

TOPS-10 Operator's Guide

AA-H283B-TB

April 1986

This guide gives the computer operator a task-oriented reference for using the TOPS-10 operating system and a brief description of the hardware supported by the TOPS-10 operating system.

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SOFTWARE:	GALAXY V5.1 RSX-20F V15-15 BACKUP V5

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INSERT TAB 1 "INTRODUCTION" HERE

PREFACE

The TOPS-10 Operator's Guide is a task-oriented reference guide for operating KS10-based TOPS-10 systems (DECSYSTEM-2020), and KL10-based TOPS-10 systems (1090, 1091 with core memory, 1091 with MOS memory, 1095, and 1099). This guide is written for experienced TOPS-10 operators.

This guide covers the following topics:

- o System Familiarization
- o Device Operation and Maintenance
- o System Startup
- o Software Tasks
- o Error-Recovery Procedures

This guide uses the following conventions:

CTY	means console terminal.
TTY	means terminal.
<RET>	means press the RETURN key.
<ESC>	means press the ESCAPE key.
<CTRL/character>	means hold the CTRL key down while you type the character indicated.
UPPERCASE BOLD PRINT	indicates anything that you type.

The term "-10 series hardware" represents all hardware systems that run TOPS-10 software.

Operating procedures unique to particular CPUs are described in the following chapters: Chapters 10 and 16 pertain to the KS10, and Chapters 11 and 17 pertain to the KL10 central processor. Sections 11.9, 11.9.2, and 17.17 refer only to SMP systems. You may want to remove the chapters that do not apply to your system.

For current information on the RSX-20F PARSER commands, please refer to the TOPS-10/TOPS-20 RSX-20F System Reference Manual.

For current information on which devices are supported for this version of the TOPS-10 monitor, please contact your Field Service Center for a copy of the TOPS-10 Software Product Description.

CHAPTER 1

THE SYSTEM OPERATOR

1.1 RESPONSIBILITIES

As a TOPS-10 operator, your primary responsibilities are to keep the system running and to respond to user requests. Therefore, you must be familiar with all of the resources available to your system, know how to use them, and be able to recognize potential problems.

You must know how to:

- o Communicate with both the microprocessor and the central processor (if you have a KS system)
- o Communicate with RSX-20F, which is a program that controls the console PDP-11, and its central processor(s) (if you have a KL system)
- o Work with the TOPS-10 command language, including a text editor
- o Do everything listed in the next two sections

You are responsible for:

- o Documenting system activities for operators on the next shift
- o Logging a permanent record of system availability, maintenance, and downtime

1.2 DUTIES

Your duties can be classified into two categories:

- o Hardware-related
- o Software-related

You may perform these duties on a regular schedule, on an "on call" basis, or on an emergency basis.

THE SYSTEM OPERATOR

1.2.1 Hardware-Related Duties

Your hardware-related duties include:

- o Maintaining the system devices and the computer room
- o Replenishing consumable supplies such as paper forms
- o Servicing user requests to mount magnetic tapes or disk packs, and so forth

If the hardware malfunctions, you must return the device that failed to normal operation as quickly as possible. This can mean either removing any damaged or foreign material or calling your Field Service representative.

Whenever there is a problem, you must be able to:

- o Assess the extent of the problem and take appropriate action
- o Make an entry in the system logbook
- o Fill out a hardware error form

1.2.2 Software-Related Duties

Your software-related duties include:

- o Responding promptly to user requests
- o Assigning devices
- o Running system accounting and control tasks specified by the system administrator

Whenever there is a problem, you must be able to:

- o Assess the extent of the problem and take appropriate action
- o Make an entry in the system logbook
- o Fill out a Software Error Report (SER) form

1.3 DOCUMENTATION

There are a number of documents available to make your responsibilities and duties easier. You should have access to the ones mentioned here. Some are for one-time reading, others are for reference, and still others are for you to document pertinent system information.

THE SYSTEM OPERATOR

1.3.1 Supplied by DIGITAL

In addition to this guide, the following publications, included in the TOPS-10 Software Notebook set, provide additional information for the system operator.

- o TOPS-10 Operator's Command Language Reference Manual
- o TOPS-10 Monitor Calls Manual Volumes 1 and 2
- o TOPS-10 Software Installation Guide
- o TOPS-10 Operating System Commands Manual
- o TOPS-10 User Utilities Manual

1.3.2 Supplied by Your Installation

The documentation that your installation supplies usually includes an operator's notebook and a system logbook. Often, this documentation also includes a set of operating procedures tailored specifically for your installation.

The operator's notebook is the most practical means for shift-to-shift communication among system operators, and between an operator and the system administrator. The operator's notebook provides a permanent message center for efficient system operations.

You should read the turnover entries as you begin your shift. These entries may include scheduled system downtime, new software to try, problems encountered on previous shifts, warnings on potential intermittent malfunctions, and specific instructions for work to be processed on your shift.

At the end of your shift, you should enter the same type of information for the next shift operator. If you are a non-prime-shift operator and the system administrator works prime shift, the operator's notebook allows you to communicate with him.

The system logbook is the prime source of information about the system. (See Figure 1-1.) Operators, system programmers, system administrators, software support personnel, and Field Service engineers all use the system logbook. You must check this log when you report for work, and update the log throughout your shift.

System logbook entries include:

- o All monitor loads and reloads, with reasons for reloading
- o All hardware and software problems, with symptoms and device identification
- o All system shutdowns

To make it easy to identify the items, you can write hardware entries on the left-hand pages and software entries on the right-hand pages.

THE SYSTEM OPERATOR

PAGE _____						
SYSTEM LOG					DATE _____	
TIME	RELOAD	NAME	MONITOR OR HARDWARE MAINTENANCE ACTIVITY	F/S A T T N	DEVICE OR PROGRAM	ENTRY

MR-S-729-80

Figure 1-1: Sample System Logbook Page

Your installation may generate a tailored set of operating procedures based upon your installation's specific hardware configuration and the software in use. You can divide such operating procedures into sections for your scheduled tasks. This would provide you with a compact, easily referenced run book, which would also be helpful in training new operators.

1.3.3 CTY Output Logbook

In addition to making entries in the operator's notebook and the system logbook, you should retain and file the system console (CTY) output or log. This chronological record of system events can be very helpful in tracking down intermittent system problems.

INSERT TAB 2 "SYSTEM FAMILIARIZATION" HERE

CHAPTER 2

HARDWARE FAMILIARIZATION

2.1 OVERVIEW

To improve your understanding of the system, this chapter briefly describes the -10 series hardware.

You can use the TOPS-10 operating system with all of the -10 series hardware systems. The hardware components of these systems are very similar. The amount and type of available memory, the type of data channels, the type of processor, or the number and type of peripherals are some of the factors that determine the system.

The 1099 systems are multiple-processor systems, and they can have Symmetric multiprocessing (SMP) features. The SMP features provide the capability of attaching and sharing memory and I/O devices between central processor units in symmetric configurations. The system uses a single copy of the monitor that can handle more than one job at a time.

The -10 series hardware that you will be operating falls into five general categories: central processors, memory systems, front-end processors or microprocessors, peripherals, and remote stations.

2.2 CENTRAL PROCESSORS

Your -10 series system has either a KL10E, KL10R, KL10B, KL10D, or KS10 central processor. Each is described below.

| The KL10E, which directs the operation of the 1091 system, and the
| KL10R, which directs the operation of the 1095 system, contains:

- o A microcoded instruction set (399 instructions)
- o A high-speed 2K cache memory
- o Fast integrated-circuit general-purpose registers
- o Virtual memory capability
- o A console terminal (CTY)

| The KL10R is the 60 Hertz domestic version of the KL10E, a 50 Hertz
| international model.

HARDWARE FAMILIARIZATION

The KL10B, KL10D or KL10R central processors, which direct the entire operation of 1090 and 1099 systems, offer the same features and functions as the KL10E plus the following:

- o Up to eight integrated high-speed data channels (RH20's)
- o Up to three integrated communications processor channels (DTE20'S); a fourth DTE20 is used to interface the Console/Diagnostic processor

The central processor, internal memory and mass storage controllers are combined in two cabinets.

The KS10 central processor, which directs the entire operation of 2020 systems, contains:

- o A microcoded instruction set (396 instructions)
- o A high-speed cache memory
- o Fast integrated circuit general-purpose registers
- o Interrupt and trap facilities
- o Virtual memory capability

The central processor, internal MOS memory, mass-storage controllers, and peripheral controllers are combined in one cabinet.

2.3 MEMORY SYSTEMS

| Types of memory storage units available for the -10 series hardware systems include: MF10, MG10, or MH10 core memory; MS10, MF20, or MG20 MOS memory; and MB20 or MA20 internal memory.

MF10, MG10, or MH10 core memory is available on 1090 and 1099 systems, and consists of combinations of 32K, 64K, 128K and 256K word modules. Up to 16 memory modules may be attached to a system, providing a maximum of 4,096K words of directly addressable storage. Each word contains 36 bits of data and 1 parity bit.

Memory modules contain up to either 4 or 8 memory ports. Each port can be further expanded through the use of the MX10 memory multiplexer.

| MS10 MOS memory is used on 2020 systems. MF20 MOS memory is used on 1091 systems. MB20 or MA20 internal memory is used on 1091 systems. Each word of memory has 36 bits of data. MG20 MOS memory is used on 1095 systems. Note that an SMP system cannot include MG20 memory.

HARDWARE FAMILIARIZATION

2.4 FRONT-END PROCESSORS (KL SYSTEMS)

The PDP-11 based console/diagnostic processor is also referred to as a console front-end. The console front-end handles:

- o Line printers
- o Card readers
- o Floppy disks
- o Terminals
- o Console functions
- o Microcode loading
- o Memory configuration
- o System startup
- o System fault continuation
- o Diagnostics

The console front end is in the cabinet to the left of the cabinets containing the central processor, internal memory, and mass-storage controllers. The PDP-11 interfaces to KL processors through the DTE (Digital Ten-to-Eleven) interface. The front-end memory consists of 28K of 18-bit words (16 data bits and 2 parity bits).

Additional PDP-11 based front-end processors, referred to as communications front ends, can be attached to the KL10B or D processors through the integrated DTE20 interface or DL10 data channel. On the KL10E and KL10R they are attached through the integrated DTE20. Communications front ends provide the facilities for supporting interactive terminals and unit record remote stations. They can be attached locally through direct electrical connections or remotely through dedicated or dial-up telephone lines.

The DN87 front-end provides synchronous line protocol to support remote stations such as the DN80 series and the DN92. They attach to the processors through the DL10 data channel. The DN87, DN87S, and DN20 front ends provide synchronous and/or asynchronous protocol to support remote stations, depending upon the line options selected. The DN87 attaches to the KL10B or D through the DL10 communication channel. The DN20 or DN87S attach to the KL10B, KL10D, KL10E, and KL10R through the integrated DTE20 interface.

2.5 FLOPPY DISKS

| Three floppy disks are distributed with each new version of the
| TOPS-10 software for all 1091 and 1095 systems. Their main functions
| include loading and starting the PDP-11 and the KL10. They also run
| diagnostics that pertain to the front-end processor.

HARDWARE FAMILIARIZATION

2.6 DECTAPES

Three DECTapes are distributed with each new version of the TOPS-10 software for all 1090 systems. Their main functions include loading and starting the PDP-11 and the KL10. They also run diagnostics that pertain to the front-end processor.

2.7 THE MICROPROCESSOR (KS SYSTEMS)

The microprocessor on the KS system (2020) is a single microprogrammed chip, which is a complete central processing unit. The microprocessor handles console functions, diagnostics, microcode-loading and system startup.

2.8 PERIPHERAL DEVICES

Peripheral devices include line printers, card readers, DECTape drives, disk packs and drives, magnetic tape devices, plotters, terminals, and remote stations. Chapters 5 through 10 detail the operation and maintenance of the peripheral devices.

2.8.1 Overview of Peripheral Device Maintenance

NOTE

If you have misplaced the operator's manual enclosed with the peripheral device you wish to operate and maintain, contact your Field Service representative for complete information on operation, maintenance, and safety measures.

Because most equipment operates more efficiently if it is kept clean, a cleaning procedure is included with each device chapter. Here are some general rules for cleaning. You should have the following cleaning supplies available:

- o 91% isopropyl alcohol
- o Lint-free wipers
- o Spray cleaner
- o Vacuum cleaner with rubber or plastic attachments, which can blow air as well as take in air
- o Cotton-tipped applicators
- o Soft suede brush

You should clean the exterior of all equipment weekly. Vacuum all outside surfaces including cabinet tops. Use spray cleaner on all vertically exposed surfaces except around switches.

In general, do not clean the interior of any equipment unless so directed in the following chapters; your Digital Field Service representative does that job. Specific instructions for cleaning line printers and magnetic tape drives are given in the sections covering those devices.

HARDWARE FAMILIARIZATION

Always be careful not to bump or change the position of any switches; this could cause the system or the device to crash. Likewise, when you are cleaning the exterior of any disk drives, be careful not to jar the equipment; this could cause a serious hardware head crash.

Lastly, if you ever have any problem or doubts concerning the cleaning procedure for a device, consult your Field Service representative.

2.8.2 Line Printers

| Each system requires at least one line printer. The following line
| printers are available:

- o LP05-V
- o LP05-W
- o LP07
- o LP10-J
- o LP10-K
- o LP14-V
- o LP14-W
- o LP26
- o LP27
- o LN01 laser printer

All the line printers are 132-column devices, and have either a 64- or 96-character print set. Those with the 96-character print set have uppercase and lowercase characters. LP10 printers have a Vertical Format Unit (VFU), which consists of a carriage control tape. The VFU controls paper motions in the printer. All other models have a Direct-Access Vertical Format Unit, or DAVFU, that is controlled by software.

2.8.3 Card Readers/Punches

| Card readers are mainly used in batch processing. Card readers are
| input devices only. The following card readers and punches are
| available:

- o The CR10-D table model card reader, which processes 1000 cards per minute.
- o The CR10-E console card reader, which processes 1200 cards per minute.
- o The CR10-F table model card reader, which processes 300 cards per minute.
- o The CP10-D card punch, which processes 100 cards per minute.

HARDWARE FAMILIARIZATION

Card readers are interfaced to the central processor through the BA10 controller on 1070, 1077, 1080, 1090, and 1099 systems; card punches are interfaced through the CP10-D controller. On 1091, 1095, and 2020 systems, the card readers are interfaced through the CD20 controller.

2.8.4 DECTapes

The TU56 DECTape drive is a bi-directional, random access, magnetic tape storage device available on the 1070, 1077, 1080, 1090, and 1099 systems. Each TU56 is a dual tape transport, and, up to 4 of the dual drives can be attached to each TD10-C DECTape controller.

2.8.5 Disk Packs

| Disk storage allows rapid transfer of data in and out of main memory.
| At least one disk must be dual-ported on the KL10 system so that the
| front-end computer and the central processor can both access the
| information on the disk. Each CPU in an SMP system requires a disk
| dual-ported from the CPU to the front-end.

The following kinds of disk packs are available:

- o The RP02 disk pack, which has a 5-million word capacity.
- o The RP03 disk pack, which has a 10-million word capacity.
- o The RS04 fixed-head disk pack, which has a 4-million word (16-bit word) capacity.
- o The RP04 disk pack, which has a 20-million word capacity.
- o The RP06 disk pack, which has a 40-million word capacity.
- o The RM03 disk pack, which has a 15-million word capacity.
- o The RP20 disk pack, which has a 107.5-million word capacity per spindle.
- o The RP07 disk pack, which has a 111-million word capacity.
- o The RA60 removable disk pack, which has a 46-million word capacity.
- o The RA81 non-removable disk pack, which has a 102-million word capacity.

| All words are 36 bits unless noted otherwise.

The drives for these packs provide error detection and correction hardware as well as high-speed access and transfer rates.

On 1090, 1091, 1095, and 1099 systems, the RP04, RP06, or RP07 disk drives have an RH20 integrated controller and data channel for access by the central processor. If the drive has the dual-port option, the console front-end processor accesses a disk drive through an RH11 disk controller.

HARDWARE FAMILIARIZATION

On 1090, 1091, 1095, and 1099 systems the RP20 disk drive has an RH20 integrated controller and a data channel connected to a DX20 programmed device adapter. The DX20 is connected to an RP20 disk controller. If the disk is dual-ported, the main processor accesses the disk drive through the RH20.

On the KS system, the RP06 or RM03 disk drives have an RH11 integrated controller and data channel for access by the central processor.

- 1 On 1090, 1095 and 1099 systems, the RP04, RP06, or RS04 disk drives have an RH10 integrated controller and DF10 data channel for access by the central processor. The RP02 and RP03 disk drives have an RP10 integrated controller and a DF10 data channel.

RP04, RP06, RP07, and RP20 disk drives are available with a dual-port option. This option allows a disk drive to be accessed over either of two paths. In the KL series processors, for example, an RP04 or RP06 dual-ported disk drive can contain files to be accessed by both the main processor and the console front-end processor. A dual-ported RP07 or RP20 disk drive can only be accessed by the main processor. For KL SMP systems, disk drives may be dual-ported across CPUs. Dual-ported disks decrease overhead and increase availability and performance.

The RA60 and RA81 disk drives can be dual-ported between two HSC-50 controllers. These controllers can be connected to different KL10 CPUs in an SMP system. This provides fail-safe capability in the case that one CPU crashes.

2.8.6 Magnetic Tapes

The following magnetic tape systems and drives are described:

TE10	TU16	TU40
TU41	TU45	TU70
TU71	TU72	TU77
TU78		

All magnetic tape drives are either 7- or 9-track drives. They can handle one of the following groups of variable recording densities:

- o 200, 556, or 800 bits per inch (BPI)
- o 800 or 1600 BPI
- o 1600 or 6250 BPI

Recording speeds vary from drive to drive, but fall in the range of 45 to 200 inches per second.

On KL systems, the TU45 and TU77 are interfaced through a TM02 or TM03 controller to an RH20 integrated controller. The TU70, TU71, and TU72 are interfaced to an RH20 through a DX20 and TX02 or they are interfaced to a DX10 through a TX01 or TX02. The TU78 is interfaced to channels (RH11, RH20) through a TM78 controller housed in the master TU78 tape drive.

On KS systems, the TU45 is interfaced to an RH11 integrated controller and data channel through a TM02 or TM03 controller.

HARDWARE FAMILIARIZATION

2.8.7 Plotters

The following plotters are described:

- o The XY10-A plotter with .01 inch, .005 inch, or .1 millimeter step size at 18,000 steps per minute, and using 12-inch-wide paper.
- o The XY10-B plotter with .01 inch step size at 12,000 steps per minute or .005 inch or .1 millimeter step size at 18,000 steps per minute, and using 31-inch-wide paper.

2.8.8 Terminals

The operator and each timesharing user interacts with the system through a terminal. You will generally use a hardcopy terminal as the operator's terminal to start, stop, load and continue the system and user programs. Using a hardcopy terminal provides you with a printed record of all your interactions with the system and the users. This is especially useful when there is a problem with the system. Users interact with the system through either a hardcopy or a video terminal. Several terminals can be used as operator's terminals, set to receive messages from certain types of system resources (see Section 12.6). The CTY is also a hardcopy terminal, useful for recording system events. These listings can provide information vital to solving puzzling system crashes.

2.8.8.1 Hardcopy Terminals - Hardcopy terminals include:

- o LA36 DECwriter II
- o LA35RO (Recieve Only) DECwriter
- o LA37APL DECwriter
- o LA120 DECwriter
- o LA180 DECprinter

2.8.8.2 CRT Display Terminals - CRT display terminals include:

- o VT50 and VT50H video terminals
- o VT52 video terminal
- o VT61 video terminal
- o VT100 video terminal
- o VT102 video terminal
- o VT220 video terminal
- o VT240 video terminal

HARDWARE FAMILIARIZATION

For a complete list of hardcopy and video terminals supported by the software, type:

HELP *

One piece of information returned by HELP * is a list of terminal types.

2.8.9 Remote Stations

The following remote stations are used in TOPS-10 network configurations:

- o The DN80 series remote stations that can provide remote job entry facilities (DN80), remote terminal facilities (DN81), or a combination of both (DN82).
- o The DN92 remote station, which can be configured in combinations of terminal lines and a card reader and/or a line printer. DN92 is not supported on 2020 systems.
- o The DN2000 remote station, which can be configured in combinations of terminal lines and a card reader and/or a line printer.
- o The DN20 remote station is a PDP-11 based processor that can run communications functions for either ANF-10 or DECnet-10 Version 3.0.

For information about ANF-10, refer to the TOPS-10 ANF-10 Networks Software Installation Guide.

For information about DECnet-10, refer to the DECnet-10 System Manager's and Operator's Guide.

CHAPTER 3

SOFTWARE OVERVIEW

The -10 series software falls into three general categories: operating systems, languages, and utilities.

3.1 OPERATING SYSTEMS

The main operating system for the -10 series hardware is called the TOPS-10 monitor. It supports timesharing, batch processing, realtime, and remote communications.

The RSX-20F operating system runs in the console/diagnostic processor on KL systems. It aids the central processor and TOPS-10 in handling system tasks such as system loading, console communications, and diagnostic functions.

3.2 LANGUAGES

The TOPS-10 monitor supports three types of translators used in symbolic language programming: assemblers, compilers, and interpreters.

3.2.1 MACRO Assembler

MACRO is the symbolic assembler program used on TOPS-10. It is device-independent; input and output devices can be selected at run time and may vary from run to run. MACRO also contains capabilities that allow the user to replace commonly-used sequences of instructions with a single statement.

3.2.2 Compilers

The compilers on TOPS-10 include ALGOL, COBOL, BLISS, and FORTRAN. The ALGOritmic Language, ALGOL, is a scientific language designed for the solution of computational processes, or algorithms. TOPS-10 ALGOL is composed of the ALGOL compiler for the translation of the source code and the ALGOL object-time system that provides I/O services, a library of mathematical functions, and control of system resources.

SOFTWARE OVERVIEW

The Common Business Oriented Language, COBOL, is an industry-wide data processing language designed for business applications. Its English-like statements are easily learned and result in self-documenting programs. TOPS-10 COBOL includes the COBOL compiler; an object-time system, LIBOL; a source library maintenance program; a COBOL checkout and debugging program, COBDDT; and ancillary programs.

BLISS is a middle-level language, providing both a substantial class of higher level facilities while permitting access to hardware features and producing high-quality object code. It is intended for use as a system implementation language.

The FORMula TRANslator language, FORTRAN, is a widely used, procedure-oriented language designed and primarily used for solving scientific problems. TOPS-10 FORTRAN-10 includes the FORTRAN-10 compiler; an object-time system, FOROTS; and a FORTRAN checkout and debugging program, FORDDT.

3.2.3 Interpreters

The interpreters include APL, CPL, and BASIC. APL (A Programming Language) is a completely conversational system especially suited for handling numeric and character array-structured data. However, it is also intended for use as a general data processing language.

CPL is an interpreter supporting a subset of the draft ANSI PL/I language. CPL supports the following classes of PL/I built-in functions: arithmetic, mathematical, string array, storage control and pseudo-variables.

The Beginner's All-purpose Symbolic Instruction Code, BASIC, is an easy to learn problem-solving language, particularly suited to a timesharing environment. BASIC contains its own editing facilities. The full language includes statements covering matrix computations, advanced string-handling capabilities, mathematical functions, and the generation of user-defined functions.

3.3 UTILITIES AND OTHER SOFTWARE

TOPS-10 provides many utilities, including text editors, text processors, file manipulators, maintenance programs, and monitor support programs. These programs are called Commonly Used System Programs (CUSPs):

BACKUP A system program to save disk files on magnetic tape, and later to restore any or all of the files back to disk.

DDT The Dynamic Debugging Technique used for the on-line checkout and updating of programs.

DIRECT DIRECT is a CUSP used to list user directories from disk, magnetic tape, and DECTape. Through the use of DIRECT, a user may at any time determine, from a terminal or batch job, the files existing in the user directory.

GALAXY A group of programs that can control user requests for devices, accounting, and batch jobs, as well as the system unit record devices.

SOFTWARE OVERVIEW

- LINK-10 A linking loader to merge independently-compiled object files into one executable program.
- OPR The operator's command interface, which allows communication with various parts of the monitor and the GALAXY system.
- OPSER A service program that allows you to control multiple subjobs from a single terminal.
- PIP A file interchange program to selectively transfer files from one media to another and concurrently perform limited editing and directory manipulation. PIP functions are performed by monitor commands like DELETE and COPY.
- RUNOFF A text processing program that produces a final formatted, paged, right-justified output from an edited file with appropriate RUNOFF commands.
- TECO A character-oriented text editor with the ability to edit any source document without requiring special formatting.

For more information about Commonly Used System Programs refer to the TOPS-10 User Utilities Manual.

INSERT TAB 3 "DEVICE OPERATION AND MAINTENANCE" HERE

CHAPTER 4

LINE PRINTERS

This chapter describes procedures for operating and maintaining line printers and the LN01 laser printer. Line printers that have similar functions and controls are grouped together in the sections that follow. Be sure to follow the procedures for the appropriate printer.

4.1 LP05, LP14, LP26, AND LP27 PRINTERS

Sections 4.1.1 through 4.1.4 describe the physical characteristics and maintenance procedures for LP05, LP14, LP26, and LP27 line printers.

4.1.1 Control Panels

The LP05, LP14, LP26, and LP27 line printers are very similar in appearance and have the same hardware controls.

The operator control panel is located on the top right of the printer and is illustrated in the following figures:

Printer	Figure
LP05	4-1
LP14	4-2
LP26	4-3
LP27	4-4

The control panel contains error indicator lights, push-button switch/indicator lights, and toggle switches. Main power to the printer is supplied by a circuit breaker located at lower right beneath the main gate. When this is turned on, the POWER ON indicator will light (green). The following list describes all switches and indicator lights.

ALARM (indicator): lights red when a fault condition exists.

CLEAR (switch): when a fault condition has been corrected, pressing CLEAR will clear master printer logic and cause the ALARM indicator to go out.

READY (indicator): printer is ready to be placed on-line when READY is lit.

LINE PRINTERS

ON/OFF LINE (switch/indicator): pressing this switch will place the line printer either on or off-line. When on-line, the printer is under control of the user system.

PAPER STEP: causes the paper to advance one line (enabled only when printer is off-line).

TOP OF FORM: causes the paper to advance to top of form (enabled only when the printer is off-line).

FORMS RESET: press down in order to use the COARSE VERTICAL FORM ADJUSTMENT control.

6-8 LPI: selects either 6 or 8 lines per inch vertical spacing. 6 lines per inch is the more common setting.

One or more of the six red error indicator lights are lit when any of the following error conditions exist:

- o HAMMER - a print hammer is not operating properly.
- o FORMAT - number of line feeds executed and number of line feed commands do not match.
- o RIBBON - ribbon is not advancing properly due to failure to reverse, or due to a snag, or motor problem.
- o GATE - the drum gate is not latched.
- o PAPER - no paper, torn paper, or paper runaway problem.
- o TAPE - parity error in the VFU memory.

Clear these lights by correcting the problem and then pressing the CLEAR switch.

