of processor time. Since the numerical values presented are percentages of the available processor time, on a dual processor system the sampling interval is multiplied by two to determine the actual amount of processor time that is available. For example, on a dual processor system there are 30 seconds of processor time available during a 15-second sampling interval. Consequently, a single user program running on a dual processor system can never obtain more than 50 percent of the available processor time, since only one copy of a program can run on a processor at any given point in time. The user must remember this fact when using the Mix Activity display on dual processor systems, lest it appear that an insufficient amount of time is being devoted to user programs and an inordinate amount of time is being spent in the idle state.

For each job listed in the Mix Activity display, the job number, the user processor time, the overlay count, a media Boolean, the program name and the job status are displayed. The media Boolean indicates whether the job is in memory or rolled out to disk. If the job was executed under a usercode, the usercode is enclosed in parentheses and displayed before the program name. If the job is a compilation, the name of the resulting object program is displayed following the name of the compiler. The job status is presented following the program name. If the job currently is in need of operator attention, the job status is displayed in reverse video.

Following the job status field, the percentage of available processor time that was allocated to the job during the last sampling interval is presented. Again, on dual processor systems, the amount of available processor time is taken to be twice the value of the sampling interval. The total of the percentages for the individual jobs shown plus the percentage for the jobs not shown should approach the percentage attributed to USER percentage in the heading of the display.

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If the Visible option is specified in the MIX command, only visible jobs are presented in the Mix Activity display. If the All option is specified, or if no options are included, invisible and visible jobs are presented. In other words, the default condition is for all jobs currently being executed to be included in the Mix Activity display. The user must take some action to view only the visible jobs being executed. All of the available Mix Activity display options and their meanings are described under Mix Activity display in section 4.

MX#	PP	MP	CPU Time	Ovly	M	Jobs=20	ML=63	User 53%	Ovrhd 13%	Idle 33%
1111	15	4	15.0	48	1	SYS/ODT0228	ON DISK	---->	Wait	0.6%
1110	15	15	7:20.3	76	1	SL6/NC0416	ON DISK	----->	Wait	1.9%
1112	14	11	1:16.8	459	1	SMCS	ON DISK	----->	Wait	4.2%
1125	14	15	14.3	190	1	BNA/NSP		----->	Wait	
1118	13	11	1:24.3	57	0	RD		----->	Wait	
1120	12	8	59.4	100	0	SYCOM:CS		----->	Wait	
1121	12	8	7.2	40	0	SYCOM:FCF		----->	Wait	
1126	12	15	2.8	30	0	BNA/PLM		----->	Wait	
1144	12	4	59.2	20	1	(TOM) MONITOR/TC		----->	Executing	2.8%
1148	12	12	13.1	50	1	(CANDE) NED		----->	Wait	
1122	10	15	38.2	1255	0	BNA/NSM		----->	Wait	
1123	4	4	2.9	18	1	BNA/LOGGER		----->	Wtg Rcv	
1134	4	4	3.2	8	1	CLOCK		----->	Wait	
1152	4	4	3.6	16	0	(CANDE) SORT		----->	Stpd for SORT	
1153	4	4	25.2	10	1	(CANDE) SORT/VSORT		----->	Executing	10.8%
			30.5	56		Jobs Not Shown		----->		32.1%

Figure 5-5. Mix Activity Display

JOB STATISTICS (SINCE BOJ)

The Job Statistics (Since BOJ) display presents cumulative information that pertains to a selected program. An example of the Job Statistics (Since BOJ) display is shown in figure 5-6. The first line of the display is the heading line. The second line is the Mix Activity display line for the specified program.

The following static information is presented in the Job Statistics (Since BOJ) display.

Date Compiled	Maximum Time (minutes)
Compiled With	Virtual Disk Allocated
Interpreter	Privileged
Execute Type	Restrictions
BOJ Time	Session Number
Static / Dynamic Memory (bytes)	Charge Number

The following is a list of dynamic information presented. Some of the following data is updated, when appropriate, after every sampling interval.