LINE PRINTERS

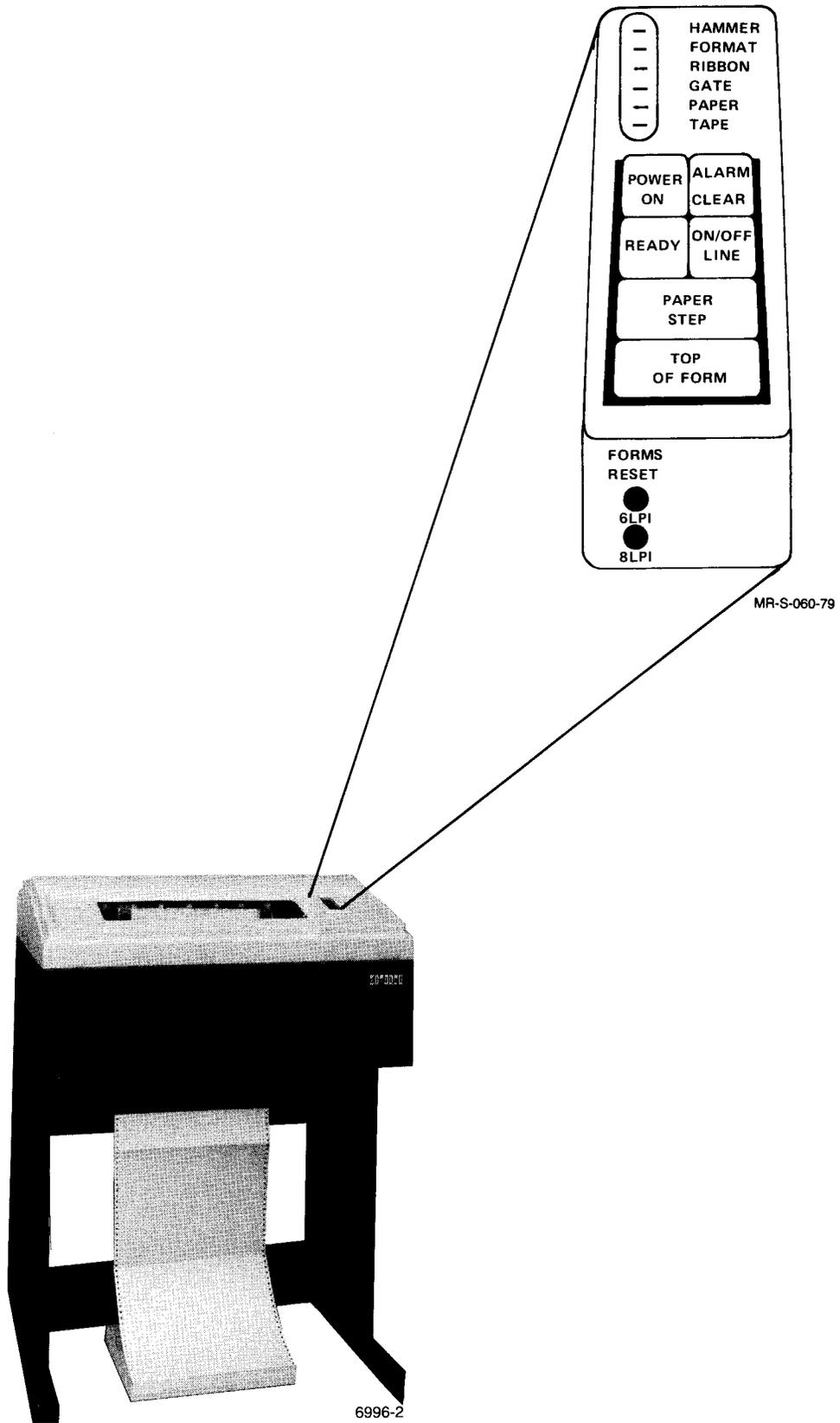


Figure 4-1: LP05 Line Printer

LINE PRINTERS

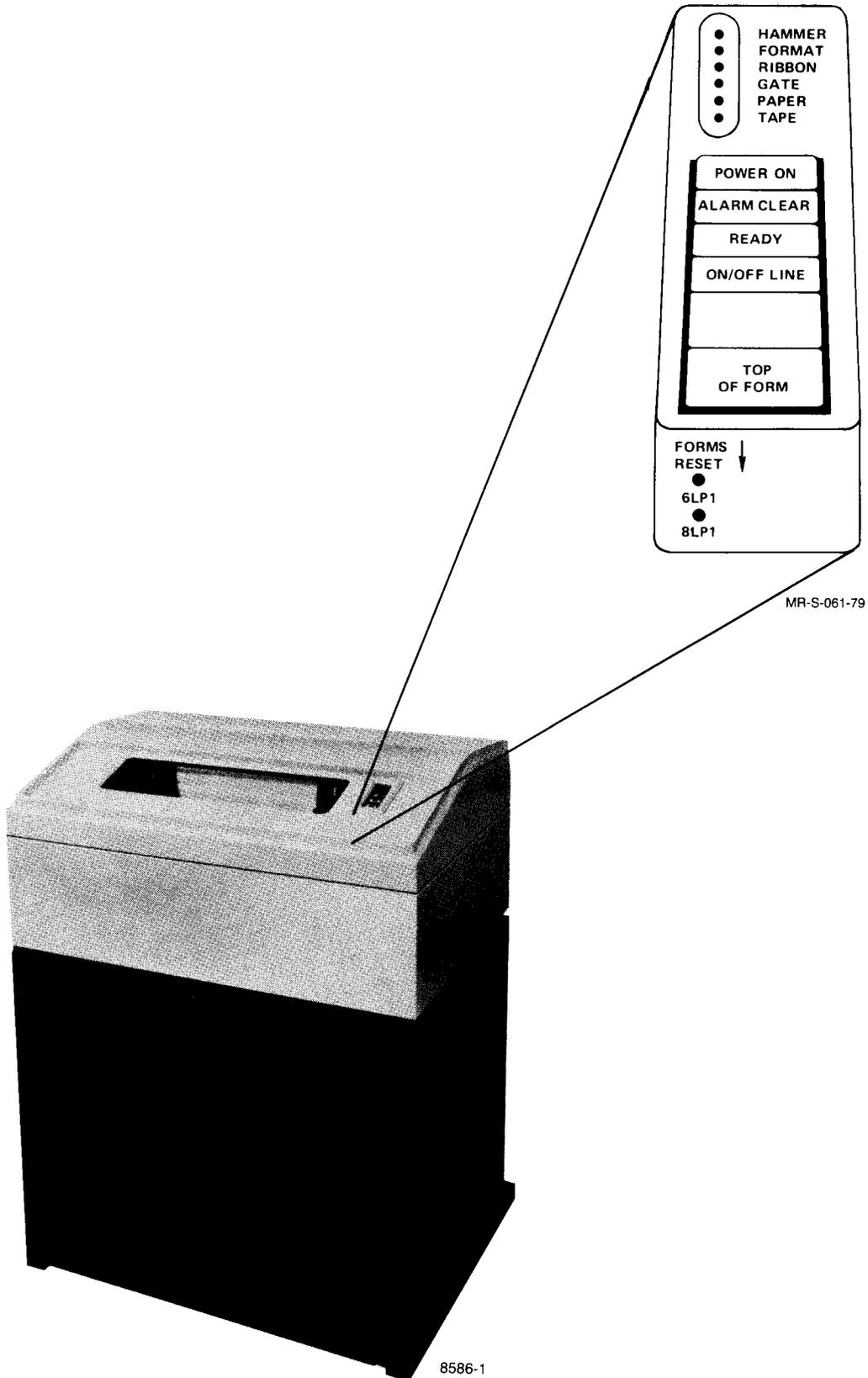


Figure 4-2: LP14 Line Printer

LINE PRINTERS

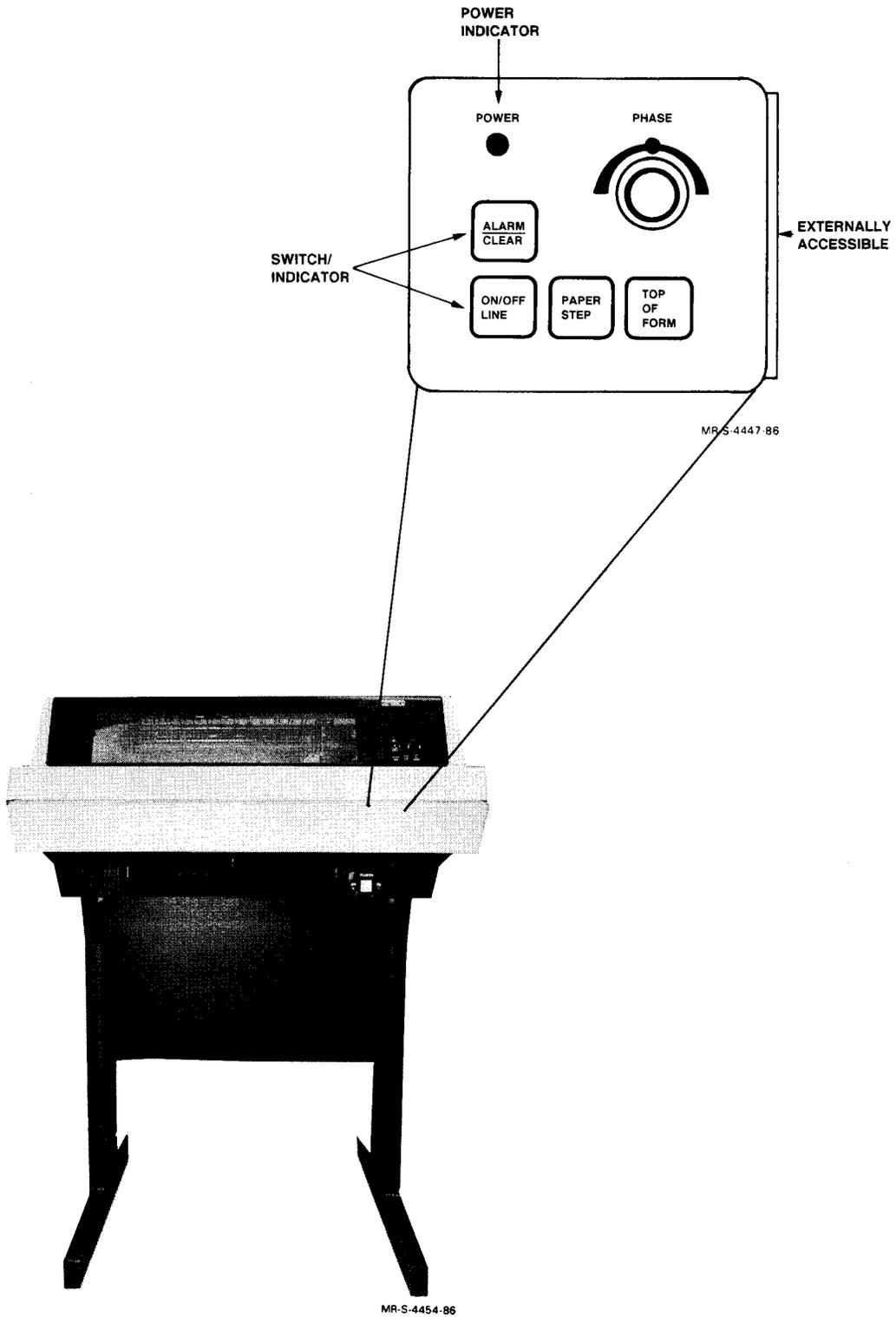
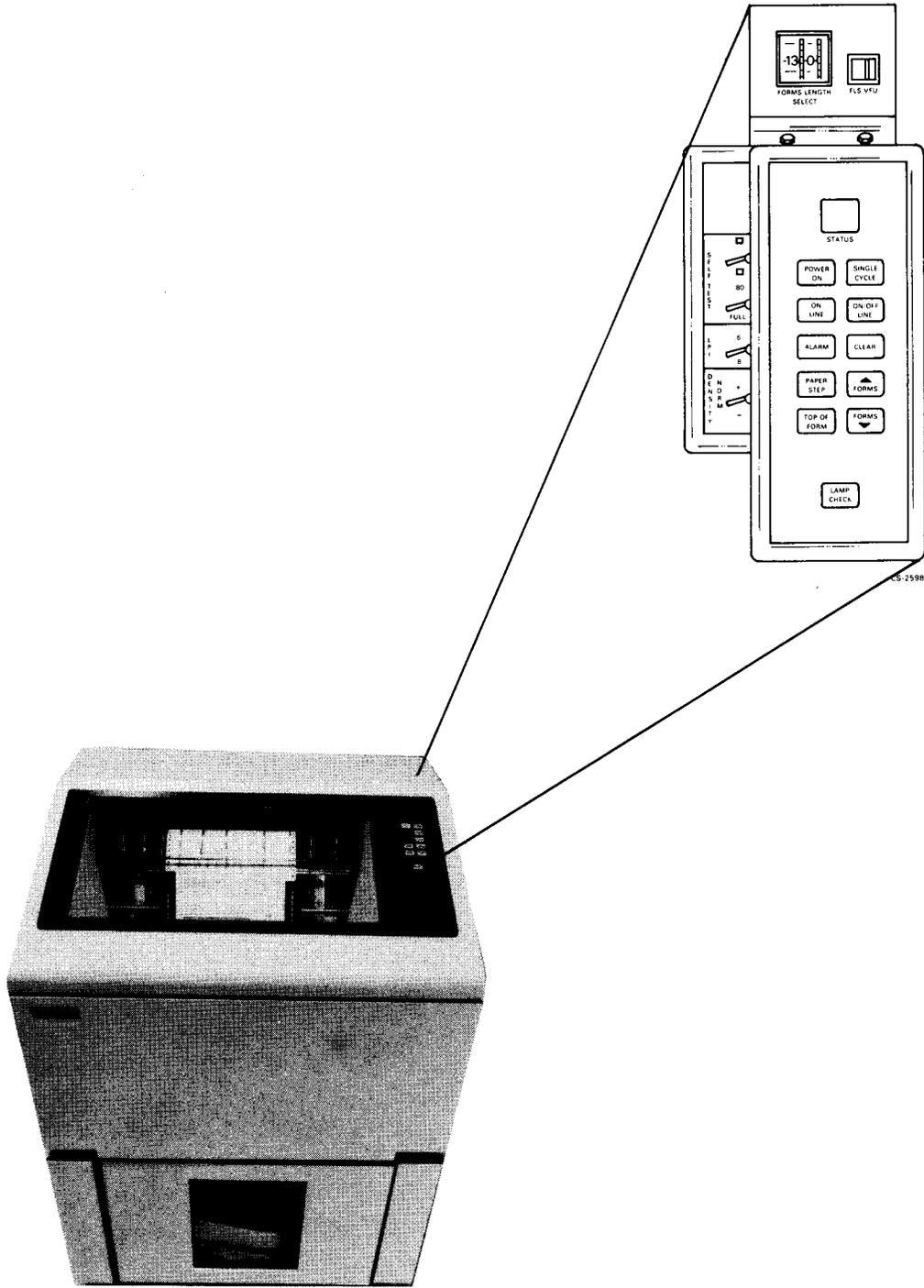


Figure 4-3: LP26 Line Printer

LINE PRINTERS



MR-S-4455-86

Figure 4-4: LP27 Line Printer

LINE PRINTERS

4.1.2 Changing Paper and Forms

The following procedure describes paper or forms installation, alignment, and adjustment on an LP05, LP14, LP26 or LP27 line printer (Figures 4-5, 4-6, 4-7 and 4-8).

1. Press the ON/OFF-LINE switch to set the printer off-line (indicator not lit).
2. Lift the printer cover.
3. Using the drum gate latch, unlatch and fully open the drum gate.

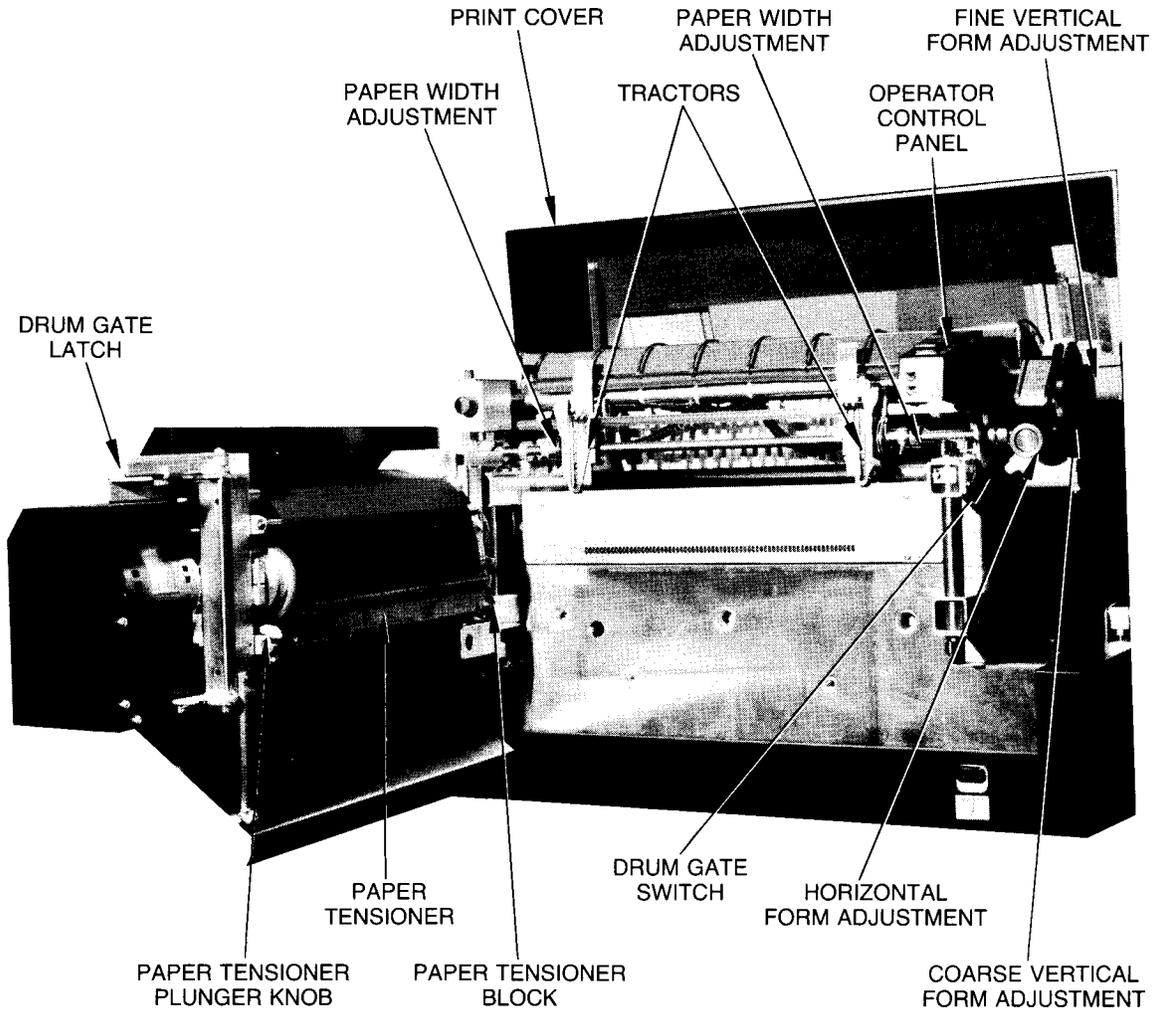
CAUTION

Wait for the character drum to stop rotating before you proceed.

4. Press and release the TOP OF FORM switch. The tractors will advance to the top-of-form position.
5. Open the spring-loaded pressure plates on the tractors.
6. Place paper in the tractors and close the pressure plates.
7. Loosen both paper-width adjustment guides and move both tractors laterally to adjust for correct paper-width. Tighten the paper-width adjustment guides.
8. If necessary, align the perforations in the paper above the print line index (Figure 4-6) by depressing the FORMS RESET switch and rotating the tractor shaft by using the COARSE VERTICAL FORM ADJUSTMENT control. Then release the FORMS RESET switch.
9. Adjust the horizontal position of the paper with the HORIZONTAL FORM ADJUSTMENT control. Use the horizontal indentation index marks as a guide.
10. Close and latch the drum gate.
11. Press ALARM/CLEAR switch.
12. Press and release the ON/OFF LINE switch to set the printer on-line (indicator lit).
13. Use the FINE VERTICAL FORM ADJUSTMENT control to correct any small misalignment in the printout during operation.
14. Close the printer cover.

Occasionally, the paper will jam in the line printer. When the paper jams, the printer goes off-line. If this happens, repeat Steps 2, 3, and 5 through 10. Then press the TOP OF FORM switch. Requeue the printer job and press the ON/OFF-LINE switch.

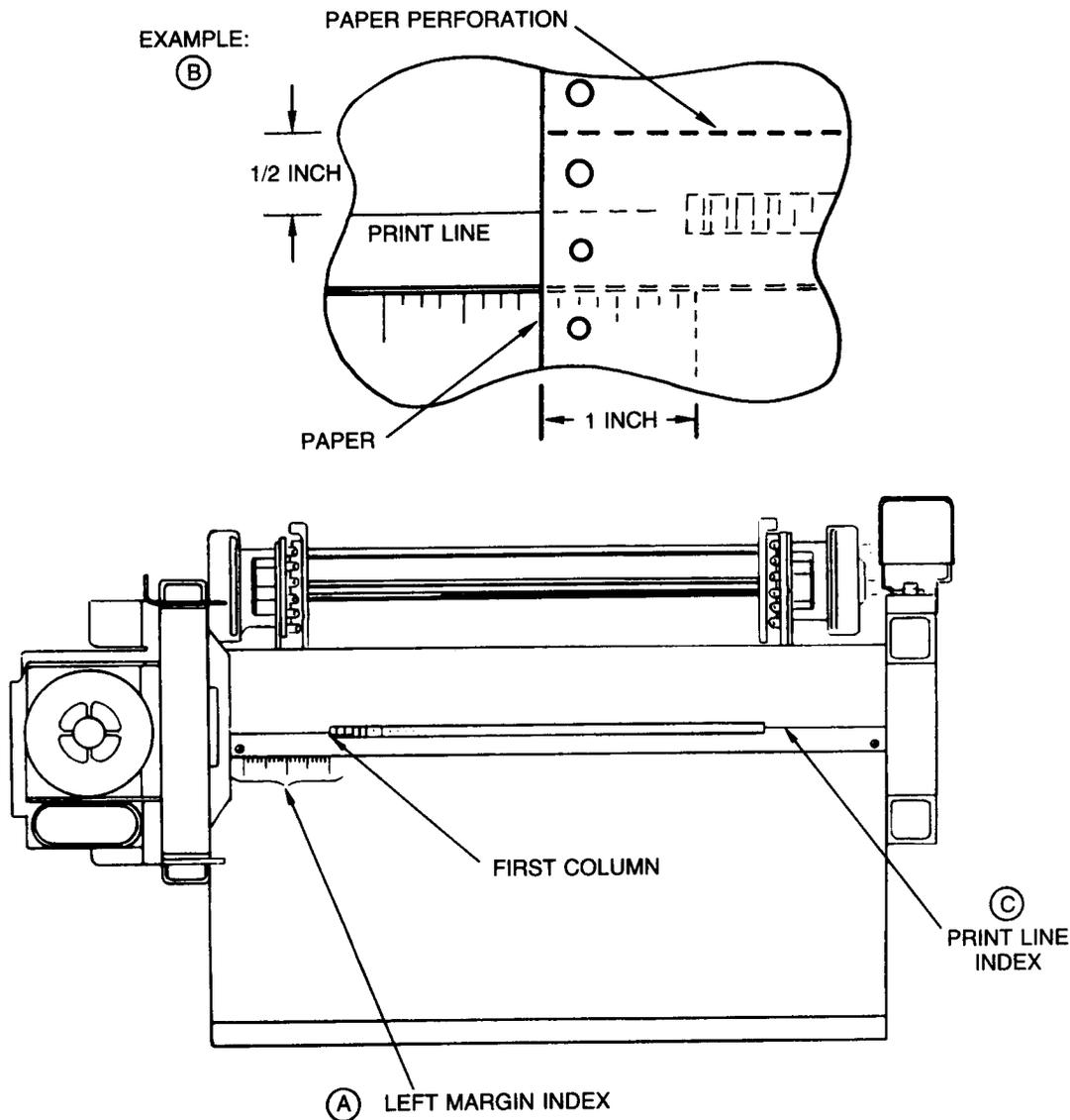
LINE PRINTERS



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Figure 4-5: LP05 or LP14 Paper Installation

LINE PRINTERS



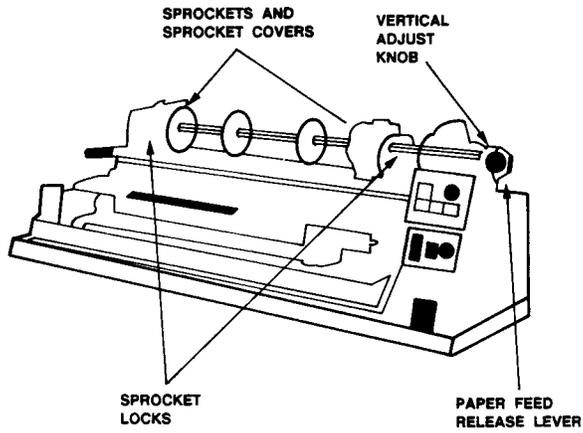
MR-S-618-80

- (A) The paper may be horizontally positioned to provide left margins up to two inches wide.
- (B) The example shows paper properly installed for a 1/2-inch top margin (top-of-form spacing) and a one-inch left margin.
- (C) The print line index shows the location of the center of the print line hammer bank.

MR-S-612-80

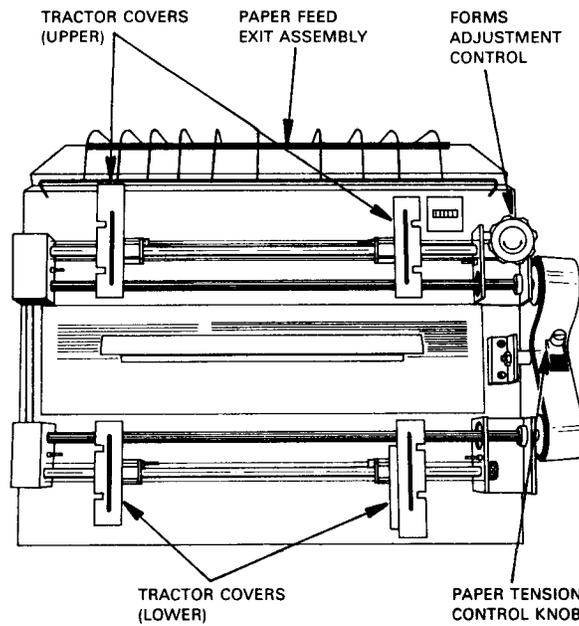
Figure 4-6: LP05 or LP14 Forms Alignment

LINE PRINTERS



MR-5-4448-86

Figure 4-7: LP26 Paper Installation



CS-2600

Figure 4-8: LP27 Paper Installation

LINE PRINTERS

Replenishing Forms

If you are merely replenishing forms and not changing to a different form, proceed as follows:

1. Lift the printer window.
2. Using the drum gate latch, unlatch and fully open the drum gate.

CAUTION

Wait for the character drum to stop rotating before you proceed.

3. Open all tractor pressure plates.
4. Insert the new form, overlapping the old one by at least one page and aligning the two at the page perforations. Close all tractor pressure plates.
5. Close and latch the drum gate.
6. Close the printer window.
7. Press the ON/OFF-LINE switch to set the printer on-line (ON LINE indicator lit).

4.1.3 Controlling the Vertical Format Unit

The LP05, LP14, LP26 and LP27 line printers have a Direct-Access Vertical Format Unit (DAVFU), which is controlled by the software. The TOPS-10 operating system loads this software.

4.1.4 Changing and Reversing the Ribbon

The following procedures describe how to change the ribbon on LP05, LP14, LP26, and LP27 line printers (Figure 4-9).

1. Use the plastic gloves supplied with the ribbon.
2. Press the ON/OFF LINE switch to place the printer off-line (indicator not lit).
3. Lift the printer cover.
4. Using the drum gate latch, unlatch and fully open the drum gate.

CAUTION

Wait until the next character drum stops rotating before proceeding to next step.

5. While holding the paper tensioner with one hand, pull the paper tensioner plunger knob to your left and remove the paper tensioner from the drum gate.

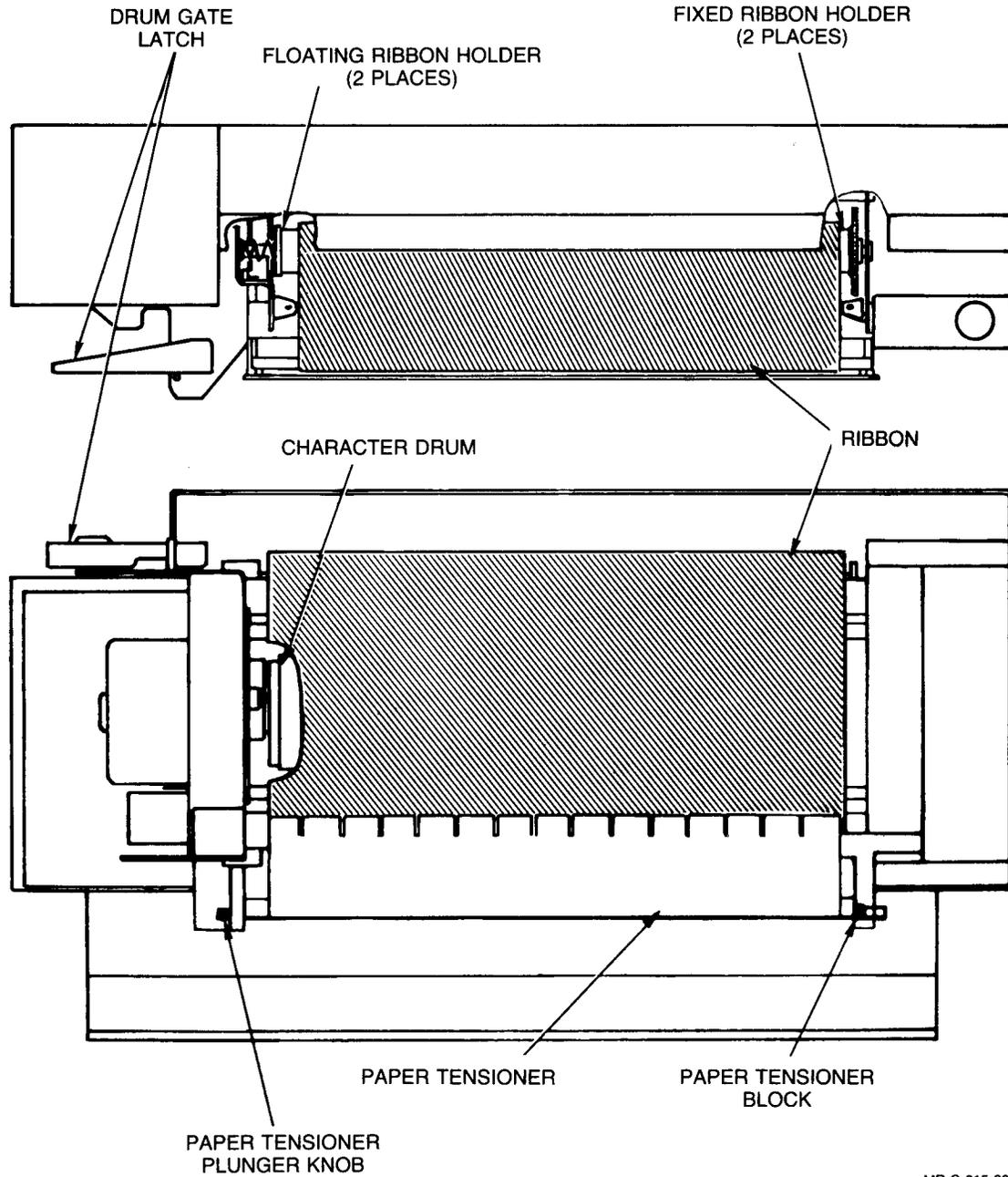
LINE PRINTERS

6. Grasp the right end (fixed ribbon holders) of the top and bottom ribbon cores and push left against the floating holder springs; pull the right end of the ribbon cores away from the drum gate first.
7. Remove the new ribbon from its packing box and remove the plastic wrapping.
8. Place the fully wound ribbon core over the top floating ribbon holder. The ribbon must be installed so that it unwinds from the top of the ribbon core.
9. Push the ribbon core end toward your left against the floating ribbon-holder spring, and place the opposite ribbon core end over the top fixed ribbon holder. Be sure that the holder guide-pin slips into the core end slot.
10. Unwind the second ribbon core and bring it down over the character drum and ribbon guide bars.
11. Place the ribbon core on the bottom ribbon holders as in Step 9, for the top ribbon core.
12. Install the paper tensioner by placing the paper tensioner block in position and pushing the tensioner against the tensioner knob, while pulling the knob to allow engagement.
13. Close the drum gate and press the ALARM/CLEAR switch.
14. Press the ON/OFF-LINE switch to place the printer on-line (indicator lit).

Most listings have more print on the left half of the paper. Therefore, to prevent the ribbon from wearing unevenly, you should reverse the ribbon using the following procedure:

1. Follow Steps 1 through 6 above to remove the ribbon.
2. Holding the two ribbon cores as you took them off the printer, rotate them clockwise until the top core is at the bottom.
3. Now that you have reversed the top and bottom ribbon cores, put the ribbon back on the printer by following Steps 9 through 14 above.

LINE PRINTERS



MR-S-615-80

Figure 4-9: LP05, LP14, LP26 or LP27 Ribbon Installation

LINE PRINTERS

4.2 LP07 PRINTER

Sections 4.2.1 through 4.2.4 describe the physical characteristics and maintenance procedures for the LP07 line printer.

4.2.1 Control Panel

The LP07 control panel is on top of the printer at the left. Controls for normal operation are visible, other controls are covered by a metal plate which can be lifted. The control panel is illustrated in Figure 4-10. The panel contains switches (two-position), white indicator lights, red error lights and two dial knobs. From the bottom up, these controls are as follows:

START/STOP Switch: Places the printer on-line (the RUN light comes ON) or takes it off-line.

SINGLE CYCLE Switch: Permits printing of one line at a time each time the START/STOP switch is pressed.

TOP OF FORM Switch: With the printer off-line, depressing the TOP OF FORM switch causes the paper and/or the carriage control loop to position themselves at the top of a page ready for printing.

CHECK CLEAR Switch: After an error condition has been corrected, pressing this switch clears the error lights.

RUN Indicator: This is lit when the printer is READY and STARTed.

READY Indicator: When lit, there are no error conditions, the printer can be placed on-line. If this light fails to come on, there is a paper fault or Charaband problem.

POWER ON Indicator: When lit, the power switch is in the ON position.

LINE PRINTERS

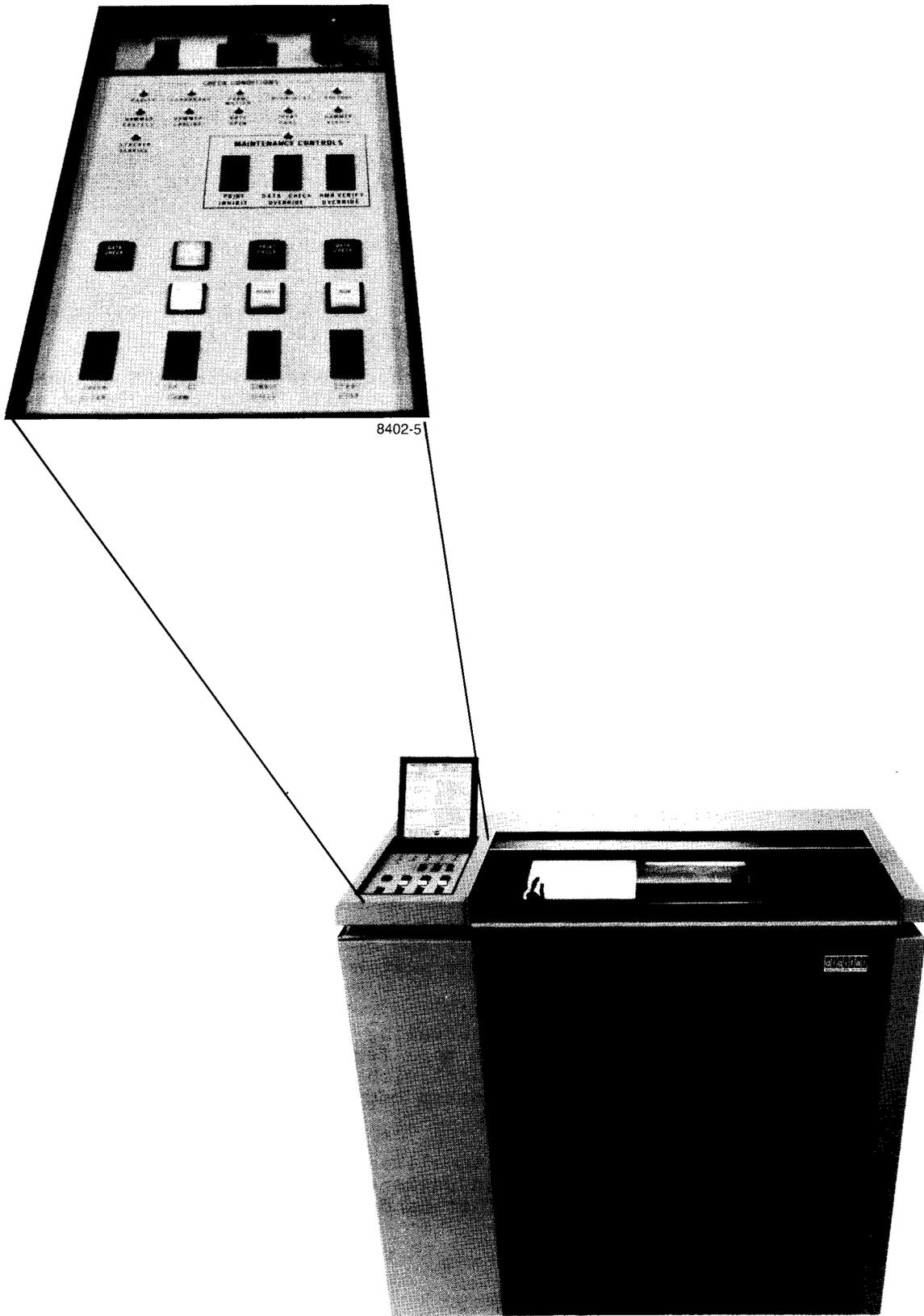


Figure 4-10: LP07 Line Printer

LINE PRINTERS

ERROR LIGHTS:

Whenever an error condition occurs, such as running out of paper, VFU error, or a problem with the Charaband, the RUN and READY lights go out. At this time one of the red error lights below may come on.

GATE CHECK Indicator: The gate is open and must be closed before printing can commence. This may also indicate a Charaband problem.

FORMS CHECK Indicator: The printer is out of paper, or runaway paper motion has occurred.

PRINT CHECK Indicator: Indicates an electrical malfunction, hammer problem, or one of the OVERRIDE switches is set.

DATA CHECK Indicator: Indicates that there is a PARITY or HAMMER cooling error, or the SINGLE CYCLE or DATA CHECK OVERRIDE is set.

To turn these lights off, correct the problem and hit the CHECK CLEAR Switch.

MAINTENANCE CONTROLS:

These consist of three switches and an indicator light. Setting any of these switches allows certain error conditions to be overridden. For example, PRINT INHIBIT deactivates the hammer firing mechanism, so that printer functions can occur without paper being loaded. DATA CHECK OVERRIDE allows the printer to disregard the IDENTIFIER code on the Charaband. These switches are essentially for Field Service use.

CHECK CONDITIONS:

These eleven small, red error indicator lights are sub-conditions of the four large error indicator lights discussed above. Their meaning is in many cases self-explanatory. INTERLOCKS lights if the RUN/ADJUST CLUTCH is open, or the VFU cover is open.

OTHER CONTROLS and SWITCHES:

POWER Switch: Powers the printer ON and OFF.

PRINT RATE Switch: The printer can operate at both high and low speeds. Make certain the POWER switch is OFF before changing the speed.

PENETRATION CONTROL Knob: Increasing the penetration causes the printer hammers to fire with more force. The penetration should be increased when printing forms with multiple or carbon copies. Check the quality of the bottom copy before proceeding with the entire print job.

PHASING CONTROL Knob: This equalizes the right-to-left density of the characters; the adjustment is necessary when you have changed the penetration or Charaband speed.

LINE PRINTERS

4.2.2 Changing Paper and Forms

The following procedure describes how to install forms, align them, and adjust the paper on an LP07 line printer. (Refer to Figures 4-11 and 4-12.)

1. If the printer is running, press the START/STOP switch to place the printer in STOP mode (RUN indicator is not lit).
2. Lift the printer window.
3. Unlatch and fully open the band gate and ribbon mask.

CAUTION

Wait until the Charaband stops rotating before proceeding to the next step.

4. If necessary, reposition the upper and lower left forms tractors. Make sure that they are still vertically aligned.
5. Unlock the upper and lower tractor locks on the right tractors.
6. Open all tractor pressure plates.
7. Insert the left edge of the form in the upper left tractor and close the pressure plate.
8. Slide the upper right tractor to a position beneath the right hand form feed holes and close the pressure plate. Lock the upper right tractor.
9. Loosen the PAPER TENSION control lock and set the PAPER TENSION control to its extreme counterclockwise position (least tension).
10. Insert form in the lower left tractor and close the pressure plate.
11. Slide the lower right tractor to a position beneath the right hand form-feed holes and close the pressure plate. Lock the lower right tractor.
12. Adjust the PAPER TENSION control clockwise to achieve proper vertical form tension. Proper tension occurs when there is a slight crease on the top edge of the form-feed holes. Tighten the PAPER TENSION lock.
13. Press the TOP OF FORM switch on the operator control panel.

LINE PRINTERS

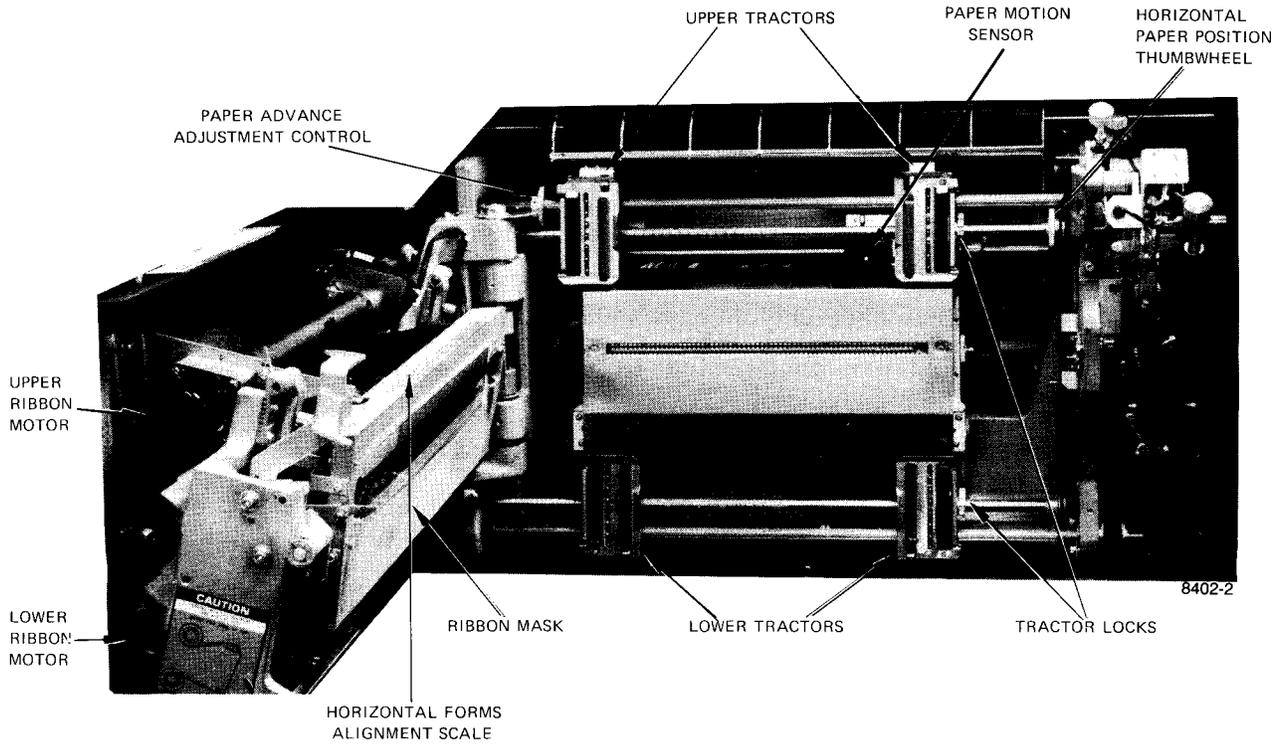


Figure 4-11: LP07 Paper Installation

LINE PRINTERS

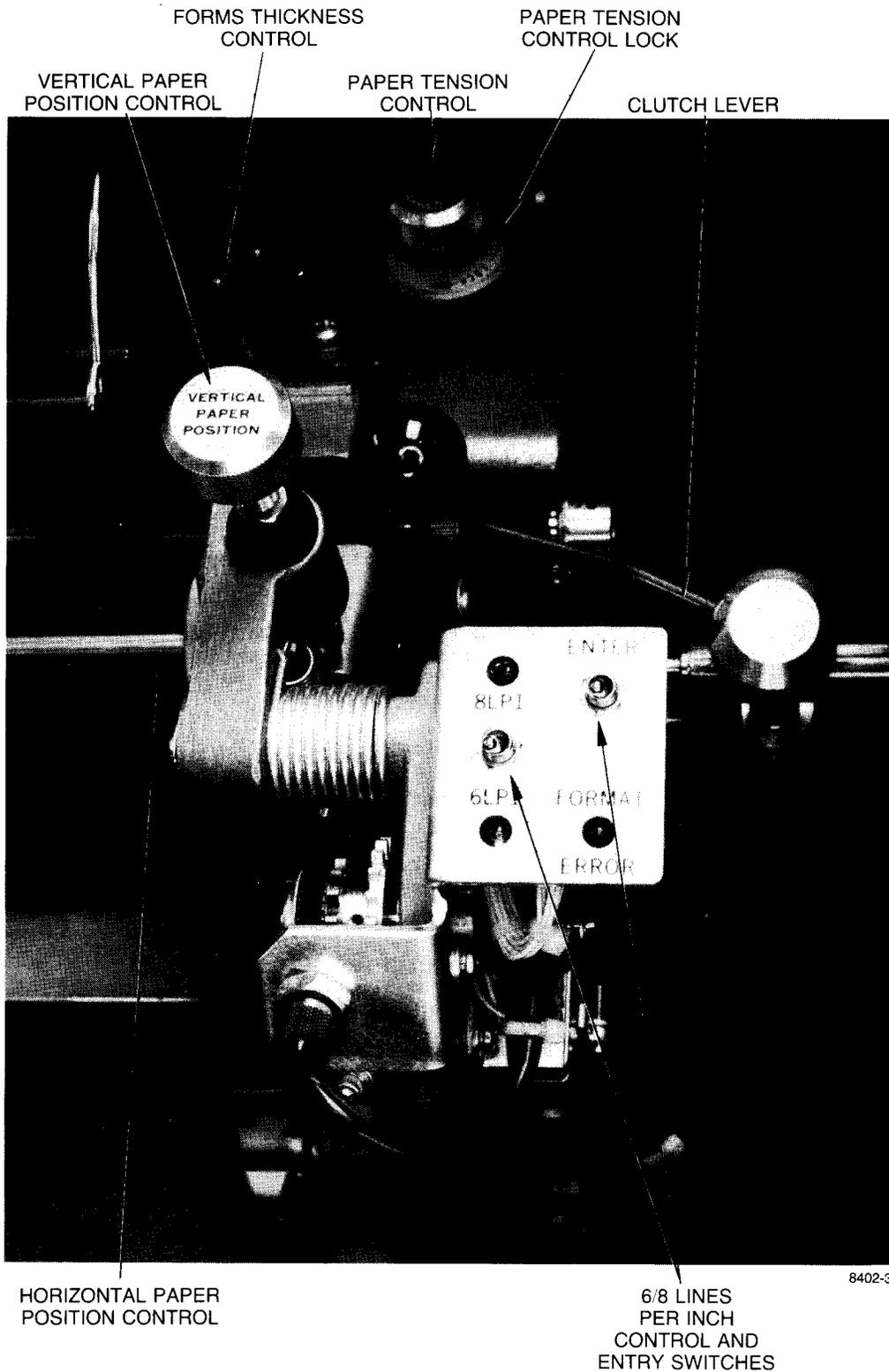


Figure 4-12: LP07 Forms Alignment

LINE PRINTERS

14. Rotate the PAPER FEED clutch clockwise to the ADJ position and use the PAPER ADVANCE ADJUSTMENT control to position the form at the first line of print. Use the hammer faces as a print-line guide. Return the clutch to the RUN position.

You can use the VERTICAL PAPER POSITION control to obtain a finer adjustment of vertical position. This may be necessary when using pre-printed forms.

15. Close and latch the ribbon mask.
16. Rotate the HORIZONTAL PAPER POSITION control to align the form horizontally; use the horizontal forms alignment scale on the ribbon mask assembly for reference.
17. Set the thickness control to match the form being loaded.
18. Close the band gate and printer window.
19. Press the TOP OF FORM switch several times to ensure that the form is advancing correctly through the tractors.
20. Press the START/STOP switch to place the printer in RUN mode (RUN indicator will light).

Occasionally, the paper will become jammed in the line printer and the printer goes off-line. If this happens, repeat Steps 2 through 13. Then press the TOP OF FORMS switch. Restart the printer job and press the ON/OFF-LINE switch.

Replenishing Forms

If you are merely replenishing the forms supply and not changing to a different form, proceed as follows:

1. Lift the printer window.
2. Unlatch and fully open the band gate and ribbon mask.

CAUTION

Wait until the Charaband stops rotating before proceeding to the next step.

3. Open all tractor pressure plates.
4. Insert the new form, overlapping the old one by at least one page and aligning the two at the page perforations. Close all tractor pressure plates.
5. Close and latch the ribbon mask.
6. Close the band gate and printer window.
7. Press the START/STOP switch to place the printer in RUN mode (RUN indicator is lit).

LINE PRINTERS

4.2.3 Controlling the Vertical Format Unit

The LP07 line printer has a Direct-Access VFU (DAVFU) that is the software counterpart of a carriage control tape. The direct-access VFU is loaded with a file containing an 8-channel by 143-line bit matrix. The ON bits in this matrix represent the punched holes in the corresponding carriage control paper tape.

The LP07 printer provides for the software control of the print density (6 or 8 lines per inch) as well as for operator control by means of a switch.

Information on how to generate, store, and load DAVFU matrices is contained in the files MAKVFU.DOC and MAKVFU.HLP.

To generate a default matrix that corresponds to Channels 1-8 of the standard line printer carriage tape for the LP10, proceed as follows:

```
.R MAKVFU          Run the MAKVFU program.
*OUTPUT          If this is the only command, the default
                 matrix is generated and is stored as
                 DSK:NORMAL.VFU on your disk area.
*EXIT            Return to the monitor.
.
```

To generate a custom matrix, load MAKVFU and give the appropriate MAKVFU commands as described below.

Command	Function
CHANNEL n ALL	Set all lines in logical page for channel n. (n = 1,2,...8)
CHANNEL n BOTTOM	Set last line in logical page for channel n. (n = 1,2,...8)
CHANNEL n EVERY m	Set every m-th line in physical page for channel n. (n = 1,2,...8) (m = 1,2,...length)
CHANNEL n LINES m1 m2 ...	Set lines m1, m2, ... in physical page for channel n. (n = 1,2,...8) (m1 m2... = 1,2,...length)
CHANNEL n TOP	Set line 1 in physical page for channel n. (n = 1,2,...8)
EXIT	Exit from MAKVFU.
FORMS	Clear all forms break channels.
FORMS n	Define forms break for channel n.
HELP	Display the MAKVFU.HLP file on the terminal.
INFORMATION	Display a brief description of the VFU file, including length, page size, forms break, and LPI (lines per inch) settings.

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Command	Function
INFORMATION n	Display a description of the lines defined for channel n.
LENGTH x	Define the physical page size to be x. (x = 1 - 143). Length must be greater than or equal to page size.
LPI y	Define the print density in lines per inch, where y = 0, 6, or 8. 0 indicates density has been set manually.
OUTPUT dev:file.ext[p,pn]	Generate a binary VFU file with the specified name. If the argument is omitted, the default is DSK:NORMAL.VFU in the user's disk area.
PAGE z	Define the logical page size to be z where z = 1 - 143. Page size must be less than or equal to length.

The automatic loading of an appropriate DAVFU file is discussed under LPTSPL.

4.2.4 Changing and Reversing the Ribbon

The following procedure describes how to change the ribbon on an LP07 line printer. (Refer to Figure 4-13.)

1. Lift the operator panel access cover and set the POWER circuit breaker to the OFF position.
2. Lift the printer window; unlatch and fully open the band gate leaving the ribbon mask against the forms.

CAUTION

Wait until the Charaband stops rotating before proceeding to the next step.

3. Using plastic gloves, grasp the ribbon rolls and force them to the right until the ribbon cores are free of the ribbon motors.
4. Pull the ribbon completely free of the band gate. Discard the ribbon unless you are reversing it.
5. Remove the new ribbon from its box and remove the plastic wrapping and any protective cardboard collars.
6. Hold the ribbon cores with the fully wound core above the other so the ribbon will unwind from the underside of the ribbon core when installed. Force the right end of the upper ribbon core against the top floating ribbon holder, align the left end with fixed ribbon holder, and allow the spring tension to lock the core into position.
7. Unwind the other ribbon core over the ribbon guide bars and Charaband. Position the lower ribbon core between the bottom ribbon holders in the same manner.

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8. Ensure that the slots in the ends of the ribbon cores are engaged by the ribbon holder guide pins.
9. Ensure that the ribbon position sensor is not covered by the ribbon.
10. Close the band gate and printer window.
11. Set the POWER circuit breaker to the ON position and close the operator panel access cover.
12. When the READY indicator comes on, press the START/STOP switch to place the printer in RUN mode. (RUN indicator is lit.)

Some listings have more print on the left half of the forms. To prevent the ribbon from wearing unevenly, you can reverse the ribbon as follows:

1. Follow Steps 1-4 above to remove the ribbon.
2. Holding the two ribbon cores as you took them off the printer, rotate them so that the top and bottom cores are reversed.
3. Put the ribbon back on the printer by following Steps 6 through 12.

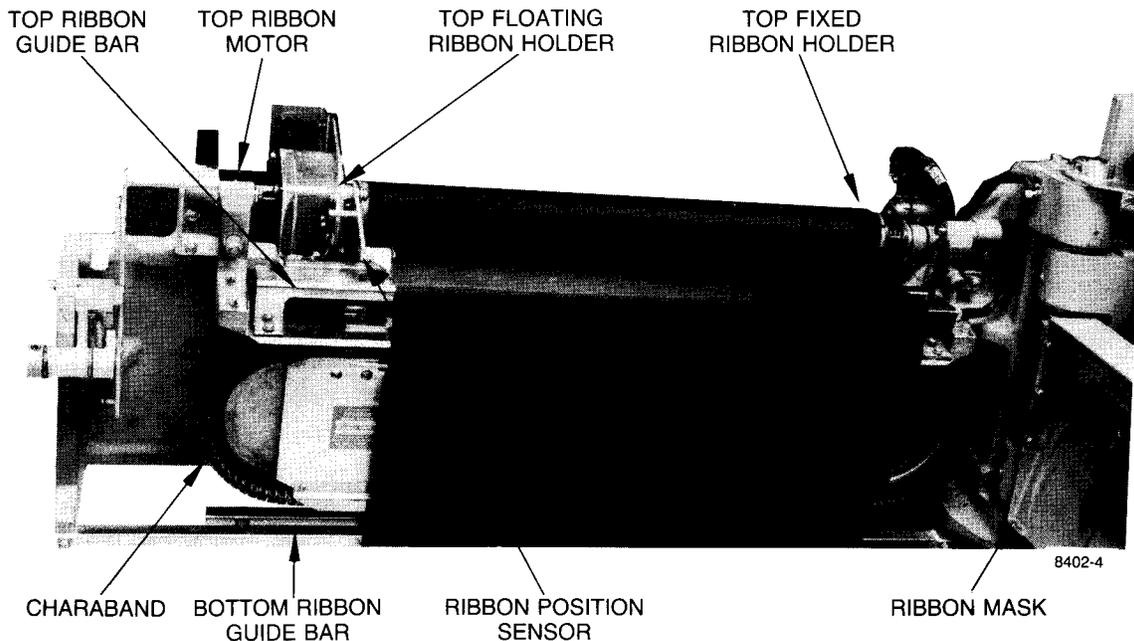


Figure 4-13: LP07 Ribbon Installation

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4.3 LPIØ PRINTER

4.3.1 Control Panel

The operator control panel is located on top of the printer at the left. Controls for normal operation are visible, other controls are covered by a metal plate which can be lifted from the front. The control panel is illustrated in Figure 4-14. The panel contains switches (two-position), white indicator lights (POWER indicator can be green), red error lights and two dial knobs. From the bottom up, these controls are as follows:

TOP OF FORM Switch: With the printer off-line, depressing the TOP OF FORM switch causes the paper and/or the carriage control loop to position themselves at the top of a page ready for printing.

TEST MODE Switch: With the printer off-line, causes a 132 character line to print continuously until the switch is depressed again. Used to test forms setup and also to check if all 132 hammers are firing.

ON/OFF/LINE Switch: Places the printer on-line or takes it off-line.

POWER Indicator Light: When lit, the power switch is in the ON position.

READY Indicator Light: When lit, there are no error conditions such as paper faults, no ribbon change needed, the printer can be placed on-line or the test mode switch depressed.

TEST Indicator Light: The TEST MODE switch is depressed.

ON-LINE Indicator Light: When lit, the printer can respond to the program.

ERROR LIGHTS:

Whenever an error condition occurs, such as running out of paper, improper installation of format loop, or ribbon reversal needed, the ON LINE and READY lights go out. At this time one of the red error lights below may come on.

DRUM GATE Light: The drum gate is open and must be closed before printing can commence.

PAPER FAULT Light: Any of these conditions will cause this to be lit: The printer is out of paper, runaway paper motion has occurred, incorrect format loop, ribbon-reversal needed.

PRINT INHIBIT Light: When lit there is an electrical malfunction.

To turn these lights off, correct the problem and press the MASTER CLEAR Switch.

OTHER CONTROLS AND SWITCHES:

POWER Switch: Powers the printer ON and OFF.

DRUM SPEED Switch: The printer can operate at both high and low speeds. Make certain the POWER Switch is OFF and the drum has ceased to rotate before changing the speed.

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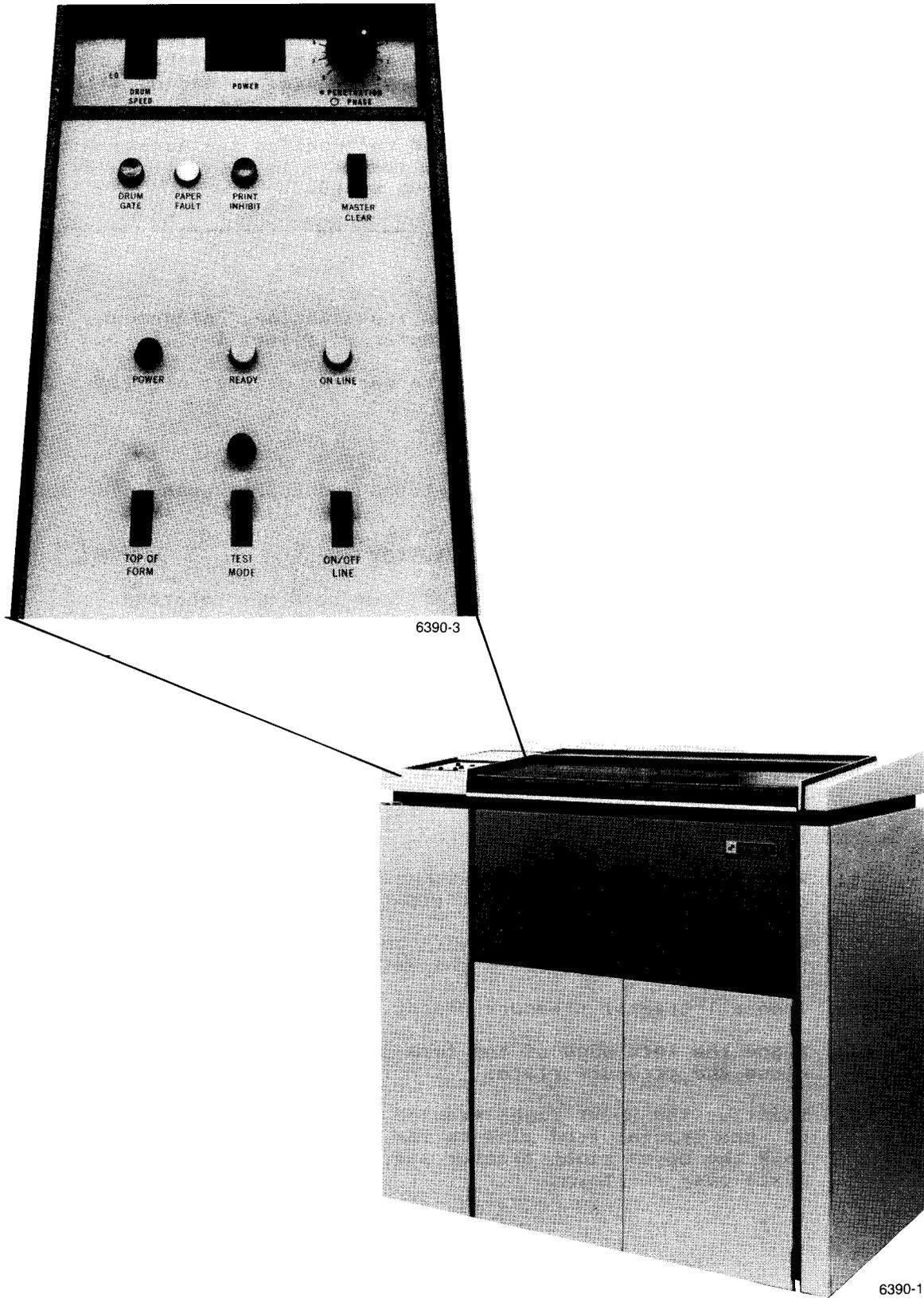


Figure 4-14: LPl0 Line Printer

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PENETRATION CONTROL Knob: Increasing the penetration causes the printer hammers to fire with more force. The penetration should be increased when printing forms with multiple or carbon copies. Check the quality of the bottom copy before proceeding with the entire print job.

PHASING CONTROL Knob: This is used to equalize the top-to-bottom density of the characters; the adjustment is necessary when you have changed the penetration or drum speed.

4.3.2 Changing Paper and Forms

The following procedure describes forms installation, alignment, and adjustment on an LP10 line printer. (Refer to Figure 4-15.)

1. Press the ON/OFF-LINE switch to set the printer off-line (ON LINE indicator is not lit).
2. Lift the printer window.
3. Using the drum gate latch, unlatch and fully open the drum gate.

CAUTION

Wait for the character drum to stop rotating before you proceed.

4. Be sure that the proper vertical format tape has been mounted on the vertical format unit.
5. Press and release the TOP-OF-FORM switch.
6. Set the COPIES CONTROL LEVER to match the form being used.
7. Be sure the upper and lower left tractors are vertically aligned.
8. Rotate the FINE ADJUSTMENT thumbwheels completely clockwise on both the upper and lower right tractors.
9. Unlock the upper and lower tractor locks on the right tractors and move them to the extreme right.
10. Open all tractor pressure plates.
11. Place the left edge of the form in the upper left tractor and close the pressure plate.
12. Position the upper right tractor to allow precise alignment of the tractor feed pins to the form-feed holes in the form. Lock the upper right tractor and close the tractor pressure plate over the form.

NOTE

Do not pull the paper taut.

13. Loosen the PAPER TENSION locking knob and turn the PAPER TENSION control knob completely counterclockwise.

LINE PRINTERS

14. Place the form in the lower left tractor and close the pressure plate.
15. Position the lower right tractor to allow precise alignment of the tractor feed pins to the form-feed holes in the form. Lock the lower right tractor, and close the tractor pressure plate.

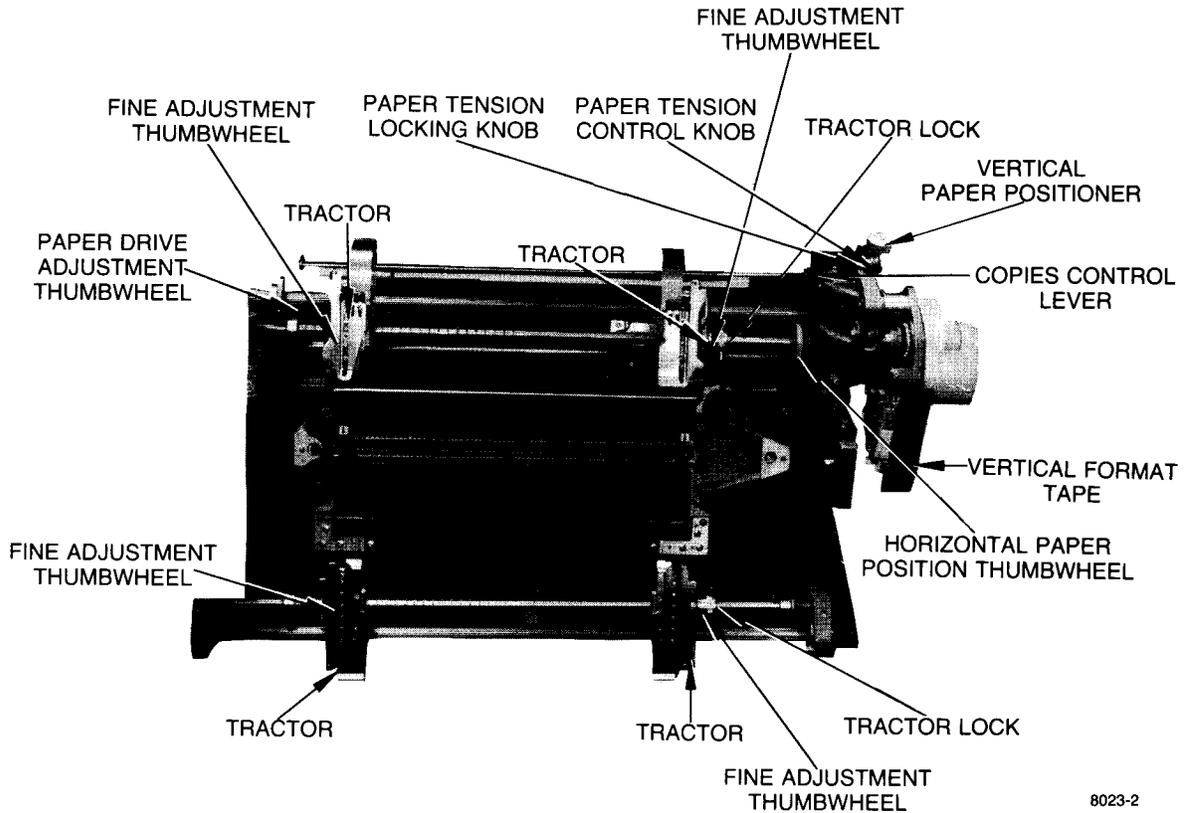


Figure 4-15: LP10 Paper Installation

16. Turn the PAPER TENSION control knob clockwise until the proper paper tension exists; this occurs when a slight crease on the top edge of the form-feed holes in the form appears. Tighten the PAPER TENSION locking knob.
17. Rotate the FINE ADJUSTMENT thumbwheel on both the upper and lower right tractors until proper horizontal paper tension exists. The tension is correct when there is a slight crease on the right edge of the form-feed holes in the form.
18. Mount the forms alignment scale (located in the paper storage area, right side) across the hammer bank area using the dowel pins located on special castings at both sides of the hammer bank.

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19. Using the HORIZONTAL PAPER POSITION thumbwheel, move the form horizontally until the first print column on the form corresponds to the first column on the forms alignment scale.
20. Move the paper feed clutch lever (located to the right of the vertical format unit) to the ADJUST position. Using the PAPER DRIVE ADJUSTMENT thumbwheel, adjust the form vertically until the first print line of the form is aligned with the FORMS ALIGNMENT SCALE print line.
21. Remove the FORMS ALIGNMENT SCALE, and replace it in the scabbard (paper storage area, right side).
22. Move the paper feed clutch lever to the RUN position.
23. Close and latch the drum gate.
24. Close the printer window.
25. Check the paper tension by pressing the TOP-OF-FORM switch several times and ensuring that the paper does not pull loose from the tractor feed pins.
26. Press the ON/OFF LINE switch to set the printer on-line (ON LINE indicator lit).

Occasionally, the paper will become jammed in the line printer and the printer will go off-line. If this happens, repeat Steps 2, 3, and 7 through 17. Then press the TOP OF FORM switch, restart the printer job and press the ON/OFF LINE switch.

4.3.3 Controlling the Vertical Format Unit

To make a standard carriage control tape for vertical format control of 11-inch paper with six lines of printing per inch, do the following:

1. Obtain a manual- or machine-operated punch made to punch 12-channel carriage control tapes.
2. Obtain a carriage control tape with feed holes, channels numbered 1 through 12, and lines numbered 0 to at least 135. In this case, the tape loop accommodates two forms.
3. Align the tape in the punch to begin punching in line 0.
4. Using Table 4-1 as a guide, proceed line by line on the tape, and punch a hole for each of the channels indicated on a line.

LINE PRINTERS

Table 4-1: Standard LPlØ Line Printer Carriage Tape

Form 1 Line	Form 2 Line	Channels Punched
ØØ	66	1-2-3-4-5-6-7-8-9-1Ø-11-12
Ø1	67	5-8
Ø2	68	3-5-8
Ø3	69	4-5-8
Ø4	7Ø	3-5-8
Ø5	71	5-8-9
Ø6	72	3-4-5-8
Ø7	73	5-8
Ø8	74	3-5-8
Ø9	75	4-5-8
1Ø	76	3-5-6-8-9
11	77	5-8
12	78	3-4-5-8
13	79	5-8
14	8Ø	3-5-8
15	81	4-5-8-9-1Ø
16	82	3-5-8
17	83	5-8
18	84	3-4-5-8
19	85	5-8
2Ø	86	3-5-6-7-8-9
21	87	4-5-8
22	88	3-5-8
23	89	5-8
24	9Ø	3-4-5-8
25	91	5-8-9-11
26	92	3-5-8
27	93	4-5-8
28	94	3-5-8
29	95	5-8
3Ø	96	2-3-4-5-6-8-9-1Ø
31	97	5-8
32	98	3-5-8
33	99	4-5-8
34	1ØØ	3-5-8
35	1Ø1	5-8-9
36	1Ø2	3-4-5-8
37	1Ø3	5-8
38	1Ø4	3-5-8
39	1Ø5	4-5-8
4Ø	1Ø6	3-5-6-7-8-9-12
41	1Ø7	5-8
42	1Ø8	3-4-5-8
43	1Ø9	5-8
44	11Ø	3-5-8

LINE PRINTERS

Table 4-1: Standard LP10 Line Printer Carriage Tape (Cont.)