Next Instruction	Code / Data Overlays
Program's Parent Queue	Parent MIX Number
Program Switches	Files (Open/Declared)
Interp Processor	SMCP Processor
MMCP Processor	DMS Processor
IBASIC Processor	Total Processor
Elapsed Time	Avg Processor Use (%)
Virtual Disk Inuse	Protected
Seconds Before Decay	Queue Id
Next Queue Id	

Although these items are largely self-identifying, the Average Processor Percentage (Avg Processor Use) requires further explanation. It is the total processor time allocated to the job divided by the elapsed time. This number can reach 100 percent for both a single and a dual processor. This figure is intended to indicate how "processor bound" a given job is. Conversely, the processor time percentages shown in the heading of the display represent percentages of available processor time on the system as opposed to elapsed time. On a single processor this value can reach 100 percent, but it can never exceed 50 percent on a dual processor system.

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```

MX#  PP MP CPU Time Ovly M Jobs=22 ML=63  User 11% Ovrhd 7% Idle 81%
-----
4075  15 15  17:01.6  113 1 COMBINED/NC_MAR14 -----> Executing  6.7%

Date Compiled -----> 03/14/85  AT 12:58:36.1
Compiled With -----> NDL Version (10/17/84)
Interpreter -----> SDL2/INTERP3M
Execute Type -----> (Execute)
BOJ Time -----> 05/01/85  AT 06:57:42.8
Next Instruction -----> P=3,S=5,D=16820=@041B4@
Static / Dynamic Memory (bytes) --> 129673 + 0 = 129673
Code / Data Overlays -----> 113 + 0 = 113
Program's Parent Queue -----> None
Parent MIX Number --> NONE
Program Switches ----> @0000000000@
Files (Open/Declared) -> 3/12
Interp Processor ----> 15:17.6
SMCP Processor -----> 1:03.9
MMCP Processor -----> 40.1
DMS Processor -----> .0
IBASIC Processor ----> .0
Total Processor -----> 17:01.6
Elapsed Time -----> 3:37:36.4
Avg Processor Use (%) 7.8

Maximum Time (minutes) -> No Limit
Virtual Disk Allocated -> None
Virtual Disk Inuse -----> None
Privileged -----> No
Restrictions -----> None
Protected -----> Yes
Session Number -----> None
Charge Number -----> None
Seconds Before Decay ----> None
Queue Id -----> Not Queued
Next Queue Id -----> Ready

```

Figure 5-6. Job Statistics (Since BOJ) Display

JOB STATISTICS (LAST INTERVAL)

An example of the Job Statistics (Last Interval) display is shown in figure 5-7. The first two lines of the Job Statistics (Last Interval) display are the same as the first two lines of the Job Statistics (Since BOJ) display. Specifically, they are the heading from the Mix Activity display and the line from the Mix display that applies to the job being monitored. The information in the Job Statistics (Last Interval) display provides information on what the job did during the last sampling interval only.

Processor times are presented as percentages of available processor time. Hence, these times can never reach 100 percent on a dual processor system. Code overlays, data overlays, logical I/O operations (program READ and WRITE operations), and physical I/O operations are presented as rates. The units for all of these variables are operations per second. Certain information on the files that the program has opened is also presented. This information is described in a subsequent paragraph.

The following is a list of dynamic information presented in this display. The data is updated, when appropriate, after every sampling interval.

Interpreter Processor	Code Overlays/sec.
SMCP Processor	Data Overlays/sec.
MMCP Processor	Logical IOs/sec.
DMS Processor	Physical IOs/sec.
IBASIC Processor	

The information presented under File Summary in this display consists of a summary of information about the files that the program has opened. The following is a list of the file information presented and a brief description of each item.

Column Heading	Description
Int Name	The internal name assigned by the programmer.
Title	The external title assigned to the file.
Type	The File Type (for example, Data, COBOL .. etc.)
Org	File Organization (sequential, relative, ISAM)
Accs	Access Method (for example, serial, random, dynamic delayed random, etc.)
Use	OPEN Type (in, out, I/O)
#of IOs/sec	Updated after every sampling interval to provide:
Log	Number of logical I/O operations per second
Phys	Number of physical I/O operations per second

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```

MX#  PP MP CPU Time Ovly M Jobs=22 ML=63  User 11% Ovrhd 7% Idle 81%
-----
4075 15 15 17:01.6 113 1 COMBINED/NC_MAR14 ON DISK --> Executing 6.7%

Interpreter Processor ---> 6.1%   Code Overlays/sec. ----->
SMCP Processor -----> 0.3%   Data Overlays/sec. ----->
MMCP Processor -----> 0.3%   Logical I/Os/sec. -----> .2
DMS Processor ----->          Physical I/Os/sec. ----->
IBASIC Processor ----->

                               F i l e   S u m m a r y
-----
                               12 Files Declared          # OF I/Os/sec

Int Name          Title          Type Org  Accs Use  Log  Phys
-----
STATIONSAV STATIONSAV          Data Seq  Dran I/O  .2
STATIONQUE STATIONQUE          Data Seq  Ser  I/O
REMOTEFILE REMOTEFILE          Data Seq  Ser  I/O