Form 1 Line	Form 2 Line	Channels Punched
45	111	4-5-8-9-10
46	112	3-5-8
47	113	5-8
48	114	3-4-5-8
49	115	5-8
50	116	3-5-6-8-9-11
51	117	4-5-8
52	118	3-5-8
53	119	5-8
54	120	3-4-5-8
55	121	5-8-9
56	122	3-5-8
57	123	4-5-8
58	124	3-5-8
59	125	5-8
60	126	5
61	127	5
62	128	5
63	129	5
64	130	5
65	131	5

5. After you have punched all the lines through 131, cut the tape at line 135. Spread some rubber cement between lines 129 and 135. Place line 0 over line 132. Keeping the feed holes aligned, press the ends of the tape together.
6. Repunch the holes covered by the overlapped tape.
7. Set the printer off-line, and open the printer cover.
8. Lift the tape loop reader handle so that the sprocket shoe clears the sprocket teeth.
9. Place the tape over the tape loop reader capstan so that the feed holes are over the sprocket teeth. Be sure that channel 12 of the tape is toward your left as you are facing the front of the line printer.
10. Close the tape loop reader. Be sure the tape stays attached to the drive sprocket while you clamp the drive sprocket shoe in place.
11. Press TOP-OF-FORM. The tape should halt with the channel 1 star wheel just beyond the TOP-OF-FORM hole.
12. Align forms vertically.
13. Close the printer cover.

LINE PRINTERS

The standard LP10 carriage tape causes the vertical actions shown in Table 4-2. Channels 1 through 8 are used by system software, and channels 9 through 12 are used by diagnostic programs.

Table 4-2: Standard LP10 Line Printer Vertical Action

Channel	Vertical Action
1	Top of form.
2	Space half a page (30 lines).
3	Double space with automatic top of form after 30 impressions.
4	Triple space with automatic top of form after 20 impressions.
5	Single space (Channel 5 is the only channel that can be specified for the last 6 lines of the page).
6	Space one sixth of a page (10 lines).
7	Space one third of a page (20 lines).
8	Single space with automatic top of form after 60 impressions.
9	Space one twelfth of a page (5 lines).
10	Space one fourth of a page (15 lines).
11	Space 25 lines.
12	Space 40 lines.

A programmer wanting a nonstandard carriage control tape must tell you what channels need to be punched on each line. Be sure that you punch a tape to accommodate the number of forms that are needed to make the tape loop at least ten inches in circumference.

4.3.4 Changing and Reversing the Ribbon

The following procedure describes how to change the ribbon on an LP10 line printer. (Refer to Figure 4-16.)

1. Use the plastic gloves supplied with the ribbon.
2. Press the ON/OFF-LINE switch to set the printer off-line (ON LINE indicator not lit.)
3. Lift the printer window.
4. Move the drum gate latch left and pull forward to fully open the drum gate.

LINE PRINTERS

CAUTION

Wait for character drum to stop rotating before you proceed.

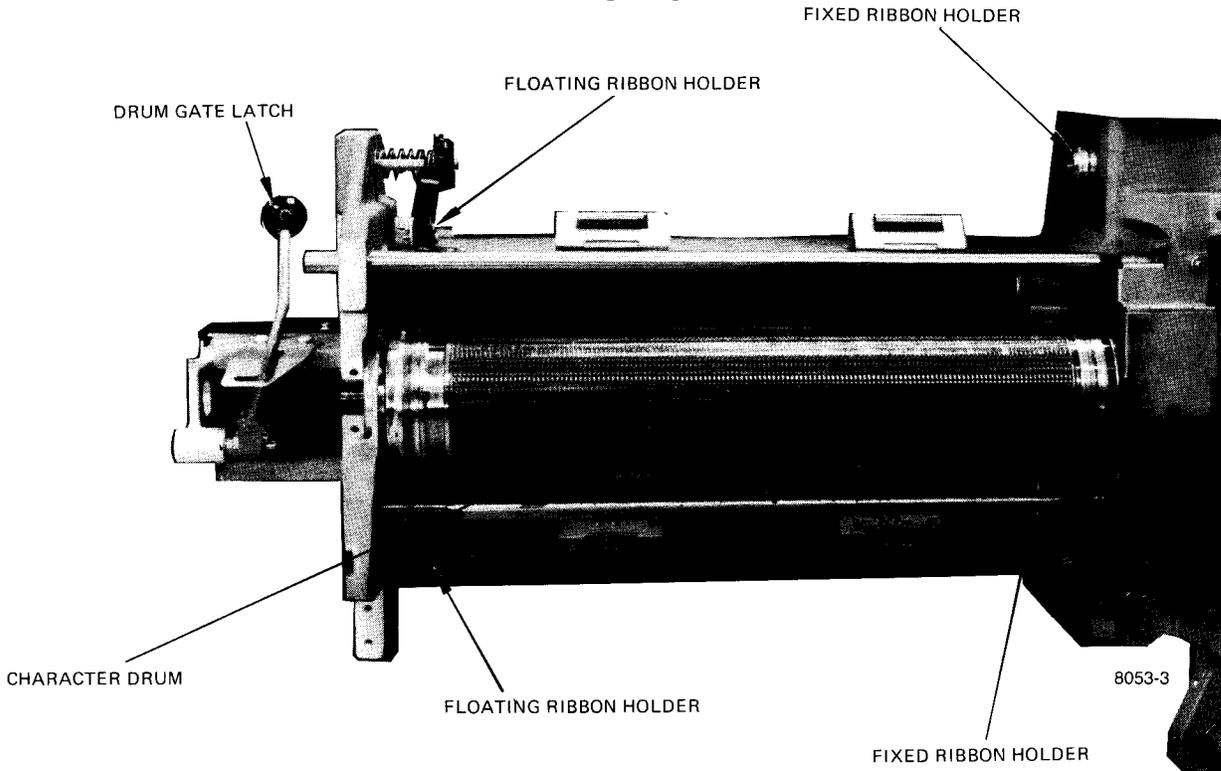


Figure 4-16: LP10 Ribbon Installation

5. Grasp the ribbon cores and force them to the left toward the drum gate latch until the floating ribbon-holder springs are completely compressed.
6. Remove the ribbon by pulling the right end of the ribbon cores away from the drum gate. Discard the ribbon unless you are reversing it. (See below)
7. Remove the new ribbon from the box and hold the ribbon cores together. Remove any protective cardboard collars.
8. Place the fully wound ribbon core over the bottom floating ribbon holder.
9. Push the core to the left and place the right end over the bottom fixed ribbon holder. Be sure that the holder guide-pin slips into the slot on the core end.
10. Unwind enough of the fully wound ribbon core to bring the ribbon up and over the character drum.
11. Slip the ribbon between the ribbon guide clips and the box sensor.

LINE PRINTERS

12. Place the ribbon core against the top floating ribbon holder.
13. Push the core to the left and place the right core end over the top fixed ribbon holder. Be sure that the holder guide-pin slips into the slot on the core end.
14. Close and latch the drum gate.
15. Close the printer window.
16. Press the ON/OFF-LINE switch to set the printer on-line (ON LINE indicator is lit).

Most listings have more print on the left half of the paper. Therefore, to prevent the ribbon from wearing unevenly, you should reverse the ribbon. Do the following:

1. Follow Steps 1 through 6 above to remove the ribbon.
2. Holding the two ribbon cores as you took them off the printer, rotate them clockwise until the top core is at the bottom. Now the top and bottom cores are reversed.
3. Put the ribbon back on the printer by following Steps 9 through 16 above.

4.4 LN01 LASER PRINTER

The LN01 laser printer is a microcomputer-based laser output device which forms electrostatic images for xerographic reproduction.

The LN01 produces xerographic originals on single 8 1/2 by 11 inch sheets, a page at a time, at a maximum rate of 12 pages per minute (approximately 600 lines per minute). Pages can be printed with either a vertical (80 characters wide) or a horizontal (132 characters wide) orientation. The LN01 uses a 142-character line buffer for the horizontal orientation and a 150-character line buffer for the vertical orientation. Note that the LN01 prints a page at a time, not a line at a time. No output occurs until a page terminator character (a form feed, for instance) is received. Overstriking characters on the LN01 is possible within the limits of the line buffer size (in other words, everything to be overprinted must fit in the buffer at once). However, bold characters cannot be made this way since the image is not built up by impact.

NOTE

In the case of the LN01 laser printer, it is especially important to remember to have on hand the following three manuals for reference: LN01 Programmer Reference Manual, LN01 Electronic Printer Installation Guide, and LN01 Electronic Printer Operator Guide. Certain operation and maintenance procedures can only be performed by licensed field service personnel.

Commands for loading fonts in the LN01 are described in Section 13.4.3.

LINE PRINTERS

4.4.1 Control Panel

The control panel for the LN01 laser printer is located on the top of the printer as shown in Figure 4-17. There are five displays on the panel (as numbered in the illustration), indicating the following:

- o On-Line: Ready to make prints, normal mode.
- o Off-Line: Stops printing. Used for testing and service.
- o Test: Makes a test print (off-line only). DEC Field Service use.
- o Display: Displays status code.
- o Keyboard: Keyboard is for service actions.

A small INSTRUCTIONS booklet is attached to the LN01 printer.

NOTE

Maintenance of the LN01 laser printer should be provided only by Digital Field Service personnel.

LINE PRINTERS

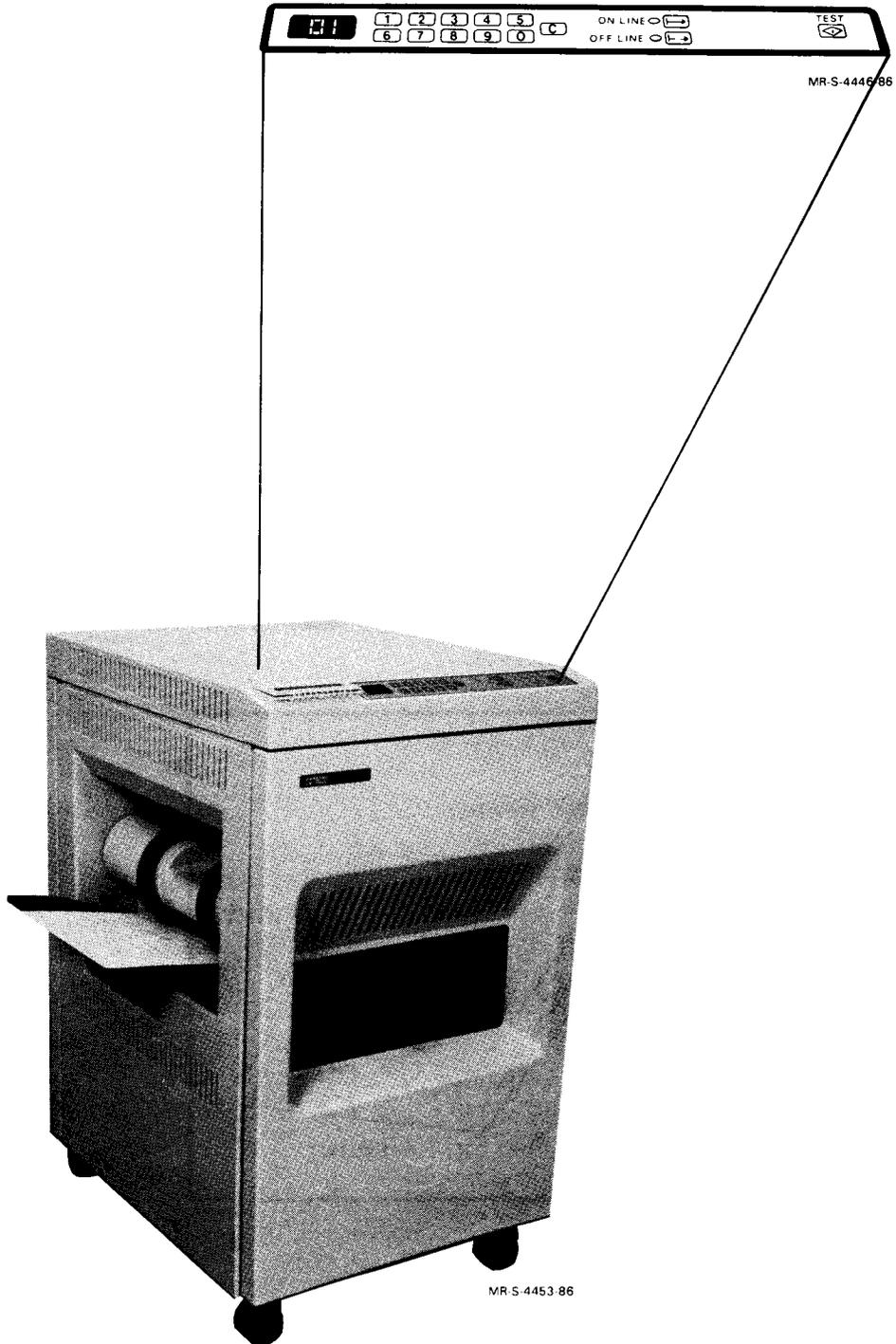


Figure 4-17: LN01 Laser Printer

LINE PRINTERS

4.4.2 Changing Paper and Forms

This section shows you how to remove the paper cassettes and load paper.

Removing Paper Cassettes:

1. Turn the cassette selector handle to the left (counterclockwise).
2. Pull the paper cassettes all the way out of the LN01.

Loading Paper:

1. Load paper from the package with the label right side up. This step ensures the paper curl matches the drum curl.

NOTE

For the best results, use only DIGITAL LN01X-AB paper or the equivalent. Call your local DIGITAL representative for information on equivalent papers.

2. Load paper into the paper cassettes (Figure 4-18). Do not load above the maximum fill line. Make sure to stack all paper under the tray positioning bars. If the paper is predrilled, make certain the holes are to the right. Load letterhead paper with the letterhead face-down and to the rear.

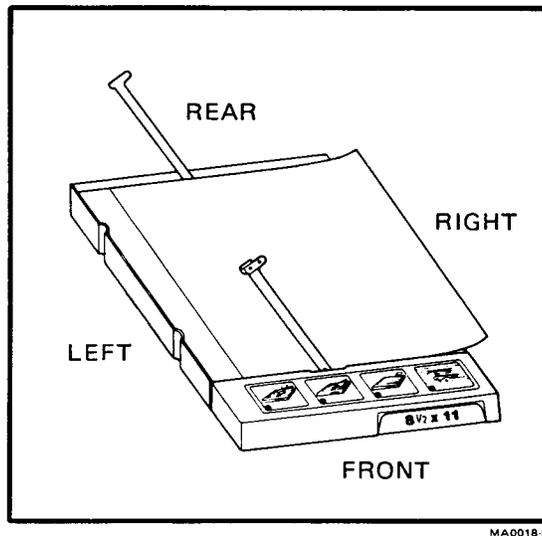


Figure 4-18: Paper Cassette

3. Insert the cassettes into the LN01 and slide the cassettes all the way in.
4. Turn the selector handle upright (clockwise). If a print job was halted by the "out of paper" status code (C4), the LN01 automatically starts printing again.

LINE PRINTERS

4.4.3 Controlling the Vertical Format Unit

This feature is controlled by the software on the LN01. See the LN01 Programmer's Reference Manual for information about the VFU.

4.4.4 Checking and Adding Dry Imager

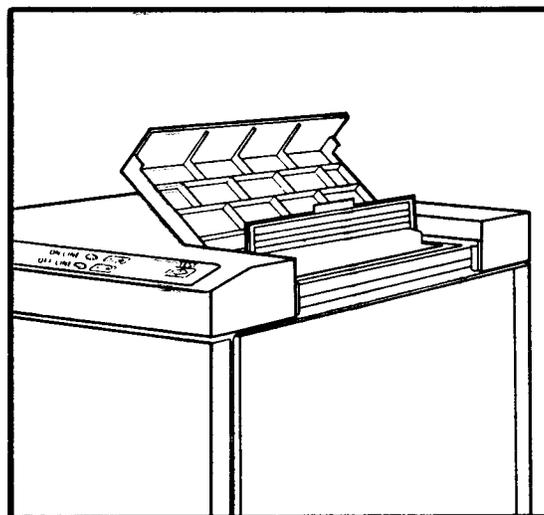
Dry imager is the black powder that forms the image on LN01 prints. To keep the image quality high, you should perform the following tasks as needed:

- o Check the dry imager and paper cassettes (DIGITAL recommends checking the dry imager and cassettes at the start of your shift).
- o Add dry imager.
- o Stir dry imager.
- o Load paper.
- o Check the print quality.
- o Unload the output tray.

Never store dry image in an area where the temperature exceeds 26 degrees Centigrade (110 degrees Fahrenheit).

Always keep the dry imager supply at a level above the agitator blades, but below the top of the hopper. Otherwise, prints become lighter when the dry imager runs low. Sometimes the dry imager may require stirring with the stirring paddle. Check the dry imager as follows:

1. Open the access door (Figure 4-19).



MA0023-83

Figure 4-19: Access Door

LINE PRINTERS

2. Lift the cover of the dry imager hopper.
3. If you can see the agitator blades (Figure 4-20), add LN01X-AA dry imager or the equivalent, as follows:
 - a. Carefully read and follow the instructions on the label of the dry imager bottle.
 - b. Shake the dry imager well before adding.
 - c. Place the funnel top on the dry imager bottle.
 - d. Carefully fill the dry imager hopper above the level of the agitator blades, but leave at least 1/2 inch below the top of the hopper. Stir. (Figure 4-20).

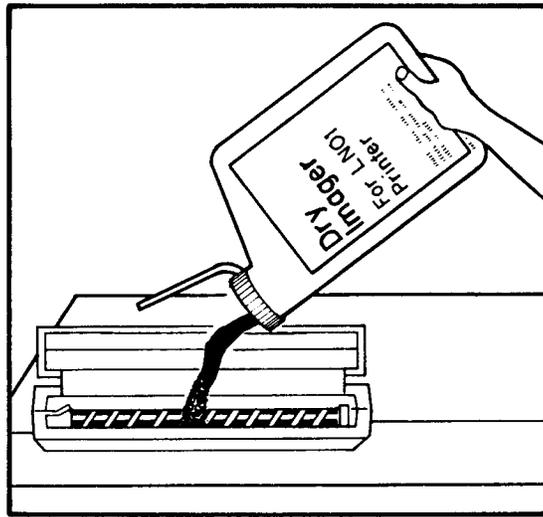


Figure 4-20: Adding Dry Imager to the Hopper

4. Avoid spilling dry imager outside the hopper area. If you do, wipe it up with a dry cloth.

CAUTION

To prevent damage to the LN01, use only LN01X-AA dry imager or its equivalent. Call your local DIGITAL representative for information on LN01X-AA equivalents.

5. Close the dry imager hopper cover.

NOTE

If you get any dry imager on your hands or clothes, you can brush, vacuum, or wash it off. Use cold water only.

LINE PRINTERS

4.5 CLEANING THE LINE PRINTER

In addition to the general cleaning procedures for impact printers given at the beginning of the chapter, you should pay particular attention to the printing elements.

You should inspect the Charaband assembly on the LP07 daily for excessive ink and paper residue collection. Use isopropyl alcohol to clean away ink accumulation from the Charaband slugs. Whenever the Charaband is removed or reversed, the roadbed and top ribbon guide should be vacuumed.

You should clean the character drum on the LP10, LP05, LP14, LP26 and LP27 every 100 hours, or sooner if necessary, using a soft suede brush and a vacuum cleaner. Every 500 hours, or sooner if necessary, clean the character drum with isopropyl alcohol.

NOTE

Do not attempt to clean the LN01 Laser Printer yourself. Call your Digital Field Service Representative for maintenance on the LN01.

CHAPTER 5

CARD READERS

The operator control panels for the high-speed reader CR10-E and the low-speed reader CR10-F are shown in Figures 5-1 and 5-2, respectively.

5.1 LIGHTS AND SWITCHES

At the back of each card reader are a power switch and two toggle switches. For normal operation the toggle switches should be set in the REMOTE and AUTO positions. Setting the mode switch to MANUAL takes the reader off-line.

The following alarm Indicator Lights are used as follows:

HOPPER CHECK: When lit, the hopper is empty or the stacker is full. Add cards to the hopper and/or remove them from the stacker. Press RESET to proceed.

STACK CHECK: The last card is not seated properly in the stacker. Check for a mutilated card.

PICK CHECK: The reader attempted to read a card but the card failed to reach the read station. Check the hopper for mutilated or worn edges, rubber bands or staples, warpage of the cards. If the cards are all right, check the picker face for ink build-up and clean with alcohol if necessary. Press RESET to proceed.

READ CHECK: Card has torn edges or is mispunched. This can also indicate a failure in the read electronics.

When one of the above lights comes on, the RESET light goes out. After the trouble has been corrected, press RESET to allow the program to continue.

CARD READERS

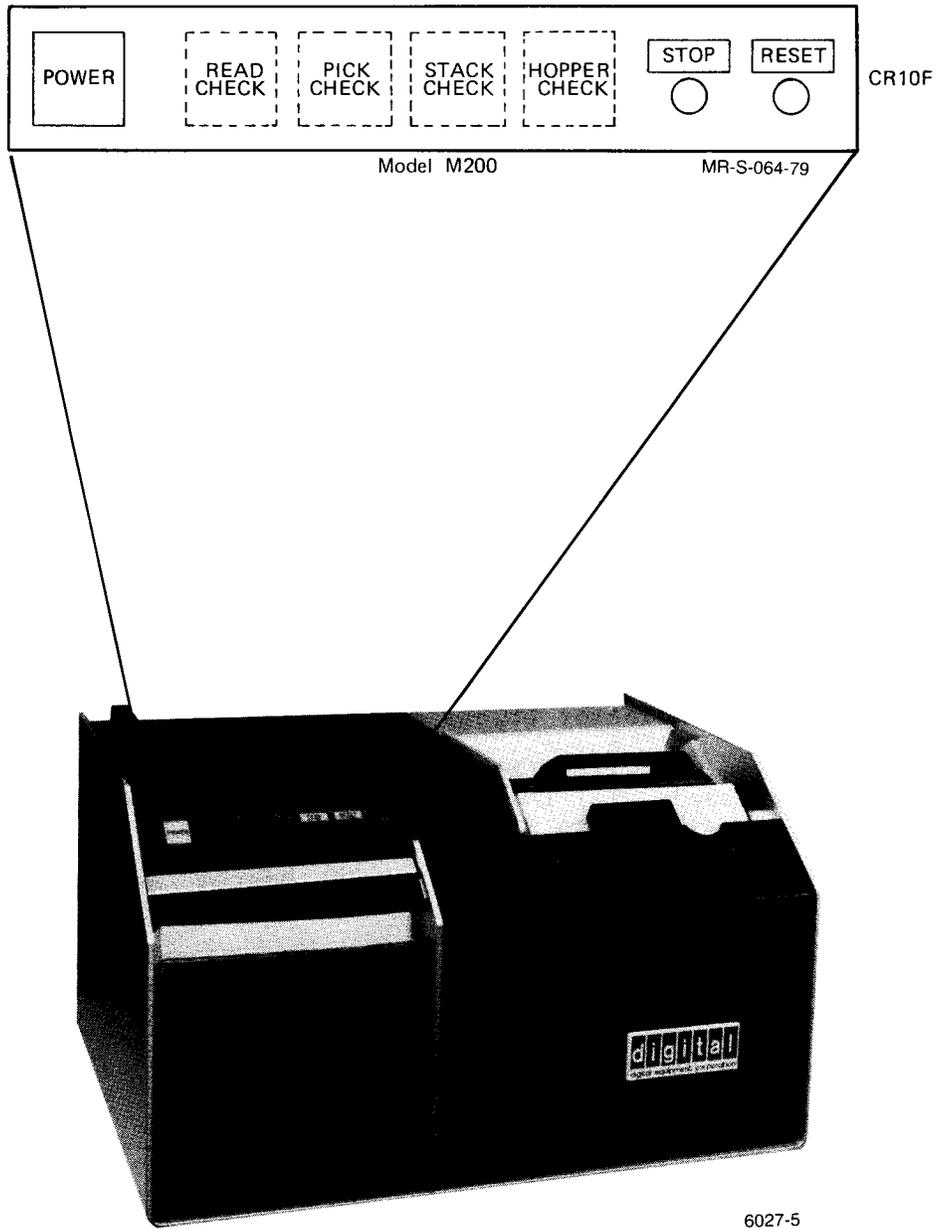
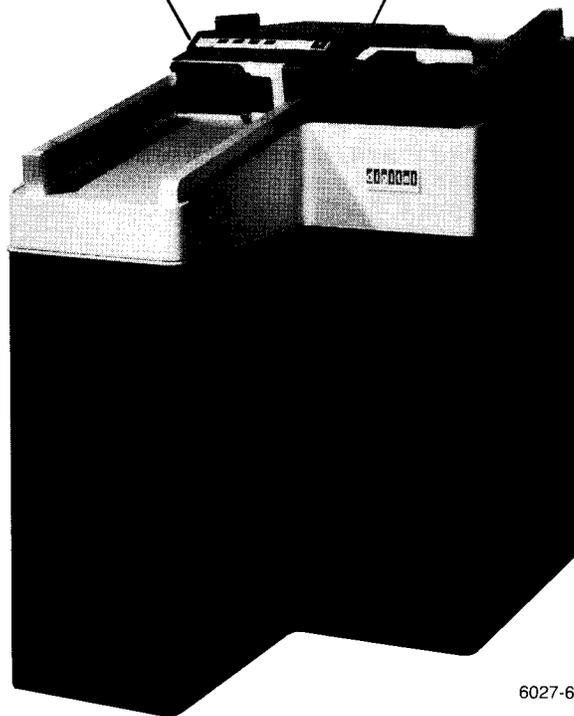
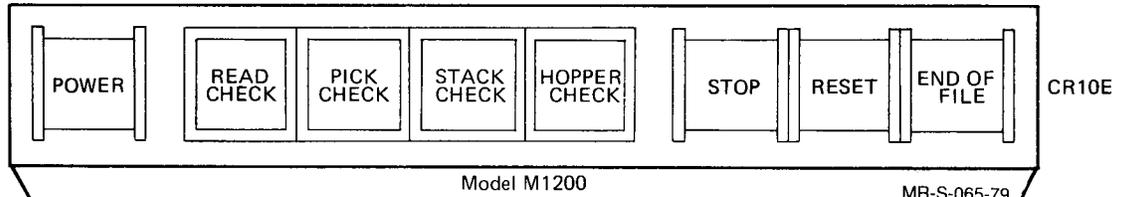


Figure 5-1: CR10-E Card Reader

CARD READERS



6027-6

Figure 5-2: CR10-F Card Reader

CARD READERS

5.2 LOADING AND UNLOADING CARDS

Use the following procedures to load the input hopper with punched cards to be read:

1. Be sure the reader is powered ON (POWER indicator lit), and check that the MODE switch on the rear control panel of the reader is set to REMOTE.
2. Pull the hopper follower back with one hand and begin loading card decks into the hopper. Be sure to place the first card to be read at the front with the 9 edge down, column 1 to the left.
3. Continue placing cards into the input hopper until it is loosely filled.

WARNING

Do not pack the input hopper so full that the air from the blower cannot riffle the cards properly. If the cards are packed too tightly, the vacuum picker cannot work properly.

4. Press RESET to allow cards to be read.
5. You may continue loading cards while the reader is operating, provided you maintain tension in the front portion of the deck as you add cards to the rear. Do not add more cards until the hopper is at least half empty.

WARNING

When you are trying to maintain pressure on the card deck, use just enough pressure to maintain the riffle action to prevent damaging cards or jamming the reader.

6. Usually, all cards are moved through the reader into the stacker. However, if you need to remove cards from the input hopper, simply pull back the follower and remove the card deck.
7. To unload cards from the output stacker, pull the stacker follower back with one hand and remove the card deck from the stacker. Be careful to maintain the order of the deck. The stacker may be unloaded while cards are being read.

5.3 CLEANING THE CARD READER

The important cleaning area for a card reader is the card path, which accumulates card dust. If this builds up, it causes data errors, card motion errors, and possibly even card jams. The card path should be cleaned at least weekly. With the power OFF, the path from the hopper to the stacker should first be blown out and then well vacuumed.

CHAPTER 6

DECTAPES

The following procedures describe the actions necessary to mount and dismount a DECTape on the TU56 transport. To assign a drive to your job, enter:

```
.ASSIGN DTAn    (Where n = 0-7, the number on the drive selector
                 indicator of some unused drive. Note, however,
                 that on some drives 0 is replaced by 8; you must
                 still enter DTA0.)
```

6.1 MOUNTING AND DISMOUNTING DECTapes

Refer to Figure 6-1 for a view of the TU56 transport.

Mounting

1. Place the REMOTE/LOCAL switch to OFF (middle position). This switch is located immediately to the right of the drive selector indicator.
2. Mount the DECTape onto the left hand hub so the tape feeds upward at the left perimeter of the reel.
3. Thread the tape to the right, over the top of the tape guides and tape head, and clockwise onto the take-up reel.
4. Wind several turns of tape clockwise onto the take-up reel.
5. Press the REMOTE/LOCAL switch into the LOCAL (bottom pressed) position.
6. Advance the tape about ten turns onto the take-up reel by pressing the top end of the rightmost rocker switch.
7. Press the REMOTE/LOCAL switch into the REMOTE (top pressed) position.

DECTAPES

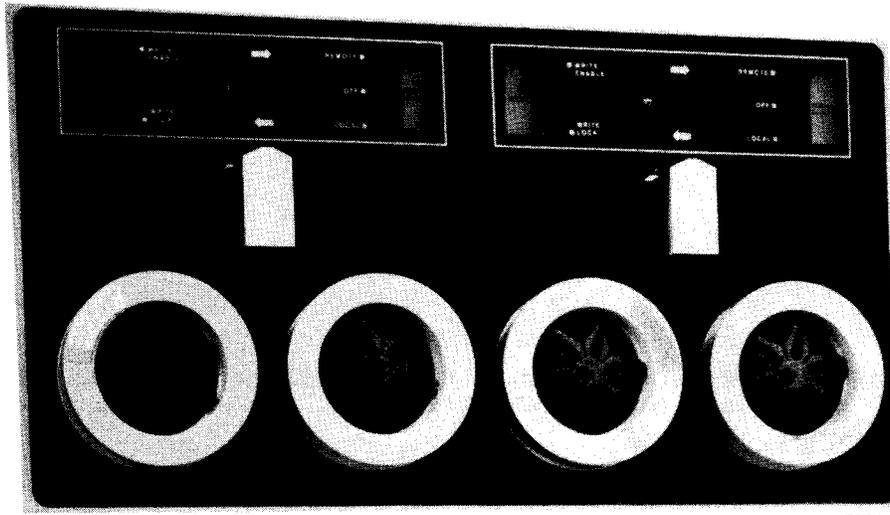


Figure 6-1: TU56 DECTape Transport

8. To write on the tape, set the WRITE ENABLE/WRITE LOCK switch to the WRITE ENABLE (top pressed) position.

Dismounting

If the software has rewound and unloaded the tape, skip Steps 1 and 2.

1. Set the REMOTE/LOCAL switch to the LOCAL position.
2. Wind the tape completely onto the left reel by pressing the rewind switch (top end of the leftmost rocker switch) and holding it pressed until all the tape has wound onto the left reel.
3. Place the REMOTE/LOCAL switch to OFF (middle) position and remove the tape.

6.2 CLEANING DECTape DRIVES

DECTapes do not have a complicated tape path; however, the brown oxide powder that flakes off when a tape is in motion will accumulate on the tape guides and tape head. Once each shift, or at least once daily, you should clean these areas with a cotton-tipped applicator and 91% isopropyl alcohol.

CHAPTER 7

MAGNETIC TAPES

The -10 series hardware systems support a variety of magnetic tape drives. They cover both 7-track and 9-track operation, tape speeds of 45 to 200 inches per second (1143mm/s to 5080mm/s), and recording densities of 200 to 6250 bits per inch (8 rows/mm to 246 rows/mm). Various size reels can be accommodated and some drives will accept industry-standard cartridges.

The system software identifies the drives by physical device names in the form MTxn. x is an alphabetic character representing the controller; n is a drive unit number for that controller. MTA0, MTB3, and MTC2 are all examples of valid names. A user can access a particular physical tape drive for input or output by indicating the physical device name.

7.1 MAGNETIC TAPE CONTROLS AND INDICATORS

The following sections describe each type of magtape drive:

Model	Section
TU16	7.1.1
TU40	7.1.2
TU45	7.1.3
TU70	7.1.4
TU77	7.1.5
TU78	7.1.6

MAGNETIC TAPES

7.1.1 TU16

Table 7-1 explains the switches on a TU16 drive, and Table 7-2 describes the indicator lights. Apply power to the drive by placing LOAD/BR REL switch to the center position.

Table 7-1: TU16 Switches

Switch	Function
LOAD/BR REL LOAD position Center position BR REL position	Enables vacuum motor, which draws tape into the buffer columns. Disables vacuum motor; brakes are full on. Releases brakes.
ON-LINE/OFF-LINE ON-LINE position OFF-LINE position	Selects remote operation. Selects local operation.
FWD/REW/REV FWD position REW position REV position	Selects, but does not initiate forward tape motion when transport is off-line. Selects, but does not initiate tape rewind when transport is off-line. Selects, but does not initiate reverse tape motion when transport is off-line.
START/STOP START position STOP position	Initiates tape motion selected by FWD/REW/REV switch when transport is off-line. Clears any motion commands when transport is off-line.
UNIT SELECT (plug activated)	Selects the tape transport unit by number (0-7); this number is used in the program to address the tape transport (slave address).

MAGNETIC TAPES

Table 7-2: TU16 Indicators

Switch	Function
PWR	Indicates power has been applied to the transport.
LOAD	Indicates the vacuum is on and the tape is loaded into the buffer columns.
RDY	Indicates that the tape transport is ready (vacuum on and settle-down delay complete); no tape motion.
LD PT	Indicates that the tape is at load point (beginning of tape - BOT).
END PT	Indicates that the tape is at end point (end of tape - EOT).
FILE PROT	Indicates that write operations are inhibited because the write enable ring is not mounted on the file reel.
OFF-LINE	Indicates local operation by the control box.
SEL	Indicates the tape transport is selected by the controller (program).
WRT	Indicates that a write operation has been initiated.
FWD	Indicates that a forward command has been issued.
REV	Indicates that a reverse command has been issued.
REW	Indicates that a rewind command has been issued.

MAGNETIC TAPES

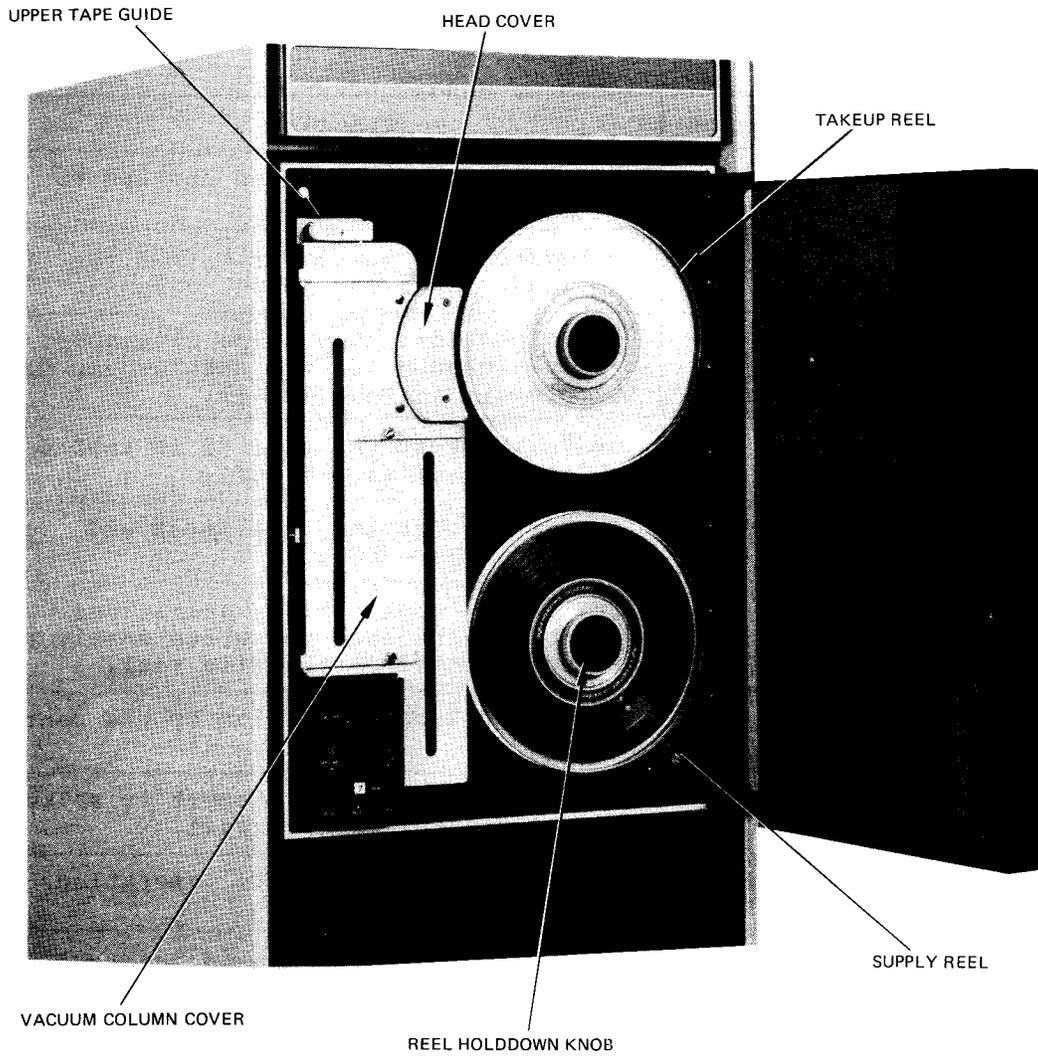


Figure 7-1: TU16 Magnetic Tape Drive

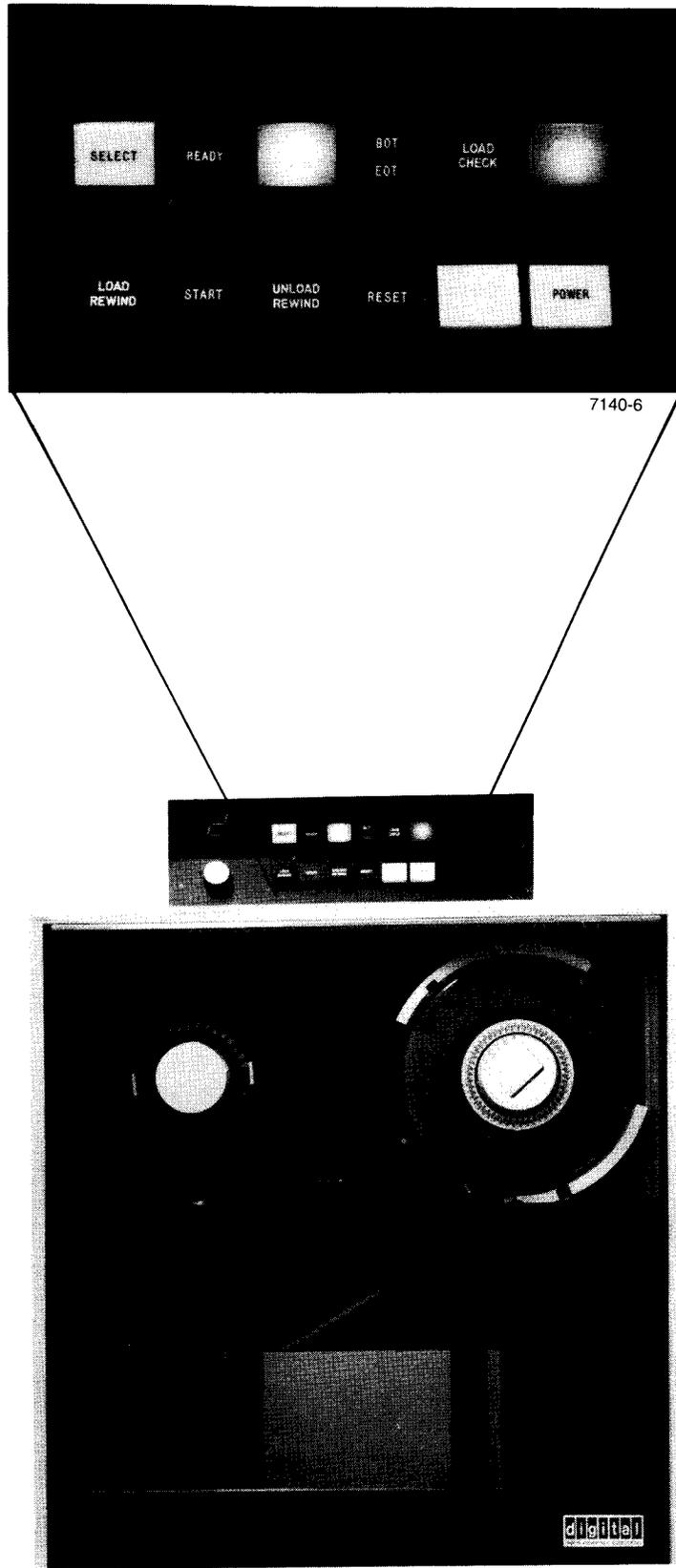
MAGNETIC TAPES

7.1.2 TU40

At the left on the control panel at the top of the transport is a rotary switch for selecting the transport number; the selected number appears in the window above the switch. The lower part of the panel contains a row of pushbuttons, all of which are momentary-contact except the one at the right end, which controls power to the transport. The lights above the switches indicate the state of the transport, whether produced by the switches or the program. Pressing START places the unit on-line, provided it is ready for use by the program (the tape is properly closed). The transport being on-line is indicated by the READY light, and SELECT goes on whenever the transport is selected by the control. FILE PROTECT means the write enable ring is absent from the supply reel.

Pressing RESET stops the tape and takes the unit off-line, enabling the remaining switches for local control. Note however that if the tape is rewinding, you must press the RESET button twice to stop the tape. The first time you press RESET will change the rewind operation to normal reverse speed. LOAD REWIND raises the transport window and loads tape from supply reel to takeup reel, unless the tape is already loaded, in which case it rewinds the tape to loadpoint. Detection of a failure of any sort during loading operations lights LOAD CHECK and the unit shuts down. Pressing UNLOAD REWIND rewinds the tape to loadpoint, and then unloads it entirely onto the supply reel and lowers the transport window. A tape positioned at loadpoint or endpoint is indicated by the BOT (beginning of tape) and EOT (end of tape) lights.

MAGNETIC TAPES



5928-1

Figure 7-2: TU40 Series Magnetic Tape Drive

MAGNETIC TAPES

7.1.3 TU45

The TU45 control panel is shown in Figure 7-3. It is located at the top left on the drive and includes a POWER switch. The drives must be powered ON before the system is started, otherwise they will not be recognized by the software as available for use. Power may also be removed from a drive by opening the large lower door and setting the small toggle switch to the off position. Normally, power should only be removed by means of the switch on the control panel.

The control panel also includes a UNIT SELECT DIAL, which normally allows the device name, such as MTA0 or MTA1 to be selected. This capability, however, is not implemented on the TU45 at present. Each drive retains its physical device name irrespective of the setting of the dial. To avoid confusion, DO NOT CHANGE the setting of the dial.

The FILE PROTECT light (FPT), when ON, indicates that the loaded tape has no write ring, so that writing on the tape is not allowed.

The LOAD control is a momentary switch/indicator. Pressing and releasing the control initiates a load sequence.

The ON-LINE control is a momentary switch/indicator that is enabled after an initial load or rewind sequence has been completed. Pressing and releasing the switch changes the transport to an ON-LINE mode. Pressing the ON-LINE control a second time sets the drive OFF-LINE.

The REWIND control is a momentary switch/indicator that is enabled only in the off-line mode. Pressing and releasing the control causes tape to rewind.

MAGNETIC TAPES

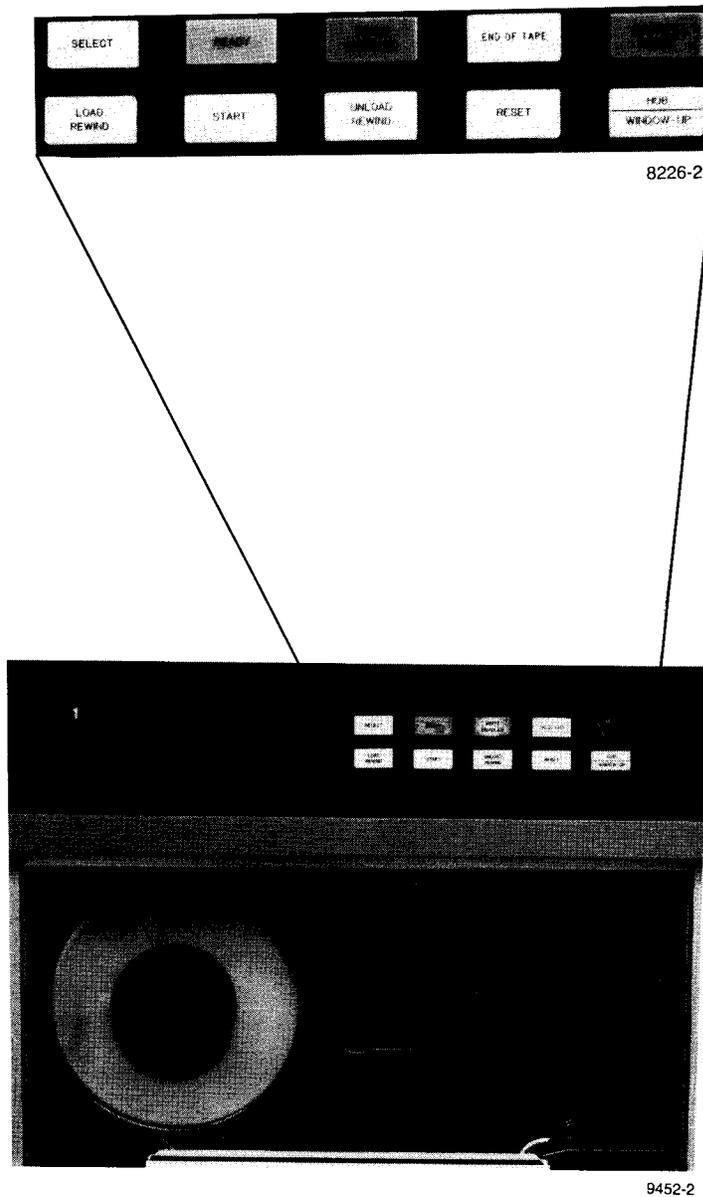


Figure 7-3: TU45 Magnetic Tape Drive

MAGNETIC TAPES

7.1.4 TU70

The control panels for TU70, TU71, and TU72 drives are identical except for the END OF TAPE and TAPE INDICATE switch. (See Figure 7-4.) Power is supplied from the tape controller, which sequences the power to groups of four drives.

The tape drives can be controlled locally by the control panel pushbuttons and indicators. Table 7-3 describes the controls and indicators.

Table 7-3: TU70 Series Controls and Indicators

Switch	Function
LOAD/REWIND	Initiates a load sequence; or, if the tape is loaded, rewinds the tape.
START	Puts the drive on-line after it is loaded.
UNLOAD/REWIND	Rewinds and unloads the tape after the drive is off-line.
RESET	Takes the drive off-line.
HUB/WINDOW UP	Lifts the hub window; the drive must be off-line.
SELECT	Indicates the drive is connected to the specified controller.
READY	Indicates the drive is on-line.
WRITE/DISABLED	Indicates the loaded tape has no write ring when lit; writing on the tape is not allowed.
TAPE INDICATE	Indicates the end of the tape (EOT).
MACHINE CHECK	Indicates some type of hardware error exists.

MAGNETIC TAPES

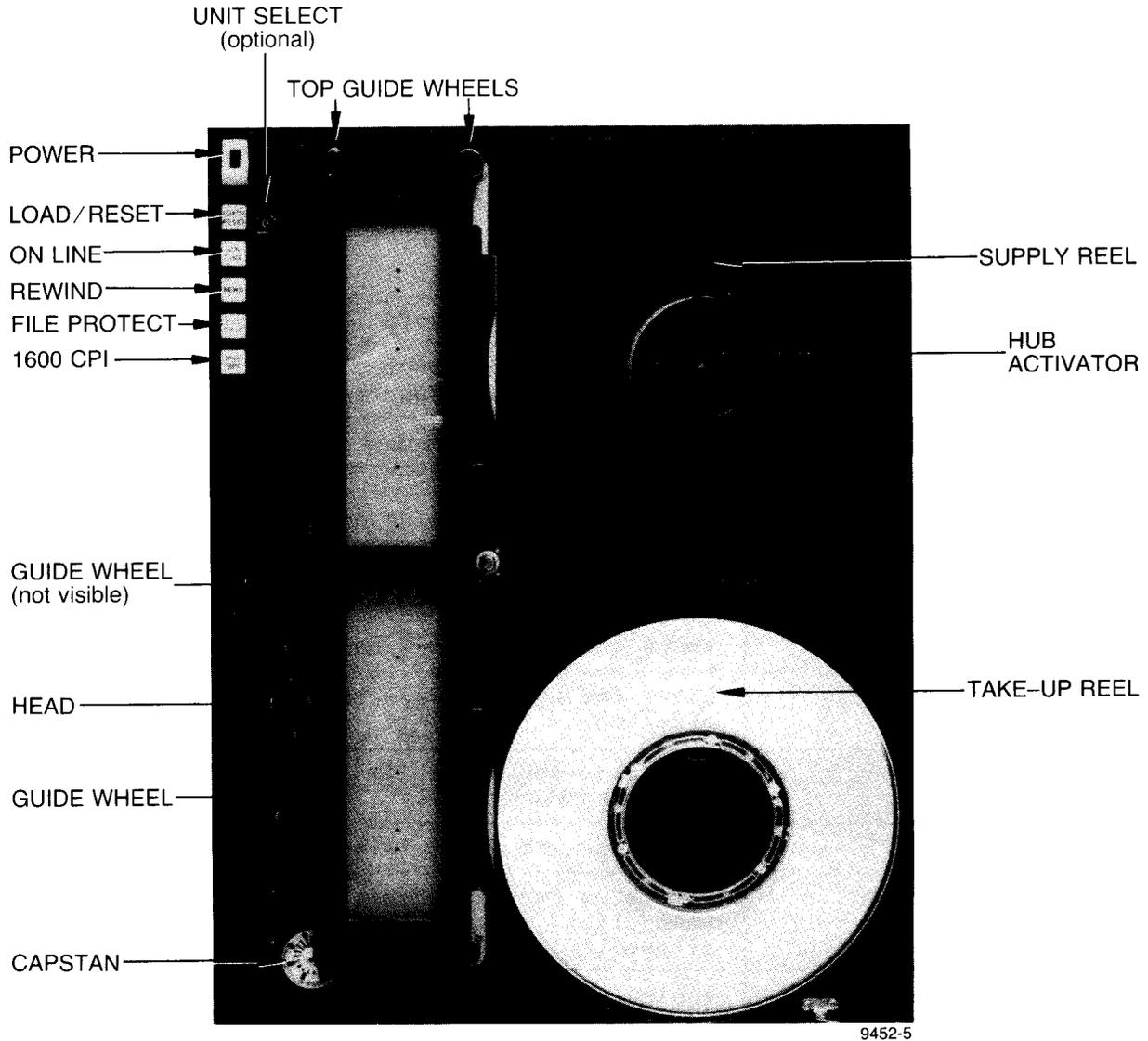


Figure 7-4: TU70 Series Magnetic Tape Drive

MAGNETIC TAPES

7.1.5 TU77

Power is applied to the TU77 when the system CPU is turned on. Table 7-4 explains TU77 controls, and Table 7-5 describes TU77 indicators.

Table 7-4: TU77 Controls

Control	Function
Slave Select Switch (unlabeled)	Selects the address (slave number 0 to 3) of the tape transport.
LOAD/REW	<p>Pressing and releasing the LOAD/REW button will initiate one of the following sequences:</p> <ul style="list-style-type: none"> o With no tape in path, a load sequence is initiated. o With tape in path but not tensioned, a mid-reel load sequence will be initiated. In a mid-reel load sequence the tape will load and run in the reverse direction to BOT. o With tape in path and tensioned, and the transport off-line, the tape rewinds to BOT. If the tape is already at BOT or if the transport is on-line, no action occurs.
ON LINE	Pressing and releasing the ON-LINE button will change the transport from off-line to on-line. Pressing and releasing the button again will change the transport from on-line to off-line.
UNLOAD	If the TU77 is off-line, pressing and releasing the UNLOAD button causes the tape to rewind and unload. If the tape is already at BOT, it will unload. If the TU77 is on-line, the UNLOAD button has no effect.
RESET	Pressing and releasing the RESET button terminates all functions and clears a load fault.

MAGNETIC TAPES

Table 7-5: TU77 Indicators

Indicator	Function
<p>POWER</p> <p>BOT</p> <p>ON LINE</p>	<p>Indicates presence of DC and secondary AC power.</p> <p>Indicates the beginning of the tape (BOT).</p> <p>Indicates the TU77 is on-line. The transport will revert to the off-line mode if any of the following occur.</p> <ul style="list-style-type: none"> o ON LINE button is pressed. o An external rewind unload command is received. o Vacuum column interlock is broken. o AC power is lost. o RESET button is pressed.
<p>FILE PROTECT</p>	<p>Indicates that a reel of tape without a write-enable ring has been loaded onto the transport.</p>
<p>LOAD FAULT</p>	<p>Lamp flashes when a load fault has occurred; such as when the autoload sequence has failed to load a tape from a 267 mm (10-1/2 in) reel after two tries.</p>
<p>800</p>	<p>Indicates the tape transport is set to read or write at 800 BPI (NRZI mode).</p>
<p>1600</p>	<p>Indicates the tape transport is set to read or write at 1600 BPI (PE mode).</p>

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7.1.6 TU78

Power is applied to the TU78 when the CPU is turned on. Table 7-6 explains TU78 controls, and Table 7-7 describes TU78 indicators.

Table 7-6: TU78 Controls

Control	Function										
Port Select Switch	<p>Selects the Massbus I/O port(s) allowed to send commands to this tape transport.</p> <table border="1"> <thead> <tr> <th>Switch Position</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Transport connected to Massbus port A</td> </tr> <tr> <td>1</td> <td>Transport connected to Massbus port B</td> </tr> <tr> <td>2</td> <td>Transport connected to both Massbus ports A and B</td> </tr> <tr> <td>3</td> <td>Transport disconnected from both Massbus ports and placed in maintenance mode (available to TM78 formatter maintenance panel)</td> </tr> </tbody> </table>	Switch Position	Function	0	Transport connected to Massbus port A	1	Transport connected to Massbus port B	2	Transport connected to both Massbus ports A and B	3	Transport disconnected from both Massbus ports and placed in maintenance mode (available to TM78 formatter maintenance panel)
Switch Position	Function										
0	Transport connected to Massbus port A										
1	Transport connected to Massbus port B										
2	Transport connected to both Massbus ports A and B										
3	Transport disconnected from both Massbus ports and placed in maintenance mode (available to TM78 formatter maintenance panel)										

Table 7-7: TU78 Indicators

Control	Function
LOAD/REW	<p>Pressing and releasing the LOAD/REW button will initiate one of the following sequences:</p> <ul style="list-style-type: none"> o With no tape in path, a load sequence is initiated. o With tape in path but not tensioned, a mid-reel load sequence will be initiated. In a mid-reel load sequence the tape will load and run in the reverse direction to BOT. o With tape in path and tensioned, and the transport off-line, the tape rewinds to BOT. If the tape is already at BOT or if the transport is on-line, no action occurs.
ON LINE	<p>Pressing and releasing the ON-LINE button will change the transport from off-line to on-line. Pressing and releasing the button again will change the transport from on-line to off-line.</p>

MAGNETIC TAPES

Table 7-7: TU78 Indicators (Cont.)

Control	Function
UNLOAD	If the TU78 is off-line, pressing and releasing the UNLOAD button causes the tape to rewind and unload. If the tape is already at BOT, it will unload. If the TU78 is on-line, the UNLOAD button has no effect.
RESET	Pressing and releasing the RESET button terminates all functions and clears a load fault.
BACKWRAP DEFEAT	<p>AUTO (automatic) position: Allows a backwrap and retry for 10.5-inch reel, with or without a cartridge.</p> <p>MAN (manual) position: Inhibits a backwrap and retry for 10.5-inch reel without a cartridge.</p>
POWER	Indicates presence of DC power and secondary AC power.
BOT	Indicates tape is at BOT.
ON LINE	<p>Indicates the TU78 is on-line. The transport will revert to the off-line mode if any of the following occur:</p> <ul style="list-style-type: none"> o ON LINE button is pressed. o An external rewind unload command is received. o Vacuum column interlock is broken. o AC power is lost. o RESET button is pressed.
FILE PROTECT	Indicates that a reel of tape without a write-enable ring has been loaded onto the transport.
LOAD FAULT	Lamp flashes when a load fault has occurred; such as when the autoloading sequence has failed to load a tape from a 267 mm (10-1/2 in) reel after two tries.
1600	Tape transport set to read or write at 1600 bits/inch density (PE mode).
6250	Tape transport set to read or write at 6250 bits/inch density (GCR mode).

MAGNETIC TAPES

7.2 MOUNTING AND DISMOUNTING MAGTAPES

The following procedures describe the steps needed for mounting and dismounting magnetic tape reels on the various drives supported by the -10 series hardware systems. Some drives provide for the automatic threading of the tape onto the take-up reel while others require you to thread the tape manually. For all drives, you must insert a write enable ring in the groove on the back of the tape reel in order to allow writing. If this ring is not present, an indicator light (FILE PROTECT on some drives, WRITE DISABLE on others) will warn you that writing is inhibited.

7.2.1 TU16 Procedures

To mount a tape on the TU16, perform the following steps:

1. Rotate the reel holddown knob of the lower hub counterclockwise as far as it will go, and place the supply reel over the holddown knob with the groove toward the back. Hold the reel firmly against the hub flange and turn the holddown knob clockwise until it is right.
2. Press BR REL and pull the tape from the supply reel. The tape should unwind from the left with the oxide (dull) side toward the hub. If the tape unwinds from the top, check that the reel is mounted with the groove toward the back.
3. Grasp the tape in both hands with the left hand at the end and the right hand back about a foot. Place the tape against the bottom and left side of the head cover over the threading slot. Pull the tape taut and slide it upwards and into the slot. Lead the tape around the upper right corner of the vacuum column cover, slide it into the slot between the cover and the upper tape guide, and lead it around the guide. Place the end of the tape over the top of the take-up reel hub, and wind about six turns of the tape clockwise on the reel.
4. Press LOAD to draw tape into the vacuum columns. Press FWD and push START to advance the tape to loadpoint. When the loadpoint marker is sensed, the tape stops, the FWD light goes out, and LD PT comes on. Note that if tape motion continues for more than ten seconds, the tape is beyond loadpoint. Press STOP, REV and then START. The tape should move back and stop at loadpoint.
5. Press ONLINE.

To dismount tapes on the TU16, perform the following actions:

1. Rewind to loadpoint by pressing OFF LINE, setting the rocker switch to REWIND, and pressing START.
2. Press BR REL and wind the remaining tape onto the supply reel.
3. Turn the holddown knob counterclockwise and remove the reel.

MAGNETIC TAPES

7.2.2 TU40 and TU41 Procedures

To mount tapes on the TU40 or TU41, perform the following steps:

1. If the transport is closed, press UNLOAD REWIND to lower the window. Pull one end of the reel lock release on the right hub and place the supply reel over the hub. If the reel does not have a cartridge, slip the end of the tape into the shoe at the lower right of the reel. If the reel has a cartridge, place it on the hub so that the projections from the cartridge fit into the two reel-positioning guides. The pin on the motor face plate should go into the opening on the tape cartridge toggle.
2. Press LOAD REWIND to load the tape automatically. Press START to place the unit on line.

To dismount tapes on the TU40 or TU41, perform the following actions:

1. Press RESET and then UNLOAD REWIND.
2. When the window has opened, remove the tape by opening the reel lock release and pulling the reel from the hub.

7.2.3 TU70, TU71, and TU72 Procedures

To mount tapes on the TU70, TU71, or TU72, perform the following steps:

1. Press the HUB/WINDOW up button to open the transport window.
2. Push the tape onto right-hand hub so that the tape unwinds clockwise. (The tape snaps onto the hub and is automatically secured.)
3. Ensure that the end of tape is not twisted and lies flush on the reel.
4. Press the RESET button, causing the window to close.
5. Press LOAD REWIND button, putting the tape at load point.
6. Press START. READY light goes on.

If the tape did not load correctly, the MACHINE CHECK button will flash, and the window will open. You should then reposition the tape and repeat Steps 4, 5, and 6 described above.

MAGNETIC TAPES

To dismount tapes on the TU70, TU71, or TU72, perform the following steps:

1. Press RESET.
2. Press the UNLOAD REWIND button, causing the tape to rewind completely and the transport window to open.
3. Pull the tape off the hub.

NOTE

The TU70 series magnetic tape drives are able to accommodate tape reels that are enclosed in cartridges. When mounting, the cartridge must be positioned on the hub so that the two tabs on either side of the cartridge toggle fit into the two slots on the left side of the right-hand hub. (The cartridge toggle will automatically be opened in the loading process and closed in the unloading process.)

7.2.4 TU45 Procedures

The supply reel (reel to be read or written) is the top reel on the drive (Figure 7-3). The reel should be positioned in such a way that the tape will unwind if the reel is turned in a clockwise direction.

To mount tapes on the TU45, perform the following steps:

1. Position the reel on the quick-release hub and press the hub actuator.
2. Thread the tape as follows:
 - a. Toward the arrow to the upper left of the supply reel
 - b. Over the two top guide wheels from right to left
 - c. Down and to the left of the upper white guide wheel
 - d. Slightly right and down, to go under the head
 - e. Down and to the left of the lower white guide wheel
 - f. Down under the capstan
 - g. Up and right, toward the arrow to the left of the take-up reel
3. Wrap the tape leader onto the take-up reel so that the tape will be wound onto the reel when it is rotated clockwise. Wind at least three turns onto the take-up reel. Remove all slack in the tape path.
4. After the tape has been loaded and checked for correct seating in the guides, position the tape at the Load Point by pressing the LOAD switch. Recheck tape tracking in the guides and close the dust cover door.

MAGNETIC TAPES

NOTE

The transport door should remain closed during normal operation to achieve maximum data reliability.

5. When the load cycle is complete, the tape will stop at the Load Point. Then, if the ONLINE indicator is not lit, press ONLINE. The transport is now ready to receive additional commands.

To dismount a tape, do the following:

1. Press the OFFLINE switch.
2. Press the REWIND switch; the tape will rewind to the BOT (beginning of tape) marker.
3. Press the REWIND switch a second time; this will start an unload sequence.

NOTE

It is not necessary to wait for the tape to rewind to the BOT marker if an unload is desired; press the REWIND switch twice in succession and the tape will rewind and unload.

4. Open the transport door and remove the reel. Close the transport door.

7.2.5 TU77 and TU78 Procedures

The TU77 drive can be loaded manually or automatically depending on the size of the reel that is being loaded. When a 216 or 178mm (8-1/2 or 7in) reel is being loaded, the manual procedure must be used. If a 267mm (10-1/2in) reel is used and the reel is in a cartridge, the cartridge will engage the cartridge interlock and causes the autoloading procedure to be used. Note that the drive door must be closed for autoloading to occur.

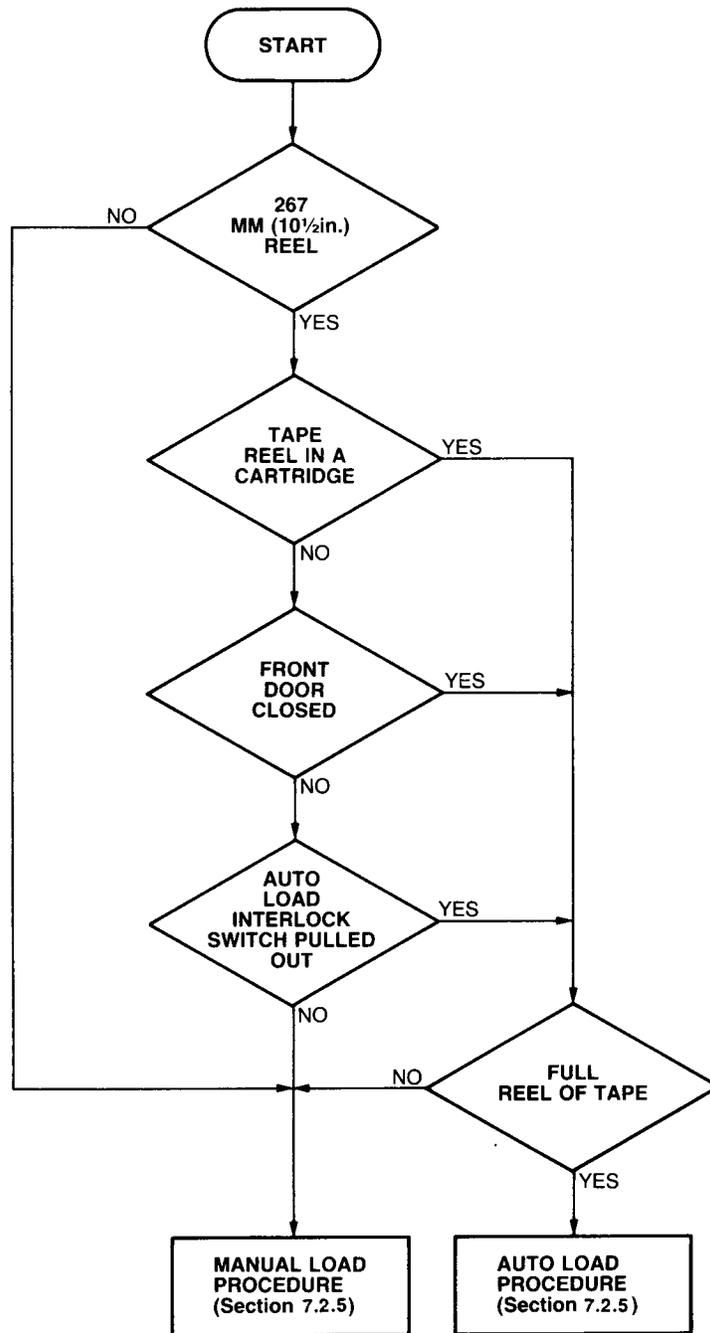
For safety requirements, you cannot load these drives with the doors open. The interlock switch cannot be pulled out. There is an AUTO/MAN rocker switch for manual load of 10 1/2-inch reels.