```

Figure 5-7. Job Statistics (Last Interval) Display

CHANNEL 9 DSC STATISTICS

CHANNEL 10 DSC STATISTICS

The DSC Statistics display presents a graphic representation of statistics accumulated by the Disk Subsystem Controller (DSC) relating to Disk I/O operations, the status of the Disk Cache subsystem (if present) and statistics reflecting the performance of the Disk Cache. The DSC Statistics display is only available on B 1990 systems with DSC-3 firmware installed. An example of the Channel 9 DSC Statistics display is presented in figure 5-8.

The upper portion of this display, below the heading, presents the potential and actual Cache hits. Potential cache hits shows the percentage of disk reads on tracks that are in or would be represented in Cache, although the particular sector(s) sought may not be present. Actual cache hits represent the read operations that are satisfied wholly from the Cache without an actual disk access.

Next to the potential and actual Cache hits information are the terms Pterm and Blocks. The number after Pterm is the maximum number of sectors that can be collected in cache during a disk read after the disk read is terminated. The number after Blocks is the number of Cache blocks allocated. By default the number is set at 48, which uses about three-fourths of the one megabyte cache memory.

The second portion of the display presents a summary of disk operations as described below. These numbers may be considered statistics for the entire channel.

Term	Definition
Units 0-8	Disk operations for all units on the channel.
Read Ops	Bar graph representation of the percentage of normal Read operations to the total number of disk operations. The percentage figure is displayed at the beginning of the bar.
Seek	Bar graph representation of the percentage of Seek operations incurred by Read operations. The percent figure is displayed at the beginning of the bar and is the percentage of total disk operations.
Slip	Number of slips occurring in Read operations.
Error	Number of errors occurring in Read operations.
Reloc	Number of relocation sectors accessed in Read operations.
Write Ops	Bar graph representation of the percentage of Write operations to the total number of disk operations.
Seek	Bar graph representation of the percentage of Seek operations incurred in Write operations. The percent figure is displayed at the beginning of the bar and is the percentage of total disk operations.

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Term	Definition
Slip	Number of slips occurring in Write operations.
Error	Number of errors occurring in Write operations.
Reloc	Number of relocation sectors accessed in Write operations.

Following the Units 0-8 bar graphs, the third portion of this display presents a group of bar graphs that represent disk operations for unit 0 and units 1-7 of the channel. These appear under the appropriate headings, Unit 0 and Units 1-7.

Term	Definition
Read Ops	Bar graph representation of the percentage of normal Read operations to the total number of disk operations. The percent figure is displayed at the beginning of the bar.
Seek	Bar graph representation of the percentage of Seek operations required prior to a Read operation data transfer. The percent figure is displayed at the beginning of the bar and is the percentage of total disk operations.
Write Ops	Bar graph representation of the percentage of Write operations to the total number of disk operations.
Seek	Bar graph representation of the percentage of Seek operations required prior to a Write operation data transfer. The percent figure is displayed at the beginning of the bar and is the percentage of total disk operations.