The autoloading procedure requires a full reel of tape be used. A full reel of tape is such that the tape on the reel comes to within 1.59 and 0.64mm (5/8 and 1/4 inch) of the other edge of the reel. Make sure the tape reel is a large 267mm (10-1/2 inch) reel. The supply reel (containing the tape to be read or written) is the top reel on the drive (Figures 7-6 and 7-7). The reel should be positioned in such a way that the tape will unwind if the reel is turned clockwise. You must insert a write-enable ring on the back of the supply reel to allow writing on the tape.

To autoloading a tape reel on a TU77, do the following:

1. Place the supply reel in position on the upper hub, rotate until it slips easily into place, and press the reel-retaining actuator.

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Figure 7-5: Autoload/Manual Load Section

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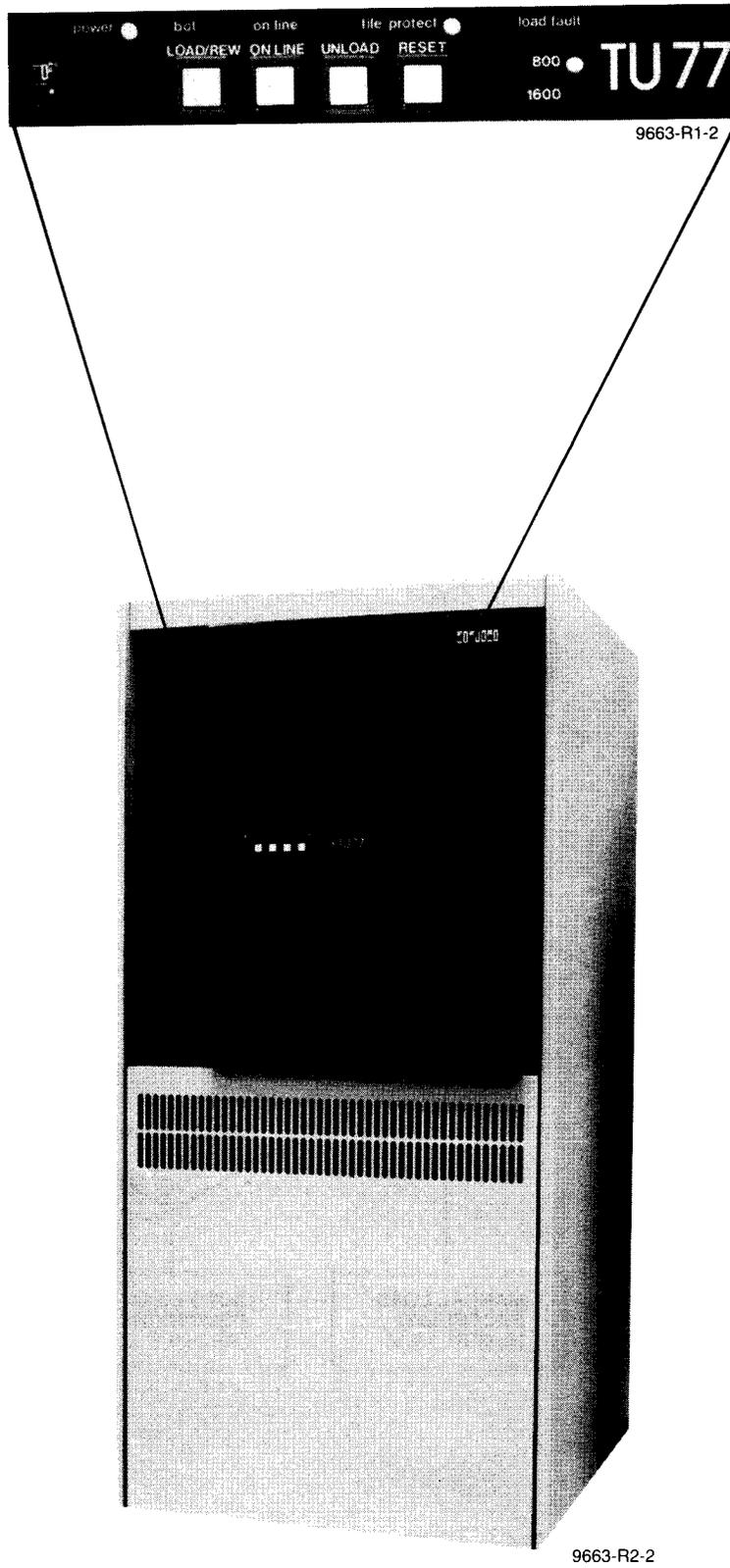


Figure 7-6: TU77 Magnetic Tape Drive

MAGNETIC TAPES

NOTE

The supply reel may be contained in a wraparound cartridge. It is not necessary to remove or open the cartridge. The cartridge will be opened automatically during the autoloading sequence.

2. Close the drive front door.
3. Check that power is applied to the tape drive (power light on).
4. Press the RESET switch.
5. Press the LOAD/REW switch.

The take-up reel will start to turn clockwise. The supply reel will turn counterclockwise a few turns and then rotate forward and eject the tape into the tape path. The tape is threaded and wrapped onto the take-up reel.

For manual loading, keep in mind that the supply reel (containing the tape to be read or written) is the top reel on the drive (Figures 7-6 and 7-7). The reel should be positioned in such a way that the tape will unwind if the reel is turned clockwise. You must insert a write-enable ring on the back of the supply reel to allow writing on the tape.

To manually load a tape reel on a TU77, do the following:

1. Place the supply reel in position on the upper hub, rotate until it slips easily into place, and then press the reel-retaining actuator.

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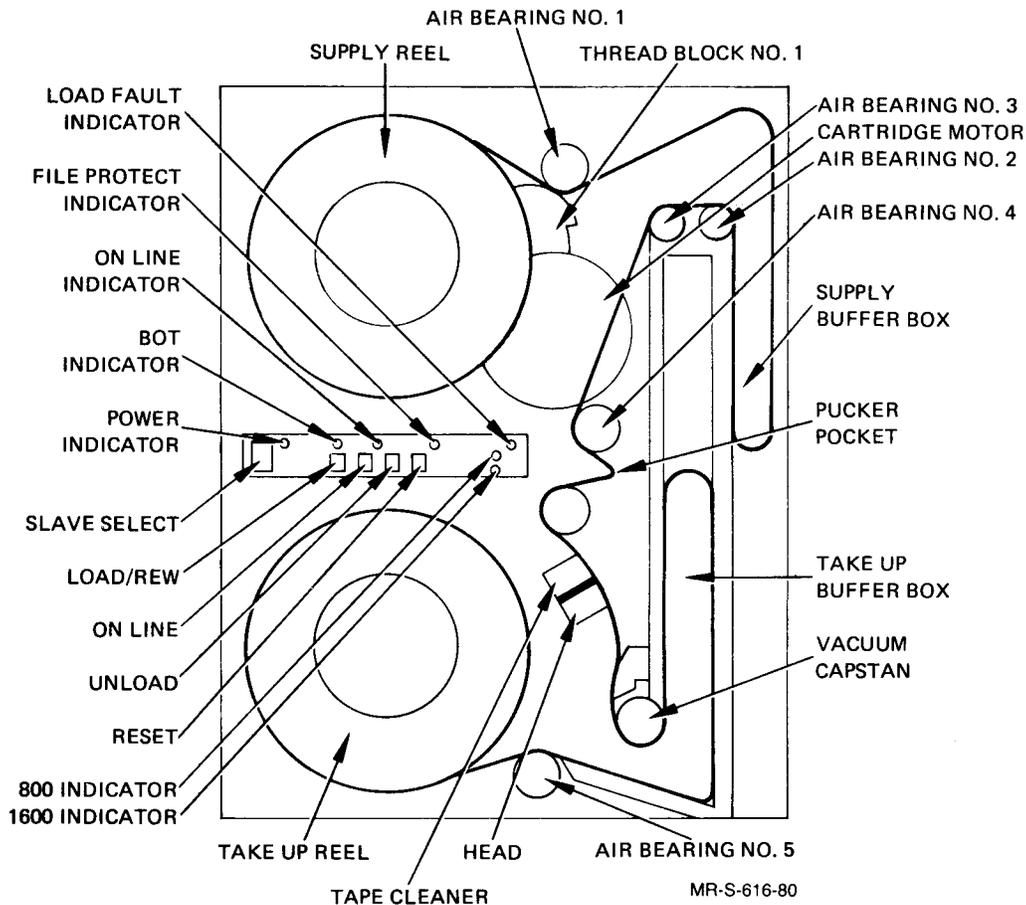


Figure 7-7: Tape Path and Controls

2. Manually place the tape leader between thread block number 1 and air bearing number 1 (Figure 7-6). Manually thread 3 to 5 inches of tape.
3. Carefully close the buffer door, making sure the door is closed securely.

NOTE

Ensure that there is no tape slack or sag between the supply reel and thread block number 1.

4. If a 216 or 178mm (8-1/2 or 7in) reel is being loaded, close the drive front door. If a 267mm (10-1/2 in) reel is being loaded, place the AUTO/MAN switch in the MAN position. This disables the autoloader sequence that would normally occur with a 267mm reel.
5. Check that power is applied to the tape (power light is on).
6. Press RESET switch.
7. Press LOAD/REW switch.

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To unload a tape on the TU77 or TU78, do the following:

1. Press RESET switch.
2. Press UNLOAD switch.

7.3 CLEANING MAGNETIC TAPE DRIVES

Cleanliness is essential for proper operation. Minute particles of dirt trapped between the head and the tape can cause data errors.

Each day you should do the following:

- o Clean the head. Use a lint-free cloth or cotton swab moistened in isopropyl alcohol. Wipe the head carefully to remove all accumulated oxide and dirt.

NOTE

Do not use rough or abrasive cloths to clean the head.

- o Clean the fixed guides and vacuum chamber with a cotton swab moistened with isopropyl alcohol to remove accumulated oxide and dirt. The vacuum column door may be opened to gain access to the chamber surfaces.
- o Clean the rotating tape guides and rubber punch rollers with a lint-free cloth or cotton swab moistened in isopropyl alcohol. Wipe the surfaces carefully to remove all accumulated oxide and dirt.

NOTE

Do not soak the guides with excessive solvent; it can seep into the guide bearings, causing contamination or a breakdown of the bearing lubricant.

- o Clean the capstan with a cotton swab moistened with water. Wipe dry lightly with a lint-free cloth or cotton swab.

CHAPTER 8

DISK DRIVES

This chapter describes operating procedures for the disk drives supported by the -10 series hardware. Drives with similar functions and like controls are grouped together in the chapter.

The drive number indicates the logical position of the drive on the controller and ranges from 0 to 7. Because a controller is associated with a channel, the term "channel number" is often used when referencing a controller. A specific disk drive is identified by its channel number and unit number. For example (0,1) indicates channel 0, drive 1.

8.1 DISK DRIVE CONTROLS AND INDICATORS

Six types of disk drives with removable disk packs, along with their operator control panels, are shown in Figures 8-1 through 8-6. The figures accompany the description of controls and indicators for each particular drive.

8.1.1 RP02 and RP03

The disk pack is illustrated in Figure 8-1. If main power is on, a pack loaded and the cover closed, press START to turn on the drive. After a stabilization delay of about a minute, the drive loads the heads and positions them to cylinder 0. Press STOP to unload the heads and turn off the drive. The numbered lights indicate the last cylinder to which the drive was commanded to position its heads. FILE UNSAFE indicates an electrical malfunction in the drive or the control (pressing STOP resets this indicator if the condition has been cleared).

The remaining switches affect the drive only when it is not selected by the control. If the switches are manipulated while the drive is selected, the conditions they represent are applied to the drive when it is deselected at the beginning of the next function (deselection occurs even if the new function reselects the same drive). With the drive in proper operating order, pressing ENABLE places it on line, lighting the large indicator at the left center of the panel. Pressing READ-WRITE allows unrestricted use of the pack by the program; pressing READ-ONLY lights the associated indicator at the right and prevents the program from writing on the pack. Pressing DISABLE takes the unit off-line.

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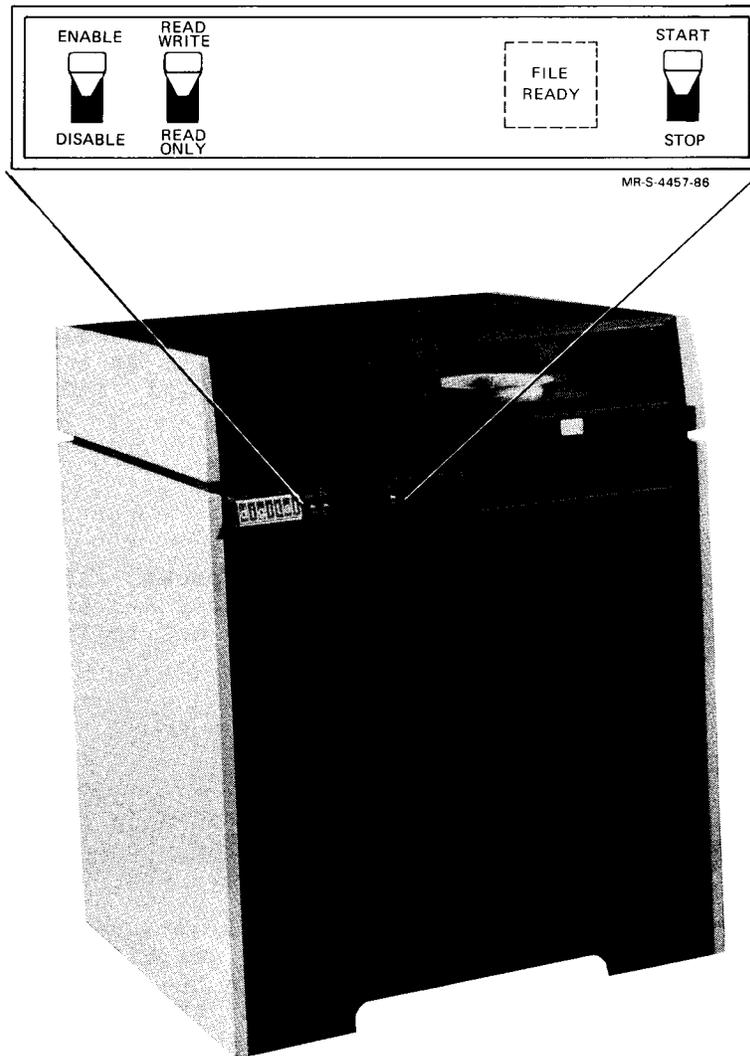


Figure 8-1: RP03 Disk Drive

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8.1.2 RP04 and RP06

Each panel contains a number of switches, indicator lights and a CONTROLLER SELECT switch.

SWITCHES:

For normal operation, the WRITE-PROTECT switch is OFF, allowing unrestricted use of the pack by the user. Setting this switch ON lights the associated indicator light, and prevents the user from writing on the pack. The START/STOP switch is used to power the drive UP (ONLINE) and DOWN (OFFLINE).

On the RP04 drive, the DISABLE switch takes the drive off-line (ready light goes out). The STANDBY switch is used in special circumstances. Software can place the drive in STANDBY mode. Pressing the STANDBY switch will then ready the drive for use again.

INDICATOR LIGHTS:

The READY light comes on when the drive is loaded and ready for use. This occurs after the pack is properly loaded and the START switch is pushed. The pack then powers up to the correct rotational speed, and the read/write heads position themselves between the platters. At this point the READY light comes on.

CONTROLLER SELECT Switch:

The CONTROLLER SELECT switch on a dual-ported drive must be set to the A/B position. The CONTROLLER SELECT switches on single-ported drives should be set to either A or B depending upon how the hardware has been configured.

DISK DRIVES



Figure 8-2: RP04 Disk Drive

DISK DRIVES

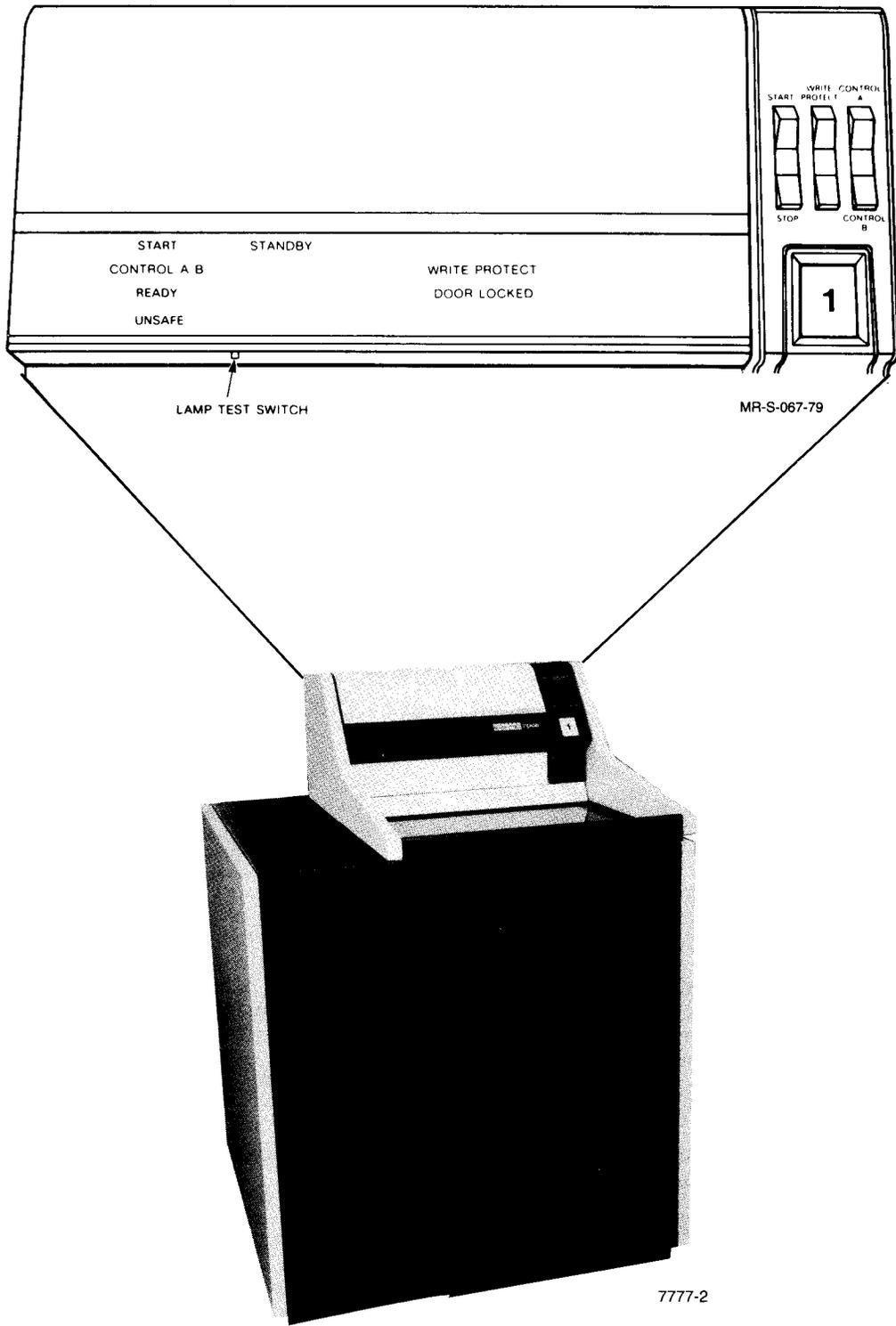


Figure 8-3: RP06 Disk Drive

DISK DRIVES

8.1.3 RM03 Controls and Indicators

The front control panel contains eight controls and indicators.

START Switch:

The START switch is a 2-position pushbutton. Pressing the START switch when the drive is in the power-off condition (disk pack not spinning), lights the START indicator and initiates the power-up sequence provided the following conditions are met:

- o Disk pack is installed.
- o Pack access cover is closed.
- o All power supply circuits are on.

START Indicator:

This indicator will light when the START switch is depressed from the off position provided the three preconditions just mentioned are met. The light indicates that power is on.

READY Indicator:

Once the start sequence has been initiated by pressing the START switch, the READY indicator will blink once a second until the disk pack is up to speed.

When the READY indicator stays on, it indicates the following conditions have been met:

- o Disk pack is up to speed.
- o Heads are loaded.
- o No fault conditions exists.

DRIVE SELECT Plug:

This plug determines the logical address of the drive. The address can be changed to any number from 0 to 7 by installing the proper plug. If no plug is installed, the Plug Valid line to the controller is false.

FAULT Indicator:

The FAULT indicator lights up when one or more of the following fault conditions exist in the drive:

- o Write fault
- o Head select fault
- o Read/write fault
- o Read/write while off cylinder fault
- o Voltage fault

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FAULT CLEAR Switch:

This switch is a momentary contact pushbutton used to clear the FAULT indicator. Pressing the FAULT CLEAR switch will extinguish the FAULT indicator only if the fault condition no longer exists.

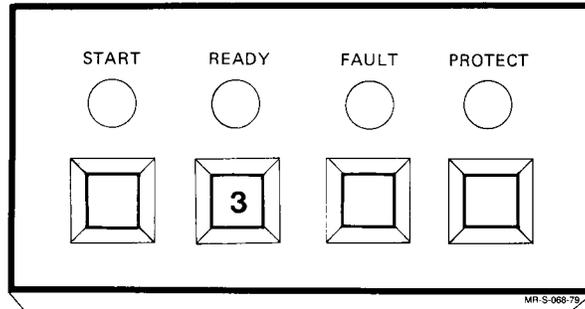
WRITE PROTECT Indicator:

When this indicator is on, it signifies that the drive is in the write protect mode. While in this mode, data cannot be written on the disk pack.

WRITE PROTECT Switch:

This switch is a 2-position pushbutton. When pressed to the IN position, it lights the WRITE PROTECT indicator and disables the drive's write circuits. While in this position, data cannot be written on to the pack.

Releasing this switch back to its OUT position removes the Disable signal from the write circuits and extinguishes the WRITE PROTECT indicator.



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Figure 8-4: RM03 Disk Drive

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8.1.4 RP20

Each RP20 master disk drive contains a number of switches and control indicators.

START/STOP Switch:

The drive START/STOP toggle switch starts and stops a drive. When set to START, the brake is released, the disks rotate up to speed, and the heads move to cylinder 0. When set to STOP, the heads retract, the brake engages, and the disks stop. An electrical interlock in the STOP position prevents a stop if the drive is busy.

READY Indicator:

The READY indicator turns on when the drive is on, the disk drive speed is up to normal, and the head is on a track.

ATTN. Switch:

When pressed, the ATTN. pushbutton switch starts a rezero operation. Rezero moves the heads to cylinder 0, resets the address registers, and signals attention to the controller. Device and interrupts are generated for both logical devices.

WARNING

The ATTN. button should never be pressed under any circumstances.

R/W READ Switch:

When in the READ position, no write or erase operation can be performed. If set in R/W, all reading and writing operations are possible. If the position of this pushbutton switch is changed during an operation, the condition does not change until the operation is completed.

Interface X and Interface Y:

Enable/Disable Switches (Dual Port):

The device interface switches have been added to the RP20-A Disk Drive control panel. The left switch controls the X interface; the right switch controls the Y interface. These enable/disable switches select the active interfaces by either dedicating the master and associated drives to a single interface or if both switches are on, to a Dual Port Device Interface.

NOTE

These X/Y Interface switches should be set according to the system configuration prior to restoring the operating system. The state of these switches should not be changed while the operating system is up.

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POWER ON Switch/Indicator:

Pressing the POWER ON switch supplies AC power to the master and slave drives if the ENABLE POWER OFF switch is in the ENABLE position. The POWER ON indicator is on when DC power is applied to the master drive.

ENABLE POWER OFF Switch:

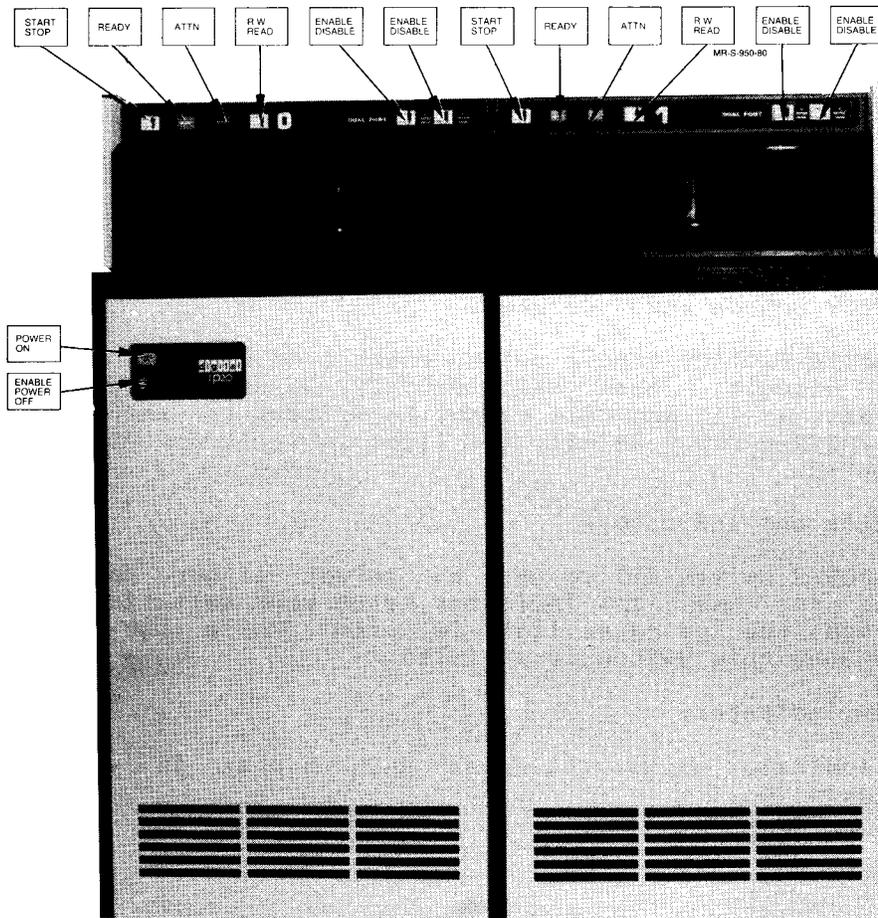
ENABLE:

With this switch in the ENABLE position, the master and slave drives may be powered up by pressing the POWER ON switch or by a system controlled power up sequence.

OFF:

With this switch in the OFF position, the master and slave drives are powered down. Power cannot be restored until switch is placed in ENABLE position and POWER ON is pressed again.

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Figure 8-5: RP20 Disk Drive

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8.1.5 RP07

START/STOP switch:

The START/STOP toggle switch starts or stops the drive.

ON-LINE Switch and Indicator:

The ON-LINE switch sets the disk on or off line. When the drive is on line, the ON-LINE indicator is lit.

WRITE-PROTECT Switch and Indicator:

The WRITE-PROTECT toggle switch enables or disables the drive's write circuit. When WRITE-PROTECT is on, the WRITE-PROTECT indicator is lit and data cannot be written to the disk. When the WRITE-PROTECT is off, the light is unlit and disk writes are permitted.

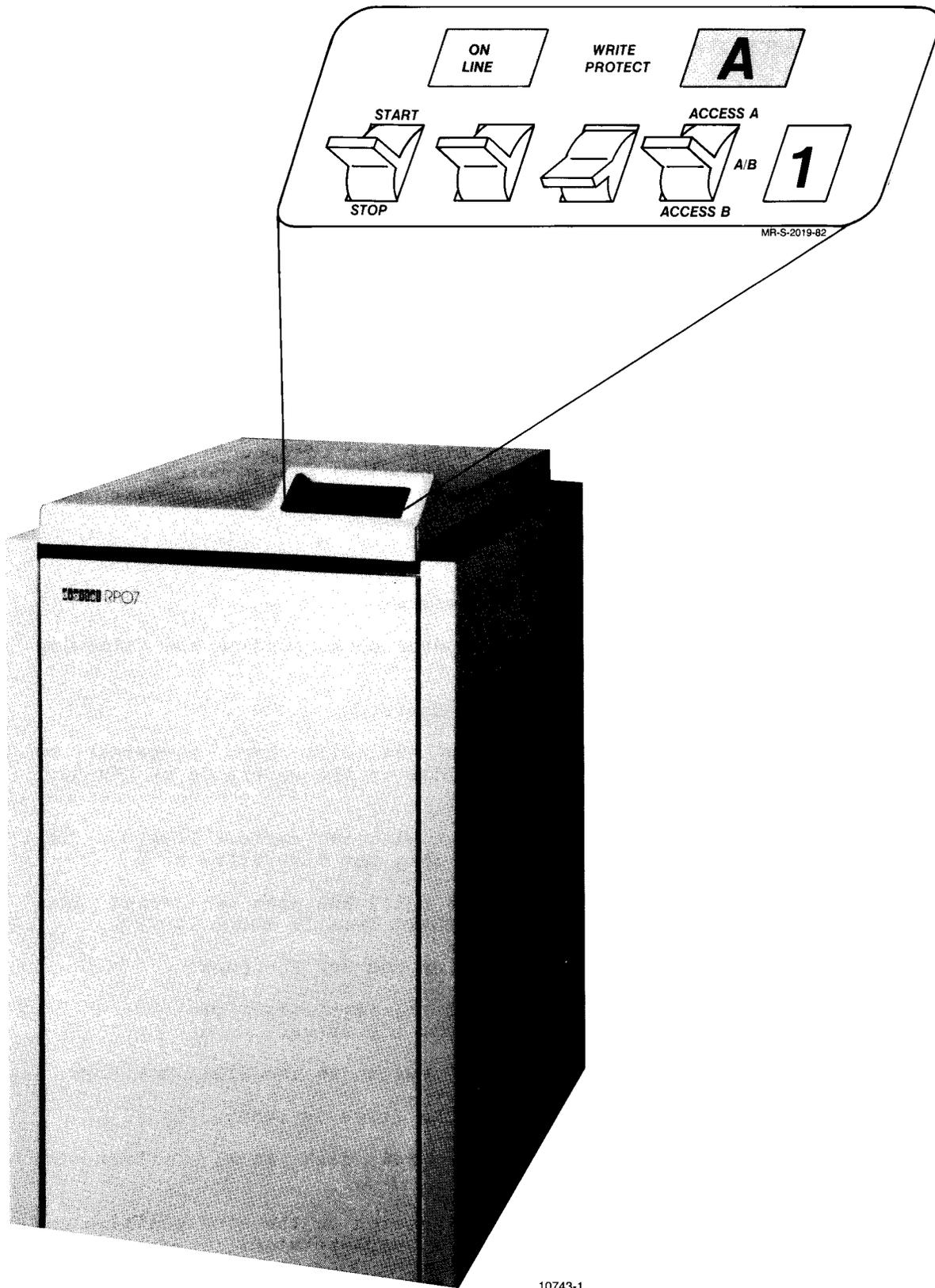
ACCESS Switch and Indicator:

The ACCESS switch allows you to select either port, or both ports, for use. The indicator notes your selection. If A/B is selected, the indicator light is off. While the disk is in operation, this switch is disabled.

UNIT-NUMBER Indicator:

This indicator shows the disk unit number in your hardware configuration.

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Figure 8-6: RP07 Disk Drive

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8.1.6 CI (HSC50, RA60, and RA81)

The RA60 and RA81 disk drives are connected to the KL CI20 bus, and controlled by the HSC50 disk controller. The HSC50 allows the drives to be accessible to multiple KL (SMP) systems. Refer to the following hardware manuals for operating information:

- o HSC50 User's Guide
- o RA60 Disk Drive User's Guide
- o RA80 Disk Drive User's Guide
- o RA81 Disk Drive User's Guide

8.2 MOUNTING AND DISMOUNTING DISK PACKS

The following steps describe how to mount and dismount disk packs. Extreme care must be taken to avoid physical damage to the pack and drive. Do not put anything on top of a drive except empty disk pack covers.

8.2.1 RP02, RP03, RP04, or RP06 Procedures

To mount an RP02, RP03, RP04, or RP06 disk pack, perform the following steps:

1. Slide back or lift the drive cover.
2. Remove the bottom plate from the disk pack container by compressing the locking handle on the underside of the pack bottom.
3. Be sure that you have the pack with the correct label on it; slide the pack straight down onto the disk drive hub.
4. Turn the pack cover clockwise until the pack is locked into position. DO NOT FORCE THE COVER ONCE IT STOPS TURNING.
5. Pull the pack cover straight up and off the pack.
6. Close the drive cover and put the empty disk pack cover on its base and store it on top of the drive.
7. Push or toggle the START/STOP switch to the START position.
8. When the READY light is on, the drive is ready.

To dismount an RP02, RP03, RP04, or RP06 disk pack, perform the following steps:

1. Push or toggle the START/STOP switch to the STOP position and wait until the pack comes to a complete stop.
2. Slide back or lift the drive cover.
3. Slip the pack cover straight down over the pack.
4. Turn the cover counterclockwise until the pack is free.

DISK DRIVES

5. Lift the pack straight up until it clears the drive.
6. Secure the bottom plate to the pack cover by compressing the locking handle on the underside of the pack bottom.
7. Close the drive cover.

8.2.2 RM03 Disk Pack Procedures

To mount an RM03 disk pack, perform the following steps:

1. Push the latch and pull up the drive cover.
2. Compress the locking handle on the underside of the bottom plate to remove the bottom from the disk pack cover.
3. Make sure that you have the pack with the correct label on it, and then slide the pack straight down onto the disk drive hub.
4. Turn the pack cover clockwise until the pack is locked into position. DO NOT FORCE THE COVER ONCE IT STOPS TURNING.
5. Pull the pack cover straight up and off the pack.
6. Close the drive cover and put the empty disk pack cover on its base and store it on top of the drive.
7. Push the START switch. This causes the START light to blink.
8. When the READ light stops blinking, the drive is ready.

To dismount an RM03 disk pack, perform the following steps:

1. Push the START switch, which causes the START light to blink, and wait until the START light goes off.
2. Pull up the drive cover.
3. Slip the pack cover straight down over the pack.
4. Turn the cover counterclockwise until the pack is free.
5. Lift the pack straight up until it clears the drive.
6. Compress the locking handle on the underside of the bottom plate to secure the bottom plate to the disk pack cover.
7. Close the drive cover.

8.2.3 RA60 Disk Pack Procedures

To mount an RA60 disk pack, perform the following steps:

1. Pull the drawer out, unless this is the topmost drive in the cabinet.
2. Push the latch on the front panel and lift the drive cover.
3. Make sure that you have the pack with the correct label on it. Slide the pack straight down on to the disk drive hub.

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4. Turn the pack cover handle clockwise until the pack is locked into position. DO NOT FORCE THE COVER ONCE IT STOPS TURNING.
5. Pull the pack cover straight up and off the pack.
6. Put the empty disk pack cover aside, close the drive cover, and push the drawer in.
7. Verify that port switch A or B is in the ON position, depending on which port is to be accessed by the controller. When both port switches are in the ON position at the same time, either Port A or Port B can be accessed by the controller.
8. Push the RUN/STOP switch.
9. When the READY light is on, the drive is ready.

To dismount an RA60 disk pack, perform the following steps:

1. Push the RUN/STOP switch and wait until the READY light goes off.
2. Pull the drawer out.
3. Push the latch on the front panel and lift the drive cover.
4. Slip the pack cover straight down over the pack.
5. Turn the cover counterclockwise until the pack is free.
6. Lift the pack straight up until it clears the drive.
7. Close the drive cover and push the drawer in.

8.3 POWERING UP AND POWERING DOWN DISK SYSTEMS

This section describes the steps for powering up and powering down disk drives.

8.3.1 RP20 Procedures

To power up an RP20 disk system, perform the following steps:

1. Place the POWER switch, located on the front of the master disk drive, to the ENABLE position.
2. Press the POWER ON button located on the front of the master disk drive.

NOTE

If the disk drive does not power up, check the POWER ON switch in the back of the disk control unit. If the switch is in the ON position and the disk drive is still not powered up, call your DIGITAL Field Service Engineer.

DISK DRIVES

To power down an RP20 disk system, perform the following steps:

1. Stop all RP20 disk drives.
2. Place the POWER switch, located on the front of the master disk drive, to the OFF position.

8.3.2 RP07 Procedures

To power up an RP07 disk drive, perform the following steps:

1. Place the ON LINE switch located on the front of the disk drive to OFF LINE.
2. Place the START/STOP switch, located on the front of the disk drive, to the START position.
3. Wait until lights stop flashing and ON LINE indicator is off. Place the ON LINE switch located on the front of the master disk drive to ON LINE.

To power down an RP07 disk system, perform the following steps:

1. Place the ON LINE switch located on the front of the disk drive to OFF LINE.
2. Place the START/STOP switch, located on the front of the master disk drive, to the STOP position.

8.3.3 HSC50 Disk Controller Procedures

Before using the CI disk sub system you must configure all HSC-50 disk controllers to use the correct sector size. To do this, use the HSC-50 utility program SETSHO. In order to verify the sector size parameter, type the following commands on the HSC-50 console terminal:

1. Type a <CTRL/Y> to get the HSC50> prompt.
2. Type the command RUN SETSHO<RET>.
3. When you receive the SETSHO> prompt, type the command SHOW SYSTEM<RET>. The SETSHO program types the system configuration information on the HSC-50 console terminal. A typical print-out is shown in Figure 8-7.
4. If the "sector size" parameter on the third line of the print-out is set to 576, no further action is necessary. Type the command EXIT<RET> to exit from the SETSHO program. If the "sector size" parameter is not set to 576, you must type the command SET SECTORSIZE 576<RET>. Now type the command EXIT<RET>.

DISK DRIVES

5. The SETSHO program prints the following question on the HSC-50 console terminal:

SETSHO-Q Rebooting HSC; type Y to continue, <CTRL/Y> to abort:?

Type a Y in response to this question.

6. The HSC-50 now reboots. When the HSC-50 software is reloaded the new "sector size" parameter is in effect.

```
.RUN SETSHO
SETSHO>SHOW SYSTEM
28-Oct-1985 09:30:21.27 Boot: 17-Oct-1985 15:01:18.67 Up:258:29
Version: Y25G          System ID: %X00000000E708      Name: HSC008
Front Panel Enabled   Sector size-576
Console Dump Enabled  TU58 Dump Disabled
Restart - Warm
Automatic Diagnostics Enabled
Periodic Diagnostic Interval- 1      Enabled
DISK allocation class = 0           Tape allocation class = 0
Start command file Enabled
SETSHO>
```

Figure 8-7: SHOW SYSTEM Output

For information on powering up and powering down the HSC50 disk controller, consult the latest version of the HSC50 User Guide.

8.4 STARTING AND STOPPING DISK DRIVES

This section describes the steps for starting and stopping various kinds of disk drives.

8.4.1 RP20 Disk Drive Procedures

To start an RP20 disk drive, perform the following steps:

1. Place the START/STOP toggle switch to the START position.
2. Wait for the READY light to illuminate.

Follow these procedures for each RP20 disk drive you plan on using.

To stop an RP20 disk drive, place the START/STOP toggle switch to the STOP position.

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8.4.2 RA60 and RA81 Procedures

To start an RA60 or RA81 disk drive, perform the following steps:

1. Verify that the port switch A, B, or A and B is set, depending on which port you are using.
2. Press the RUN/STOP switch.
3. Wait for the READY light to come on.

Follow these procedures for each RA60 or RA81 disk drive you plan to use.

To stop an RA60 or RA81 disk drive, press the RUN/STOP switch and wait for the READY light to go off.

8.5 FORMATTING DISK PACKS

NOTE

The RP07, RP20, RA60, and RA81 disk packs are already formatted. If you need to have an RA60 or RA81 disk pack reformatted, contact your Digital Field Service Representative.

Formatting and mapping disk packs is required prior to their first use. This procedure is also recommended if a disk pack develops search errors or other problems such as bad spots on the pack. Formatting writes (or rewrites) a header record at the beginning of each sector so that the hardware can position itself when reading or writing on the disk. Mapping is the process of writing and reading each disk block, or sector, a number of times to search for bad blocks. A log of any bad blocks is kept and is output in two duplicate BAT blocks.

Because the formatting process destroys all data on the disk pack, you should first run the BACKUP program and save any important files. (Refer to Appendix E for information on BACKUP.)

8.5.1 RP02 and RP03 with DCRPE

RP02s and RP03s can all be formatted in a timesharing environment using the DCRPE program. The requirements for running DCRPE are:

- o You must be logged in under [1,2], preferably on a hard copy terminal.
- o The disk pack must be mounted on a private drive; the pack must not have been ASSIGNED or MOUNTed.
- o The "write header" switch inside the appropriate RP10 disk controller must be set to enable write headers (LK OUT position).

DISK DRIVES

Proceed as follows:

Step	Function
.R DCRPE[6,6] <RET>	Run DCRPE, which is usually stored in the hardware and diagnostic area [6,6]. DCRPE will then enter into a dialogue with you.
TYPE THE PHYSICAL NAME OF THE DISK PACK DRIVE:	Reply with the physical designation of the drive; for example, DPA0 or DPB2.
DO YOU WISH TO FORMAT THE PACK? Y or N	Y will continue with the formatting; N will skip the formatting and go to the mapping questions that follow the NOTE below.
NAME THE DEVICE FOR ERROR REPORTING:	Enter the logical or physical name of the device for error reports; for example, TTY. A carriage return defaults to disk.
***ARE YOU SURE YOU WANT TO PROCEED? ALL INFORMATION ON DEVICE dev WILL BE LOST BEYOND THIS POINT. Y or N <CR>-	This is your last chance to exit before losing data or disk. Type Y if all necessary data has been saved.
FORMATTING IN PROGRESS hh:mm:ss	DCRPE notifies you that it has started to format the disk and gives you a timestamp.
HEADERS HAVE BEEN WRITTEN- VERIFICATION NOW IN PROGRESS	DCRPE has completed writing the headers and is now reading them to verify their validity.
FORMATTING COMPLETE- RECOMMEND MAPPING THE PACK TOTAL ERRORS:n TOTAL FORMATTING TIME= hh:mm:ss	DCRPE has completed the verification: you are notified of the number of errors (n) and of the time it took for the formatting process.
DO YOU WISH TO MAP THE PACK? Y or N <CR>-	Y will continue with mapping; N will exit to the monitor.

At this time you can switch the "write headers" switch on the disk controller back to the WH position.

DISK DRIVES

NOTE

If you are formatting a new pack, one that has not been used since it came from the factory, it will not have the valid HOM and BAT blocks required by the mapping portion of DCRPE. Use the TWICE program with the LONG option to structure the pack, giving it a scratch name, and initializing both the HOM and BAT blocks. The detailed specifications for running the TWICE program can be found in the TOPS-10 Software Installation Guide under the ONCE-Only dialogue. After this is done, reload the DCRPE program. Answer N to the question DO YOU WISH TO FORMAT THE PACK?. You will then be prompted as follows:

Step	Function
USE OLD BAT BLOCK AS BASE? Y or N <CR>-	You must reply Y (for Yes).
DO YOU WISH TO RETAIN THE HOME BLOCKS IF YES, THE PACK WILL HAVE TO BE REFRESHED IF NO, THE HOME BLOCK PARAMETERS WILL HAVE TO BE REDEFINED IN ONCE Y or N <CR>-	Again, answer Y.
NAME THE DEVICE FOR CRASH RECOVERY DATA:	The usual reply is DSK.
NAME THE DEVICE FOR ERROR REPORTING:	This question is asked only if you skipped formatting. Answer with TTY.
***ARE YOU SURE YOU WANT TO PROCEED? ALL INFORMATION ON DEVICE dev WILL BE LOST BEYOND THIS POINT Y or N <CR>-	Type Y if all necessary data files have been saved.
MAPPING IN PROGRESS hh:mm:ss	DCRPE notifies you that it is mapping and gives you a timestamp.
END OF PASS 1; ELAPSED TIME =hh:mm:ss	DCRPE has read all the blocks once in the time shown and has found n errors.
n ERRORS THIS PASS CONTINUE? A or Y or N <CR>-	Type A to continue reading all the blocks a total of ten times without stopping. Type Y to read the blocks one more time and ask the question again. Type N to end mapping at this pass.

DISK DRIVES

Step	Function
TOTAL MAPPING TIME	After the final pass, DCRPE prints out the total mapping time and the location, size, and number of any bad regions on the disk. Each bad area is located by block number bbbbbb, as well as cylinder (ccc), head (hh) and sector (ss). The size of each bad region is given by n. After all bad areas have been logged, the total number of bad regions (q) and bad blocks (p) are printed. This same information is also stored in the two duplicate BAT blocks. The program then exits.
FOR dev=hh:mm:ss	
HISTORY OF BAD BLOCKS:	
START OF BAD BLOCK:	
bbbbbb=ccc, hh, ss	
SIZE OF BAD REGION IN	
BLOCKS=n	
.	
.	
.	
p=BAD BLOCKS TOTAL	
q=BAD REGIONS TOTAL	
EXIT	

Now use the TWICE program with the REFRESH option to re-initialize the two duplicate HOM blocks and clear the Storage Allocation Table (SAT). This procedure frees up any lost blocks and eliminates fragmentation of files since the subsequent BACKUP operation, RESTORE, will reload the files systematically.

8.5.2 Formatting RP02s and RP03s with DDRPC

RP02 and RP03 disks can also be formatted in exec mode using the DDRPC program. This program gives you the additional capability of formatting single cylinders of a disk pack and single surfaces of a cylinder.

The requirements for running DDRPC are:

- o The "write header" switch inside the appropriate RP10 disk controller must be set to enable write headers (LK OUT position).
- o Drives that are not to be formatted must be placed off line with the STOP switch.

Load and start the DDRPC program; it will initialize and print a description of the disk system.

PDP-10 RP10 Disk Pack Reliability Test (DDRPC) Version 000,002

Memory Map =
From To SIZE/K
000000 077777 32K

POWER FREQUENCY = 60 HZ

Write Enable Entire Disk Y or N <CR> Y <RET>
DF10 in KA Addressing Mode
Number of Drives= 4
DPA0 = RP03, STATUS-ON LINE
DPA1 = RP02, STATUS-OFF LINE
DPA2 = RP03, STATUS-OFF LINE
EDDT

DISK DRIVES

You are now ready to format an entire disk or selected portions of it.

----- Examples -----

1. Formatting an Entire Disk Pack

You type everything that is in UPPERCASE BOLD PRINT:

Step	Function
EX FORMAT\$X <RET>	You want to use the formatting capability of the DDRPC diagnostic program. (Note that \$ indicates pressing the ESCape or ALTmode key.)
WANT TO FORMAT THE DISK? Y or N <CR> - Y <RET>	Type Y to format pack.
WHAT DRIVE?-<CR>0 <RET>	Format drive 0.
WANT TO FORMAT ENTIRE DISK? Y or N <CR>-Y <RET>	The complete disk pack on drive 0 is to be formatted.
VERIFY ERROR, DISK ADDR, DPA=0 CYL=013 SURF=02 SECT=03	
VERIFY ERROR, DISK ADDR, DPA=0 CYL=056 SURF=01 SECT=01	
VERIFY ERROR, DISK ADDR, DPA=0 CYL=103 SURF=04 SECT=03	
VERIFY ERROR, DISK ADDR, DPA=0 CYL=277 SURF=06 SECT=00	

```
*****  
EXIT TEST-FORMAT RUN TIME 0:15:20  
*****
```

The error messages above indicate that the disk failed to format the indicated disk addresses successfully. The disk may be completely formatted again or the individual addresses (surfaces) may be reformatted as indicated in the example below.

2. Formatting a Portion of the Disk Pack

You type everything that is in UPPERCASE BOLD PRINT:

Step	Function
EX FORMAT\$X <RET>	Format a portion of a disk pack. (Note that \$ indicates where you press the ESCape or ALTmode key.)
WANT TO FORMAT THE DISK? Y or N <CR>-Y <RET>	Type Y to format pack.
WHAT DRIVE?-<CR>0 <RET>	Format drive 0.
FORMAT ENTIRE DISK? Y or N <CR>-N <RET>	To format only a portion of the disk.
CYL(8)=100 <RET>	Cylinder 100 (octal).
SURF (8)=0 <RET>	All sectors of surface 0.

DISK DRIVES

Step	Function
CYL(8)=102 <RET>	Cylinder 102.
SURF(8)=A <RET>	All surfaces.
CYL(8)=B <RET>	B is an illegal character.
?HUH?	
CYL(8)=217 <RET>	Cylinder 217.
SURF(8)=40 <RET>	40 is an illegal surface address.
?HUH?	
CYL(8)=217 <RET>	Cylinder 217 again.
SURF(8)=4 <RET>	Surface 4.
CYL(8)=E <RET>	Either E or X at this point causes the program to ask if there is another drive to be formatted (or tested).
TEST WHAT DRIVE?-<CR>E <RET>	The formatting for the above cylinders and surfaces will be done, error messages may appear as in the above example, and EXIT TEST will be output.

At this time you can switch the "write headers" switch on the disk controller back to the WH position.

8.5.3 Formatting RP04s and RP06s with DDRPI

RP04s and RP06s can be formatted and mapped in either a timesharing environment or stand-alone using the DDRPI program.

DDRPI (Timesharing)

Running DDRPI during timesharing requires the following:

- o You must be logged in under [1,2].
- o Packs to be formatted must not be in the system structure list.
- o The following files must be in your area:

DIAMON.SAV
DDRPI.SAV
KLDDT.SAV
SUBRTN.SAV

DISK DRIVES

Proceed as follows, type everything in UPPERCASE BOLD PRINT:

.ASSIGN DSK LPT <RET> Direct printer output file to disk.
.RUN DIAMON <RET> Load and start the diagnostic monitor.
DIAMON will then request a command.

DIAMON CMD- Enter "DDRPI" to start the disk
formatting dialogue.

The DDRPI dialogue for formatting RP04 and RP06 type disk drives is rather lengthy. Print out the DDRPI.HLP file and use it as reference. The dialogue questions and their suggested responses are fully detailed.

8.6 CLEANING DISK DRIVES

Other than keeping the outside of the drive and the cover of the packs clean, you should leave this task to your Digital Field Service representative.

CHAPTER 9

FLOPPY DISKS

A floppy disk is a single, record-like platter which is housed in a protective cover. A narrow slot in this cover allows the surface to be accessed by the drive heads. During system installation, the front-end software is loaded from floppy disks and transferred to the regular disk system. During normal operation of the computer thereafter, the floppy disks are used only occasionally. Such use may involve booting the system if normal methods fail, or mounting a floppy with diagnostic programs for trouble-shooting by Digital Field Service.

As you face the two floppy disk units, unit 0 is the left one, and unit 1 is the right one.

9.1 INSERTING AND REMOVING FLOPPY DISKS

To insert a floppy disk (Figure 9-1), first choose the correct unit and press the pushbutton in the middle of the unit to allow the spring-loaded front cover to open. Insert the floppy disk with the narrow slot toward the back of the drive and the label up. Then push the bar on the cover to lock it.

To remove a floppy disk, press the pushbutton again to open the front cover and slide the floppy disk out.

NOTE

Do not open the covers while the floppy disks are being accessed.

9.2 HANDLING FLOPPY DISKS

To prolong the life of a floppy disk and to prevent errors, you should handle floppy disks with reasonable care. You should follow the handling recommendations given below to prevent unnecessary loss of data or interruptions of system operation.

- o To attach visual information to a floppy disk, first write the information on a label, then attach the label to the floppy disk. Do not write on the floppy disk.
- o Do not use paper clips on a floppy disk.
- o When you write on the outer jacket in which you store a floppy disk, do not use anything that leaves flakes, such as lead or grease pencils.

FLOPPY DISKS

- o Do not touch the surface exposed in the slot or small index hole.
- o Do not clean the floppy disk in any manner.
- o Keep the floppy disk away from magnets or tools that may have become magnetized. Exposure to a magnetic field may cause a loss of data.
- o Do not expose the floppy disk to a heat source or sunlight.
- o Always return floppy disks to the envelopes supplied with them to protect them from dust and dirt, and store them horizontally.
- o Protect empty envelopes from liquids, dust, and metallic materials.
- o Do not place heavy items on floppy disks.
- o Do not store floppy disks on computer cabinets or in places where dirt can be blown by fans.
- o If a floppy disk has been exposed to less than 59 F (15 C) or more than 90 F (32 C), let it stay in the computer room about five minutes before you use it.

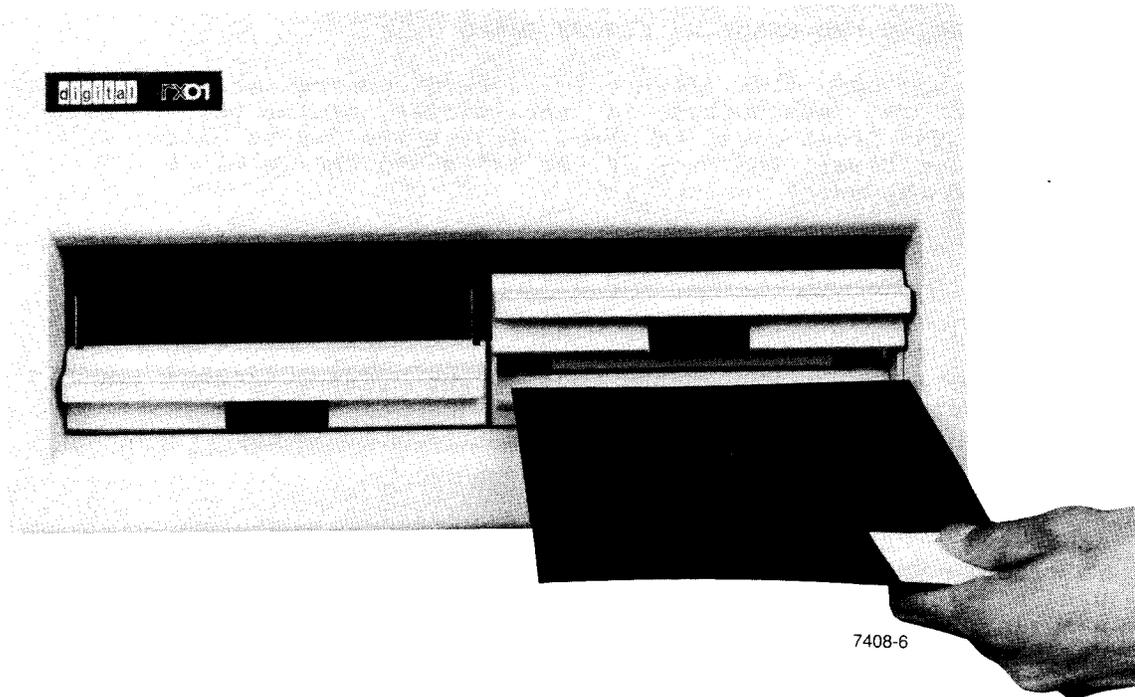


Figure 9-1: Floppy Disk

INSERT TAB 4 "STARTING THE SYSTEM" HERE

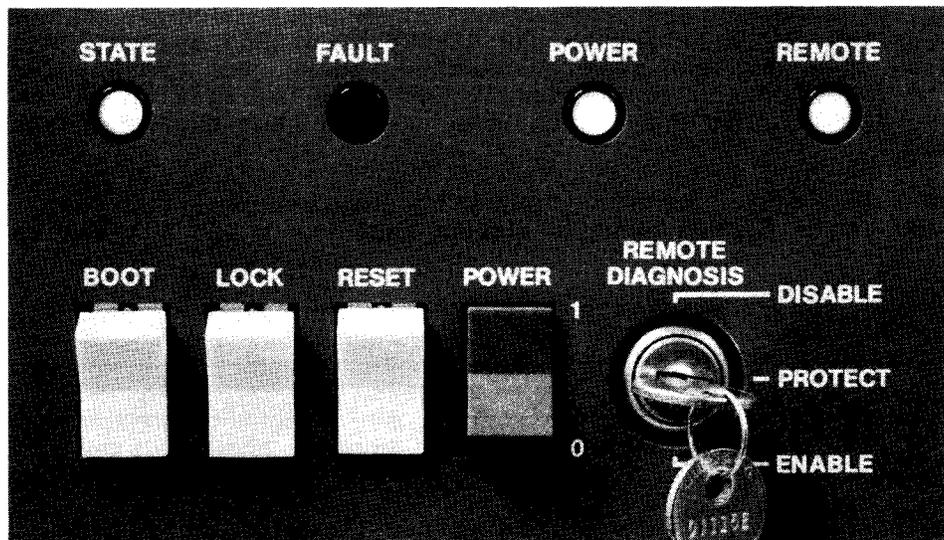
CHAPTER 10

STARTING THE KS10 CENTRAL PROCESSOR

10.1 SWITCHES AND LIGHTS

Before you start the DECSYSTEM-2020, you must become familiar with the switches and lights on the cabinet. Figure 10-1 shows the load switches and indicator lights.

Four rocker switches and one key switch are located on the top right corner of the front panel. Just above them are the four indicator lights.



9156-6

Figure 10-1: Load Switches and Indicator Lights

STARTING THE KS10 CENTRAL PROCESSOR

The rocker switches in Figure 10-1 are load switches. They are labeled BOOT, LOCK, RESET, and POWER. To set any of these switches to ON, press the top half of the switch. Table 10-1 lists the load switches and their functions.

Table 10-1: Load Switches

Switch	Function
BOOT	Boots the system from either the default device or the last selected device.
LOCK	Disables the BOOT and RESET switches and prevents the console program from recognizing a CTRL/backslash.
RESET	Starts the system without beginning the boot procedure.
POWER	Supplies power to the system and automatically loads the system from the default device 30 seconds after being switched from 0 to 1. The "1" next to the switch means that it is on; the "0" means that it is off.

The key switch on the right is the REMOTE DIAGNOSIS switch. This is a 3-position key switch that controls access to the KLINIK remote diagnosis facility. (See Chapter 17 for more information on KLINIK.) You can remove the key with the switch set to any of the three positions.

Table 10-2 lists the REMOTE DIAGNOSIS switch positions and their functions. Your system manager should tell you which setting to use.

Table 10-2: REMOTE DIAGNOSIS Switch Positions

Position	Function
DISABLE	Prohibits access to the system through the KLINIK link.
PROTECT	Allows access to the system through the KLINIK link, but only if the password entered from the link matches the password previously entered by the operator.
ENABLE	Allows access to the system through the KLINIK link.

STARTING THE KS10 CENTRAL PROCESSOR

There are four indicator lights above the switches. Table 10-3 describes each of the indicator lights.

Table 10-3: Indicator Lights

Light	Condition	Explanation
STATE	ON	The microprocessor has successfully loaded the microcode and is up and running, but the TOPS-10 operating system is not yet running.
	OFF	The microprocessor has stopped.
	BLINKING	The microprocessor has successfully loaded the monitor. The monitor is in the timesharing state, and is exchanging dialog with the console program in the microprocessor. During input and output to the CTY, the blinking slows down.
FAULT	ON (during system loading)	The system is malfunctioning. This can mean that there is an error in device selection or that there is a microprocessor fault. Make sure the disk or magnetic tape is mounted on drive 0. Try to reload. If the reload fails, call your Field Service representative.
	ON (during timesharing)	The microprocessor has stopped. Try to reload. If the reload fails, call your Field Service representative.
	OFF	The microprocessor is operating normally.
POWER	ON	The central processor is powered up.
	OFF	The central processor is powered down.
REMOTE	ON	The KLINIK link has been enabled.
	OFF	The KLINIK link cannot be accessed.

STARTING THE KS10 CENTRAL PROCESSOR

10.2 POWERING UP THE SYSTEM

Before you power up the system, turn on the console terminal (CTY). Make sure that it is online, and has paper. Make sure that the following peripheral devices are powered up. If they are not, see the chapter listed in parentheses.

- o Line printers (Chapter 4)
- o Magnetic-tape drives (Chapter 7)
- o Disk drives (Chapter 8)

To power up the system, press the POWER switch to the ON position. The POWER light will go on. If you do not type CTRL/C within 30 seconds, the system will begin the automatic boot procedure from disk. (See Section 10.3.1 for more information on the automatic boot procedure.)

10.3 LOADING THE SYSTEM USING DEFAULT PARAMETERS

Before you begin to load the DECSYSTEM-2020, make sure that:

- o All hardware and software is properly installed.
- o The disk packs are mounted properly.
- o The LOCK switch is off.

If you are installing the system for the first time, or installing a new version of the software, see the TOPS-10 Software Installation Guide.

The default parameters for loading the system are:

- o UBA1 is the UNIBUS adapter for disk.
- o UBA3 is the UNIBUS adapter for magnetic tape.
- o RHBASE 776700 is the address of RH11 controller for disk.
- o RHBASE 772440 is the address of RH11 controller for magnetic tape.
- o Unit 0 is the disk drive and magnetic-tape drive.
- o DSK:SYSTEM.EXE[1,4] is the monitor file.

NOTE

The unit number is the only parameter you can change.

You can use the default parameters to load the system either from disk (Section 10.3.1) or from magnetic tape (Section 10.3.3). To use nondefault parameters to load the system, see Section 10.4.

STARTING THE KS10 CENTRAL PROCESSOR

To reload the monitor from disk pack when the monitor is already running, see Section 10.3.2.

After you answer the monitor startup questions described in Section 11.6, INITIA may print a few lines on the CTY. The INITIA program automatically starts the jobs you always want to run at system startup, and initializes terminal characteristics. See the TOPS-10 Software Installation Guide for more information on INITIA.

10.3.1 Powering Up and Loading from Disk

To load the system from disk using the default parameters do the following:

1. Press the POWER switch to the ON position. The POWER light goes on, the microprocessor prints its ROM code and version number on the CTY, and the system automatically boots. To stop the automatic boot procedure, type CTRL/C on the CTY within 30 seconds of pressing POWER. If you receive the message, "?NXM", on the CTY, you can ignore it.

2. Press RETURN where indicated in the following sample dialog:

```
KS10 CSL.V4.2      Microprocessor ROM code and version
                   number.

BT AUTO           This message prints 30 seconds after
                   power-up.

BOOT V#(#)        BOOT version number.

BOOT><RET>         Press RETURN to load the default monitor
                   from the file DSKB:SYSTEM.EXE[1,4].
```

Immediately after the system prints BT AUTO, the microprocessor starts the boot procedure from disk unit 0. The system then assumes all of the default parameters. If the CTY does not print the BOOT prompt, the automatic boot procedure has failed. If that happens, check the disk to make sure it is properly mounted. If no hardware problem is apparent, the default parameters may be incorrectly set.

To remedy this situation, follow the steps in Section 10.4.1 to reset the default parameters, or the steps in Section 10.3.3 to load the monitor from magnetic tape.

When the monitor has been loaded into memory, the monitor startup questions begin. If the system does not print the first monitor startup question (Why reload:), BOOT sends an error message. (For explanations of BOOT messages, see Appendix A.)

3. Answer the monitor startup questions described in Section 11.6.

STARTING THE KS10 CENTRAL PROCESSOR

10.3.2 Reloading the Monitor from Disk

To reload the monitor from disk when the monitor is already running, halt timesharing and reload the monitor. To do this, perform the following steps:

1. Make sure the POWER light is on. (See Section 10.3.1.)
2. Type the following commands:
 - .RUN OPR<RET>
Run the OPR program.
 - OPR>SET KSYS +0:05<RET>
This halts timesharing in five minutes.
To change the amount of time, see the SET KSYS command in the Operator's Command Language Reference Manual.
 - OPR>EXIT<RET>
Exit the OPR program.
3. Wait five minutes before proceeding and then perform the following steps on the CTY.
 - .^\
Type CTRL/backslash (shown here as ^\) to communicate with the microprocessor. CTRL/backslash does not echo on the CTY.
 - KS10>SHUT<RET>
Type SHUT and press RETURN to shut down the system.
 - KS10>USR MOD
The CTY automatically enters user mode.
 - BOOT>DSKB:<RET>
Type DSKB: and press RETURN to load the default monitor from the file DSKB:SYSTEM.EXE[1,4].

[Loading from DSKB:SYSTEM.EXE[1,4]]

BOOT reloads the monitor.

When the monitor has been loaded into memory, the monitor startup questions begin.
4. Answer the monitor startup questions described in Section 11.6.

STARTING THE KS10 CENTRAL PROCESSOR

10.3.3 Powering Up and Loading from Magnetic Tape

Before you load the system from magnetic tape with the default parameters, make sure that:

- o All of the software is on magnetic tape. If it is not, see Section 10.3.1.
- o The magnetic tape is mounted on tape-drive unit 0. If it is not, see Chapter 7.

To load the system from magnetic tape using default parameters, do the following:

1. Make sure the POWER light is on. If the light is not on, press POWER to the ON position and type CTRL/C within 30 seconds. If you do not type CTRL/C within 30 seconds, the system begins the automatic boot procedure from disk. Section 10.3.1 explains the automatic boot procedure.
2. Make sure a bootstrap tape, such as the distributed installation tape, is mounted on drive 0.
3. Type everything that is in UPPERCASE BOLD PRINT in the following sample dialog:

```
KS10>MT<RET>           Type MT and then press RETURN.
KS10>USR MOD           The CTY enters user mode.
BOOTM V#(##)          BOOTM version number.
BTM><RET>             Press RETURN to load the default
                      monitor from the file
                      DSKB:SYSTEM.EXE[1,4].
```

See Appendix B for information on the KS10 microprocessor commands. When the monitor has been loaded into memory, the monitor startup questions begin.