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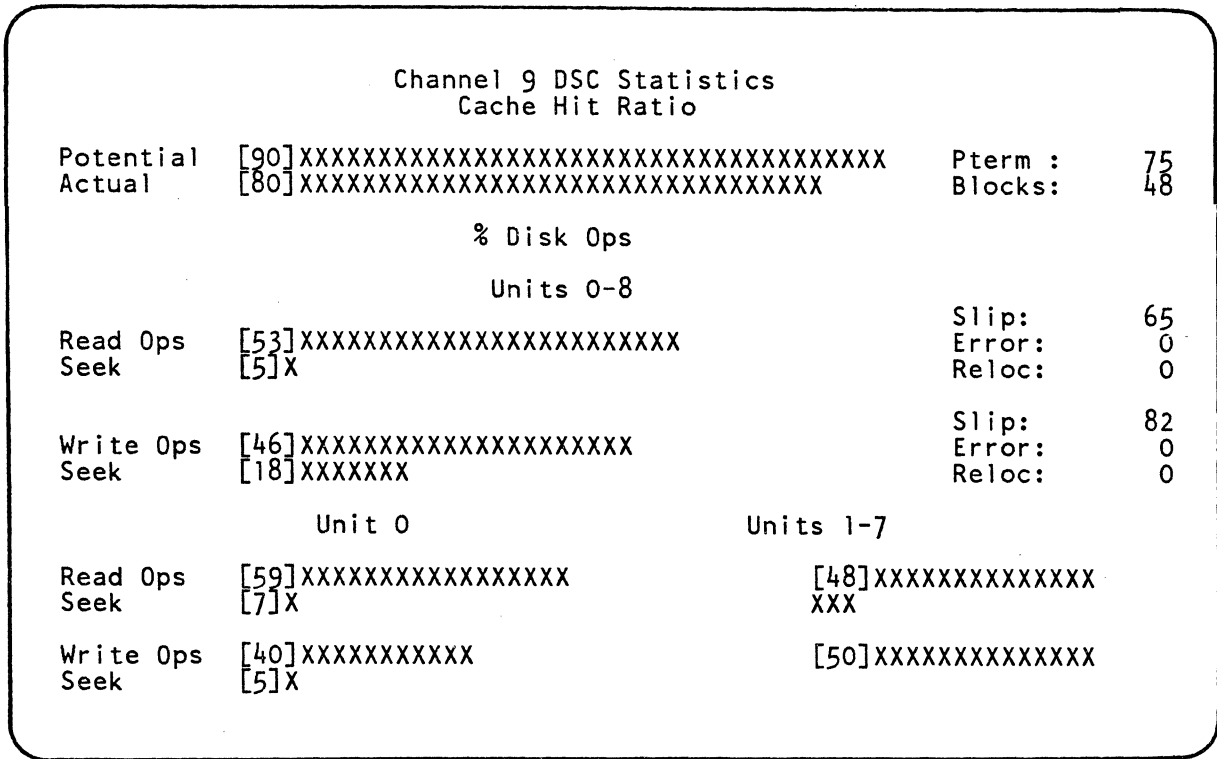


Figure 5-8. Channel 9 DSC Statistics Display

APPENDIX A

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 (|).

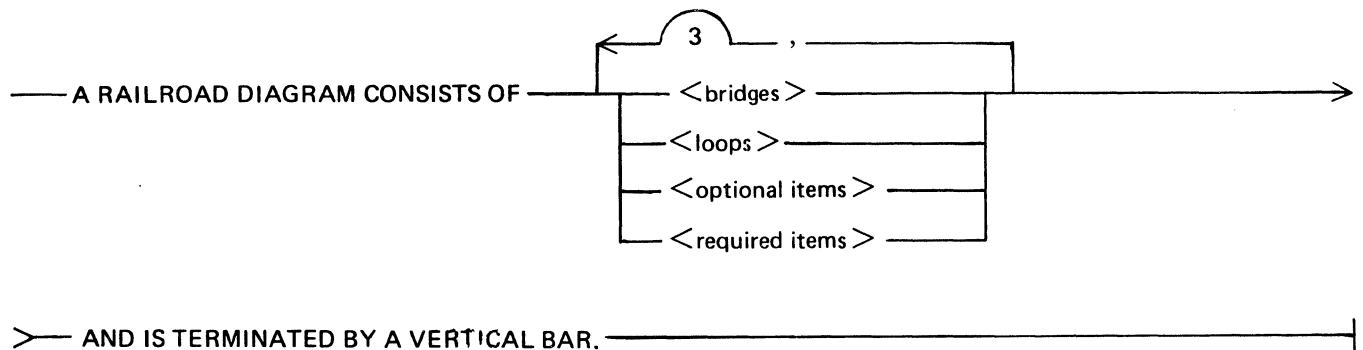
SYNTACTIC VARIABLES

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 defined beneath the keyword.

Example:



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.

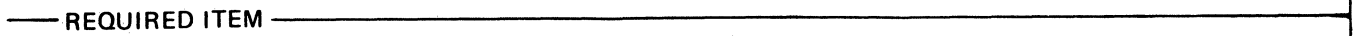
A RAILROAD DIAGRAM CONSISTS OF <bridges>, <loops> AND IS TERMINATED BY A VERTICAL BAR.

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.

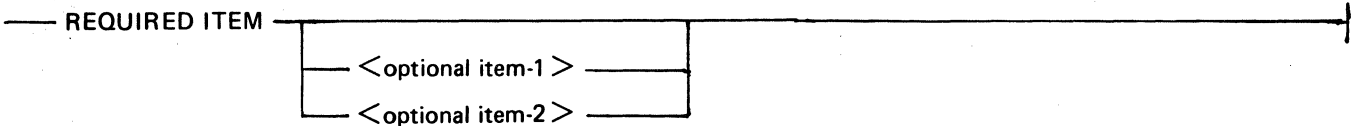
Example:



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:



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

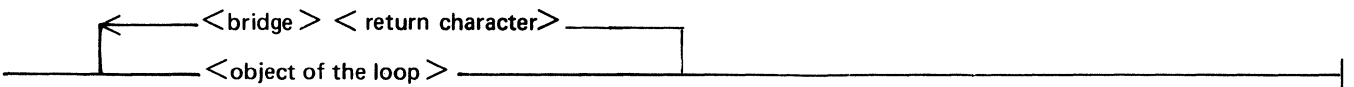
REQUIRED ITEM

REQUIRED ITEM <optional item-1>

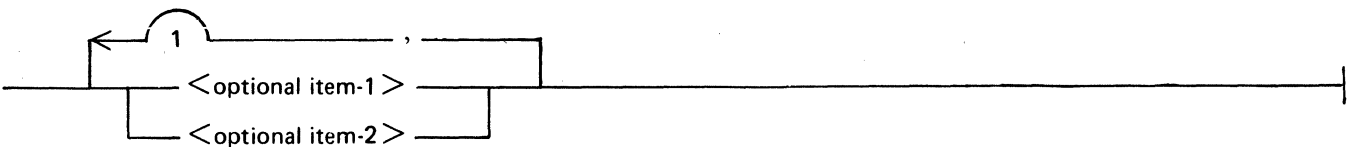
REQUIRED ITEM <optional item-2>

LOOPS

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



Example:



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

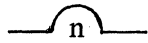
- <optional item-1>
- <optional item-2>
- <optional item-1> , <optional item-1>
- <optional item-1> , <optional item-2>
- <optional item-2> , <optional item-1>
- <optional item-2> , <optional item-2>

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

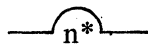
BRIDGES

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>.

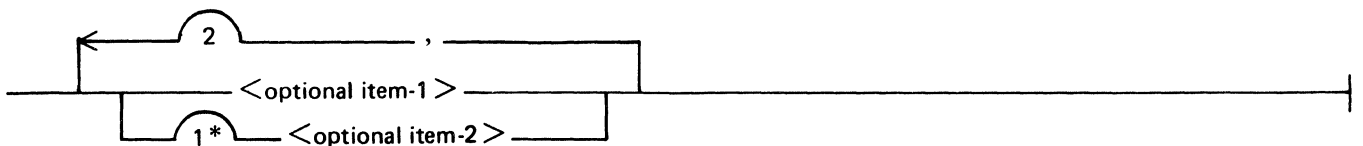


n is an integer which specifies the maximum number of times the path can be traversed.



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

Example:



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.

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