4. Answer the monitor startup questions described in Section 11.6.

10.4 LOADING THE SYSTEM USING NONDEFAULT PARAMETERS

Before you begin to load the DECSYSTEM-2020 using nondefault parameters, make sure that:

- o All hardware and software is properly installed.
- o The disk packs are mounted properly.
- o The LOCK switch is off.

If you are installing the system for the first time, refer to the TOPS-10 Software Installation Guide.

STARTING THE KS10 CENTRAL PROCESSOR

10.4.1 Loading from Disk and Changing Parameters

To load from a disk mounted on a drive other than unit 0, perform the following steps:

1. Make sure the POWER light is on. If the light is not on, press POWER to the ON position and type CTRL/C within 30 seconds. If you do not type CTRL/C within 30 seconds, the system will begin the automatic boot procedure. (See Section 10.3.1 for more information on the automatic boot procedure.)
2. Make sure the disk pack is mounted on the drive you want.
3. Type everything that is in UPPERCASE BOLD PRINT in the following sample dialog. When you press RETURN to answer a question, the system assumes the default value.

```
KS10>DS<RET>           Type DS then press RETURN.
>>UBA?<RET>           Which UBA is the drive controller
                        attached to? Press RETURN.
>>RHBASE?<RET>        What is the RH11 base address? Press
                        RETURN.
>>UNIT?n<RET>         Type the disk-drive unit number (n)
                        and press RETURN. Currently, UNIT is
                        the only parameter that you may
                        change.
KS10>BT<RET>          Type BT and press RETURN.
BOOT V#(##)            BOOT version number.
BOOT><RET>             Press RETURN to load the default
                        monitor from the file
                        DSKB:SYSTEM.EXE[1,4].
```

When the monitor has been loaded into memory, the monitor startup questions begin. If the system does not print the first monitor startup question, BOOT prints an error message. See Appendix A for information about BOOT error messages.

4. Answer the monitor startup questions described in Section 11.6.

10.4.2 Loading from Magnetic Tape and Changing Parameters

To load from a magnetic-tape drive other than drive 0, perform the following steps:

1. Make sure the POWER light is on. If the light is not on, press POWER to the ON position and type CTRL/C within 30 seconds. If you do not type CTRL/C within 30 seconds, the system will begin the automatic boot procedure from the disk. (See Section 10.3.1 for details on the automatic boot procedure.)
2. Make sure the monitor tape is mounted on the magnetic-tape drive you want. The default drive is 0.

STARTING THE KS10 CENTRAL PROCESSOR

3. Type everything that is in UPPERCASE BOLD PRINT in the following sample dialog. When you press RETURN to answer a question, the system assumes the default value.

KS10>MS<RET> Type MS and press RETURN.

>>UBA?<RET> Which UBA is the drive controller attached to? Press RETURN.

>>RHBASE?<RET> What is the RH11 base address? Press RETURN.

>>TCU?<RET> What is the tape-controller unit number? Press RETURN. Your system may print UNIT. UNIT and TCU both refer to the tape-controller unit number.

>>DENS?<RET> What is the tape density? The tape density depends on the type of drive you have. (See Chapter 3 for more information about tape densities.) Press RETURN.

>>SLV?n<RET> What is the slave? Type the number (n) that is on the outside of the magnetic-tape drive and press RETURN.

KS10>MT<RET> Type MT and press RETURN.

KS10>USR MOD The CTY enters user mode.

BOOTM V#(##) BOOTM version number.

BTM><RET> Press RETURN to load the default monitor from the magnetic tape.

When the monitor has been loaded into memory, the monitor startup questions begin.

4. Answer the monitor startup questions described in Section 11.6.

STARTING THE KSIØ CENTRAL PROCESSOR

1Ø.4.3 Loading the Monitor from a Nondefault File

To load a monitor from a file other than DSKB:SYSTEM.EXE[1,4], perform the following steps:

1. Load the system as usual from disk (see Sections 1Ø.3.1 and 1Ø.4.1) or magnetic tape (see Sections 1Ø.3.3 and 1Ø.4.2). When the CTY prints bootstrap program prompt (BOOT> or BTM>) perform Step 2.
2. Type the monitor name (for example, NEWMON.EXE) or a complete file specification and then press RETURN. Everything that you type is in UPPERCASE BOLD PRINT in the following examples:

BTS>NEWMON.EXE<RET> This is an example of using BOOT to load the monitor from disk.

BTM>NEWMON.EXE<RET> This is an example of using BOOTM to load the monitor from magnetic tape.

When the monitor has been loaded into memory, the monitor startup questions begin.

3. Answer the monitor startup questions described in Section 11.6.

1Ø.5 ANSWERING MONITOR STARTUP QUESTIONS

When you have loaded the microcode, the bootstrap program, and the monitor, you can start timesharing by answering the questions in the monitor startup dialog. Section 11.6 briefly describes the startup dialog. See the TOPS-1Ø Software Installation Guide for a detailed discussion of the dialog.

CHAPTER 11

STARTING THE KL10 CENTRAL PROCESSOR

This chapter contains step-by-step instructions for loading and starting a KL system. Sections 11.1 through 11.8 apply to both single-processor and Symmetric Multiprocessing (SMP) systems. Sections 11.9 through 11.11 apply to SMP systems only.

To load and start a single-processor system, perform the following steps:

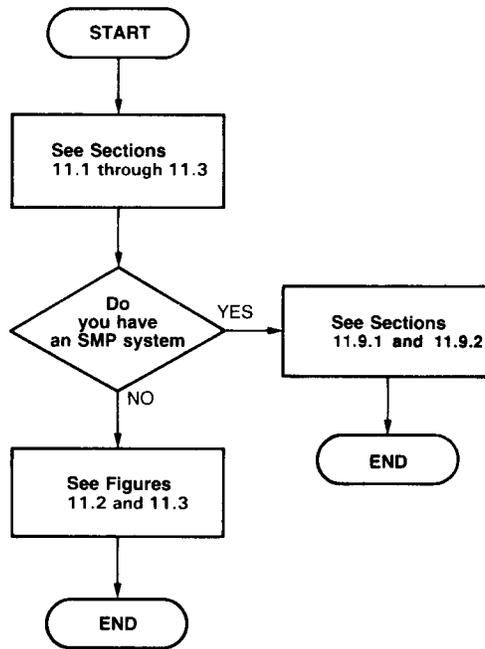
1. Power up the system. (See Section 11.2.)
2. Load the RSX-20F front-end file system. (See Section 11.3.)
3. Load the monitor and start the central processor (CPU). (See Section 11.4 or Section 11.5.)
4. Answer the monitor startup questions. (See Section 11.6.)
5. Load the communications front end (if any).

To load and start an SMP system, perform the following steps:

1. Read Section 11.9, which defines the terms policy and nonpolicy CPU.
2. Power up the system. (See Section 11.2.)
3. Load the RSX-20F front-end file system on each nonpolicy CPU from disk or DECTape using the switch register. (See Section 11.10.)
4. Load the RSX-20F front-end file system, the bootstrap program, and the monitor on the policy CPU. Do not answer the monitor startup questions at this time. (See Section 11.9.1.)
5. Start each nonpolicy CPU. (See Section 11.9.1.)
6. Answer the monitor startup questions at the CTY that is attached to the policy CPU. (See Section 11.6.)
7. Load any communications front ends.

At nearly every step there are choices that you must make about how you want the system to start. For example, there are at least four ways to load RSX-20F, and two ways to load the monitor. To help you make these choices and to help you find the sections that are of interest to you, see Figures 11-1 through 11-3.

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Figure 11-1: Reading Path for Chapter 11

11.1 SWITCHES AND LIGHTS

Before you start your system, become familiar with the switches and lights on the cabinets. (See Figures 11-4 and 11-5.)

On all systems except the 1091, six rocker switches are located in the middle of the front panel. Just to the right of them are the two indicator lights. (See Figure 11-4.)

On the 1091, six rocker switches are located on the top left corner of the front panel. To the right of the rocker switches are the two power switches. Just above the rocker switches are the two indicator lights. (See Figure 11-5.)

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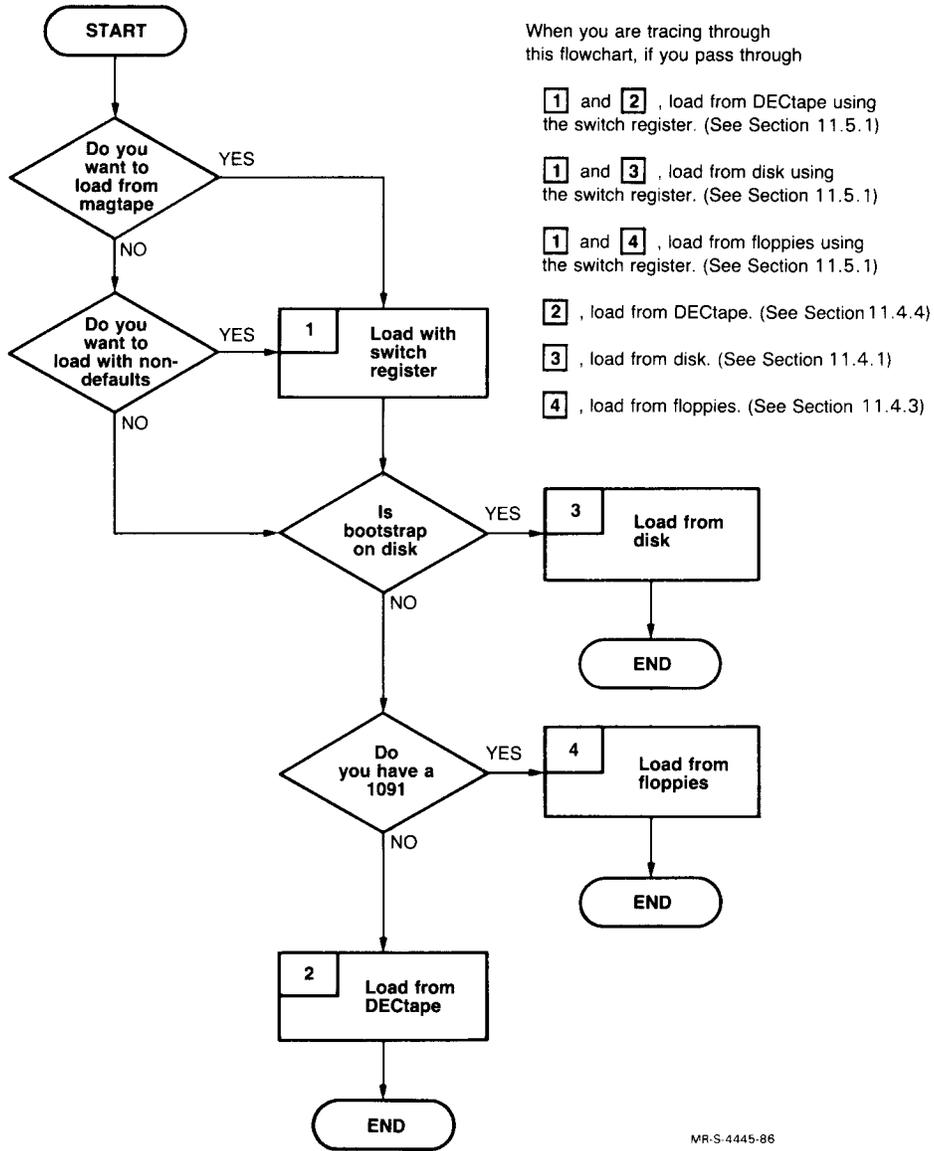
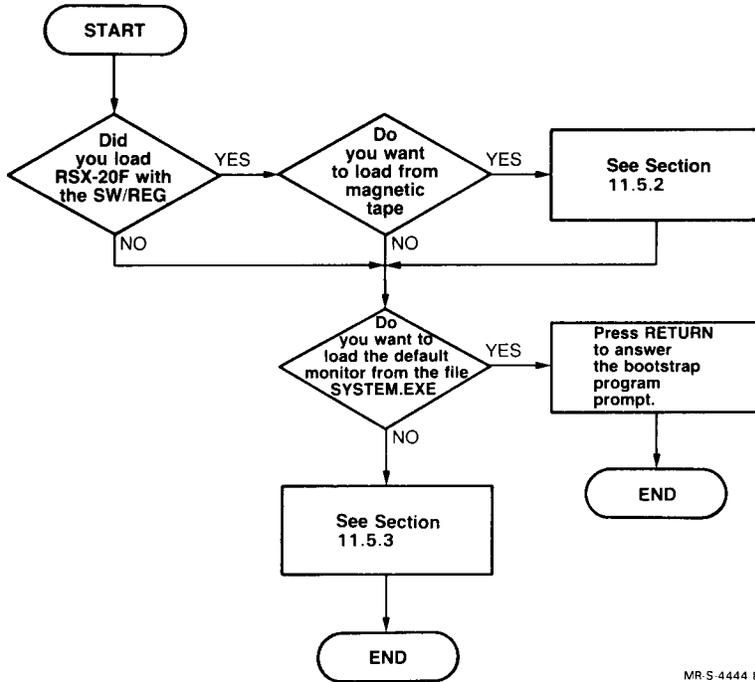


Figure 11-2: RSX-20F Loading Choices

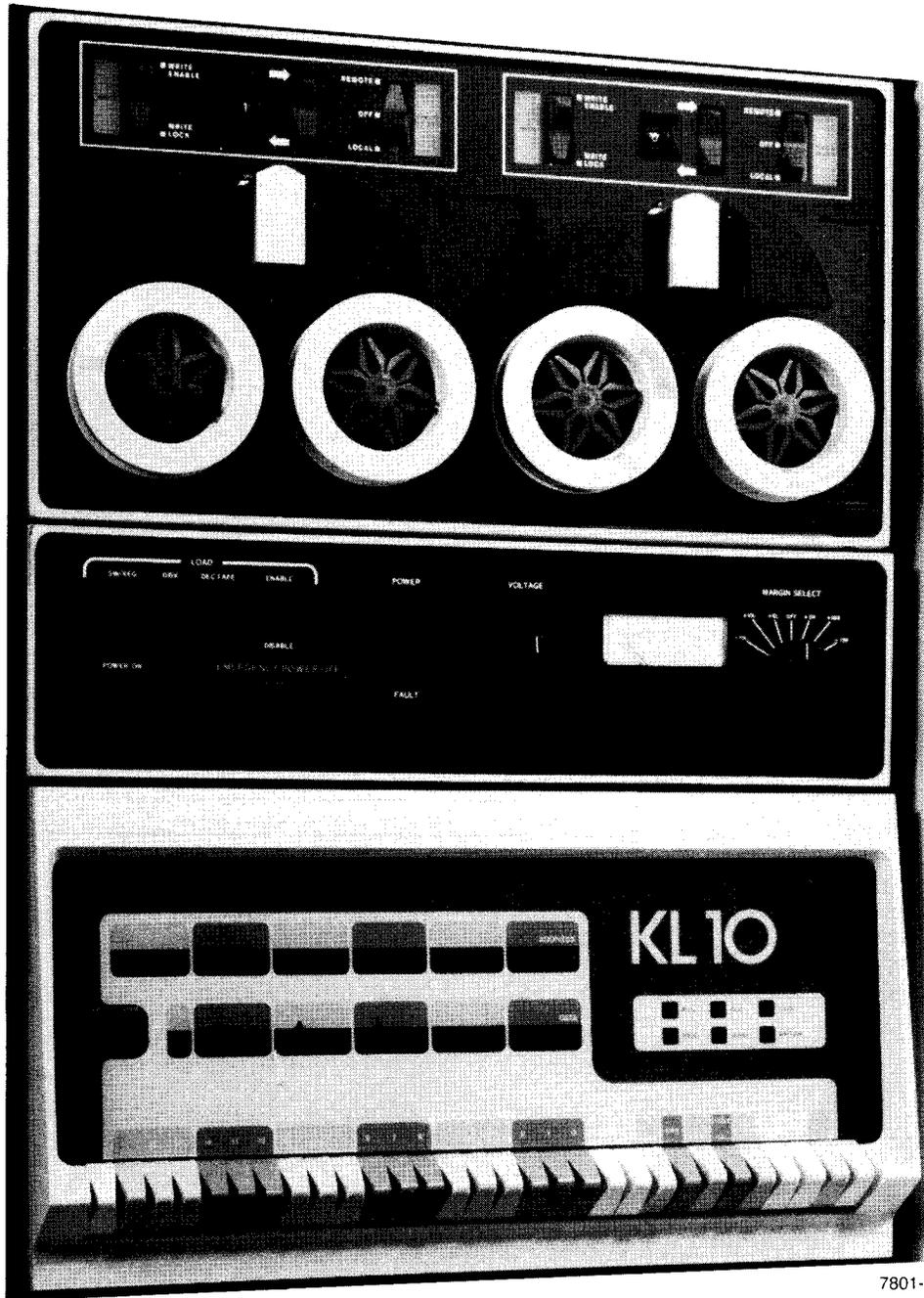
STARTING THE KL10 CENTRAL PROCESSOR



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Figure 11-3: Monitor Loading Choices

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Figure 11-4: Load Switches and Switch Register (All systems except 1091)

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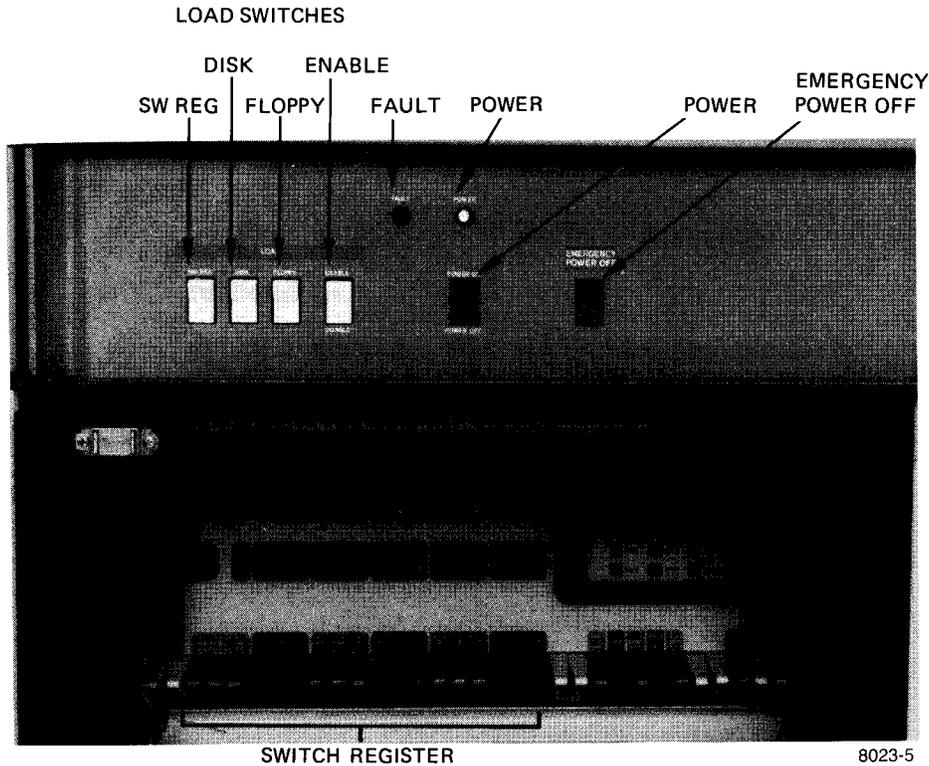


Figure 11-5: Load Switches and Switch Register (1091 only)

All systems have four load switches grouped together as shown in Figures 11-4 and 11-5. They are, from left to right, SW/REG, DISK, DECTAPE or FLOPPY, and ENABLE/DISABLE. When you press the top half of a load switch, it is ON. Table 11-1 lists the load switches and their functions.

Table 11-1: Load Switches

Switch	Function
SW/REG	Loads the front end according to the contents of the switch register.
DISK	Loads the front end from a disk pack.
DECTAPE	(All systems except 1091) Loads the front end from DECTapes mounted on the PDP-11 DECTape drives.
FLOPPY	(1091 only) Loads the front end from floppy disks.
ENABLE/ DISABLE	Enables loading from any load switch.

There are two power switches. The black switch, which is labeled POWER ON and POWER OFF, normally supplies or cuts power to the system. The red switch, which is labeled EMERGENCY POWER OFF, cuts the power in an emergency such as fire.

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NOTE

Only your Field Service representative can restore power after you press the red switch.

Figures 11-4 and 11-5 show two indicator lights labeled FAULT and POWER. Table 11-2 explains these lights.

Table 11-2: Indicator Lights

Light	Condition	Explanation
FAULT	ON (during system loading)	<p>The system is malfunctioning. This can indicate one of the following faults:</p> <ul style="list-style-type: none"> o A circuit breaker was tripped. o A cabinet door is open. o The system is overheating. o There is an air flow problem. <p>If the POWER light is not blinking, one of the above faults will cause a power failure.</p> <p>If you cannot correct the fault, call your Field Service representative.</p>
	ON (during timesharing)	<p>The central processor has stopped. Try to reload. If the reload fails, call your Field Service representative.</p>
	OFF	<p>The central processor is operating normally.</p>
POWER	ON	<p>The central processor is powered up.</p>
	OFF	<p>The central processor is powered down.</p>
	BLINKING	<p>A Field Service representative at your installation may have set OVERRIDE. Do not run the system with OVERRIDE set. OVERRIDE prevents the processor from powering down if it overheats. Call your Field Service Representative.</p> <p>If the FAULT light is on and the POWER light is blinking, then the system may continue to run.</p>

The switch register contains 18 switches that represent bit settings. These switches, numbered 17 through 0 from left to right, set certain values when you load from the switch register. To set a switch, lift it up. See Section 11.5.1 for more information on the switch register.

STARTING THE KL10 CENTRAL PROCESSOR

11.2 POWERING UP THE SYSTEM

Before you power up the system, turn on the console terminal (CTY). Make sure that it is on line and has paper. If you have an SMP system, there is a CTY for each CPU. Turn on each CTY, making sure that it is online and has paper.

Make sure that the peripheral devices are powered up. If they are not, see the appropriate chapter listed below:

- o Line printers (Chapter 4)
- o Magnetic-tape drives (Chapter 7)
- o Disk drives (Chapter 8)

To power up the system, press the black power switch to the POWER ON position.

NOTE

If the FAULT light is on, the system will not power up unless OVERRIDE is set. (See Table 11-2)

11.3 FAMILIARIZING YOURSELF WITH RSX-20F

The PDP-11 front end has its own front-end file system and front-end monitor. The front-end monitor is RSX-20F. To avoid confusion with the TOPS-10 monitor, this manual refers to the RSX-20F monitor as "RSX-20F" and the TOPS-10 monitor as "the monitor." (See the TOPS-10/TOPS-20 RSX-20F System Reference Manual for complete information on RSX-20F.)

The RSX-20F command language processor, the PARSER, allows you to communicate with front-end programs such as KLINIT. KLINIT is the program that initializes the KL10 central processor. The RSX-20F software must reside on a disk drive that is connected to both the PDP-11 and KL10. The front-end file structure cannot reside on an RP07 or an RP20.

Section 11.3.1 is a brief discussion of the PARSER and how to use it. Section 11.3.2 is a brief discussion of KLINIT and its operator dialog.

11.3.1 Using the PARSER

The PARSER allows you to communicate with RSX-20F.

To enter the PARSER, type CTRL/backslash (^). (CTRL/backslash does not echo on the CTY.) The PARSER then prints one of the following prompts and waits for you to type a command:

- PAR> The KL10 is running (that is, the KL10 clock is running and the KL10 run flip-flop is on).
- PAR% The KL10 microcode is in a halt loop (that is, the KL10 clock is running, but the KL10 run flip-flop is off).

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PAR# The KL10 clock is stopped and the KL10 is not running (the KL10 run flip-flop is off).

NOTE

If the PARSER displays the PAR# prompt during timesharing, you must reload the system or restart the central processor.

To exit from the PARSER, type QUIT.

For more information on the PARSER, see the TOPS-10/TOPS-20 RSX-20F System Reference Manual.

11.3.2 Using KLINIT

KLINIT is the KL10 initialization program. By default KLINIT performs the following steps:

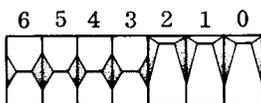
- o Selects the MCA25 page table. (MCA25 systems only.)
- o Loads the KL10 microcode.
- o Configures cache memory as specified in the configuration file, KL.CFG.
- o Enables all caches.
- o Configures KL10 memory as specified in KL.CFG.
- o Configures all internal core memory.
- o Configures all of the external memory modules.
- o Configures up to 4-way memory interleaving.
- o Sets the external-memory bus mode for optimal performance.
- o Configures all MOS memory (1091 systems only).
- o Configures all memory blocks for controller n, where n is the current controller number.
- o Loads the bootstrap specified in the KL.CFG file. If there is no KL.CFG file, KLINIT uses the default bootstrap, which loads the monitor from the default file, DSK:SYSTEM.EXE[1,4].
- o Writes a new KL.CFG file that contains the current configuration and load parameters.
- o Exits from KLINIT.

STARTING THE KL10 CENTRAL PROCESSOR

The configuration of your system may cause KLINIT to skip certain steps. KLINIT performs only the steps that are appropriate for your system. If you have SW/REG set to OFF, KLINIT performs default actions. If you want to change any default parameters or actions, set SW/REG to ON.

The KLINIT operator dialog is a series of questions preceded by "KLI --". To enter the KLINIT operator dialog after you have loaded RSX-20F, do the following:

1. Set at least Switches 0, 1, and 2 in the switch register. (See Section 11.5.1 for more information on switch-register settings.)



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2. Press the SW/REG and ENABLE load switches simultaneously.
3. Type YES and press RETURN when KLINIT prints the following question on the CTY:

```
KLI -- ENTER DIALOG [NO, YES, EXIT, BOOT]? YES<RET>
```

To enter the KLINIT operator dialog when RSX-20F is already running, type everything that is in UPPERCASE BOLD PRINT in the following dialog:

^\
PAR>

Type CTRL/backslash, (not echoed) to communicate with the PARSER.

MCR KLINIT<RET>

Type MCR KLINIT and press RETURN to load KLINIT.

```
KLI -- ENTER DIALOG [NO, YES,EXIT,BOOT]?YES<RET>
```

Type YES and press RETURN to enter the KLINIT operator dialog.

See Appendix E for detailed information on answering the KLINIT dialog questions.

11.4 LOADING THE SYSTEM USING DEFAULT PARAMETERS

Before you begin to load the system, make sure that:

- o All hardware and software is properly installed.
- o The disk packs are mounted properly.

STARTING THE KL10 CENTRAL PROCESSOR

If you are installing the system for the first time, or installing a new version of the software, see the TOPS-10 Software Installation Guide.

The default parameters for loading the system are:

1. Unit 0 is the default disk or magnetic-tape drive.
2. DSK:SYSTEM.EXE[1,4] is the default monitor file.
3. KLINIT performs the default operations described in Section 11.3.2.

If you want to use nondefault parameters to load the system, see Section 11.5.

You can load RSX-20F from one of the following:

1. Disk pack (all systems). (See Section 11.4.1.)
2. Floppy disks (1091 systems only). (See Section 11.4.3.)
3. DECTapes (all systems except 1091). (See Section 11.4.4.)

To load the monitor from magnetic tape, see Section 11.5.2.

11.4.1 Loading RSX-20F from Disk

Before you load RSX-20F from disk using the default parameters, make sure that:

- o The POWER light is on. If it is not, perform the steps listed in Section 11.2.
- o The hardware and software are properly installed. If they are not, see Chapters 4-9.
- o The disk pack that contains RSX-20F is mounted on a dual-ported disk drive. If it is not, see Chapter 8.
- o The disk pack is mounted on disk-drive unit 0. If it is not, see Section 11.5.1.

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To load RSX-20F from disk, do the following:

1. Press the ENABLE half of the ENABLE/DISABLE Load switch and the DISK Load switch at the same time. This causes RSX-20F to load from the disk on drive 0, and causes KLINIT to load.
2. Type everything in UPPERCASE BOLD PRINT in the following sample dialog:

RSX-20F VE##-## hh:mm dd-mmm-yy

RSX-20F version and
creation time and date.

[SY0: REDIRECTED TO DB0:]
[DB0: MOUNTED]

DB0: is the system device
for the RSX-20F tasks.

KL1 -- VERSION VA##-##RUNNING
KL1 -- KL10 S/N: 1026., MODEL B, 60 HERTZ
KL1 -- KL10 HARDWARE ENVIRONMENT:
MCA25 CACHE PAGER
EXTENDED ADDRESSING
INTERNAL CHANNELS
CACHE

KLINIT prints this and
the following lines.

KL1--SELECT PAGE TABLE [FILE,BOTH,0,1]

KL1>BOTH<RET>

KL1--PAGE TABLE SELECTED:BOTH

KL1 -- MICROCODE VERSION #.#[###] LOADED
KL1 -- ALL CACHES ENABLED

LOGICAL MEMORY CONFIGURATION.
ADDRESS SIZE INT TYPE CONTROLLER
00000000 1024K 4 DMA20 4

KL1 -- CONFIGURATION FILE WRITTEN
KL1 -- BOOTSTRAP LOADED AND STARTED

KLINIT has loaded and
started BOOT.

BOOT V#(#)

BOOT version number.

BOOT><RET>

Press RETURN to load the
default monitor from the
file DSKB:SYSTEM.EXE[1,4].

When the monitor has been loaded into memory, the monitor startup questions begin. (See Section 11.6.) If the system does not print the first monitor startup question, BOOT prints an error message. (See Appendix A for more information about BOOT messages.)

If KL1 -- followed by a message prints on the CTY before the BOOT version number, see Chapter 17.

STARTING THE KL10 CENTRAL PROCESSOR

11.4.2 Reloading the Monitor from Disk

To reload the monitor from disk when the monitor is already running, first halt timesharing, and then reload the monitor. To do this, perform the following steps:

1. Make sure the POWER light is on. If the light is not on, see Section 11.4.1.
2. Type everything that is in UPPERCASE BOLD PRINT in the following sample dialog:

.ENTER OPR<RET>	
OPR>SET KSYS NOW<RET>	
OPR>EXIT<RET>	
^\	Type CTRL/backslash (not echoed) to communicate with the PARSER.
PAR>SHUT<RET>	Type SHUT and press RETURN to shut down the system.
DECSYSTEM-10 NOT RUNNING	The monitor has stopped.
BOOT>DSKB:<RET>	Type DSKB: and press RETURN to load the default monitor from the file DSKB:SYSTEM.EXE[1,4].
[Loading from DSKB:SYSTEM.EXE[1,4]]	BOOT is now reloading the monitor.

When the monitor has been loaded into memory, the monitor startup questions begin.

3. Answer the monitor startup questions described in Section 11.6.

11.4.3 Loading RSX-20F from Floppy Disks

Before you load RSX-20F from floppy disks using the default parameters, make sure that:

- o The POWER light is on. If it is not, see Section 11.2.
- o All of the software is on floppies. If it is not, see Section 11.4.1.
- o Floppy A, which contains BOOT, is mounted on Unit 0, the left unit. If it is not, mount Floppy A on Unit 0.
- o Floppy B is mounted on Unit 1, the right unit. If it is not, mount Floppy B on Unit 1.

STARTING THE KL10 CENTRAL PROCESSOR

To load RSX-20F from floppy disks using the default parameters, do the following:

1. Press the ENABLE half of the ENABLE/DISABLE load switch and the FLOPPY load switch at the same time.

This causes RSX-20F to load from floppies and causes KLINIT to load.

2. Type everything that is in UPPERCASE BOLD PRINT in the following sample dialog:

```
RSX-20F VE##-## hh:mm dd-mmm-yy          RSX-20F version and
                                           creation time and date.

[SY0: REDIRECTED TO DX0:]                DX0 is the system device
[DX0: MOUNTED]                             for the RSX-20F tasks.
KLI -- VERSION VA##-## RUNNING            KLINIT prints this and
KLI --KL10 S/N: 2136., MODEL B, 60 HERTZ  the following lines.
KLI -- KL10 HARDWARE ENVIRONMENT:        Appears only if your system
                                           has MCA25 hardware.
                                           MCA25 CACHE PAGER
                                           MOS MASTER OSCILLATOR
                                           EXTENDED ADDRESSING
                                           INTERNAL CHANNELS
                                           CACHE

| KLI -- SELECT PAGE TABLE [FILE, BOTH, 0, 1]
|
| KLI>BOTH<RET>
|
| KLI -- PAGE TABLE SELECTED:BOTH
|
KLI -- MICROCODE VERSION #.# [###] LOADED
KLI -- ALL CACHES ENABLED
KLI -- % MOS MEMORY IS ALREADY CONFIGURED

LOGICAL MEMORY CONFIGURATION.
  ADDRESS SIZE  INT  TYPE CONTROLLER
  00000000 128K   4   MA20 0 & 1
  00400000 768K   4   MF20 11

KLI -- CONFIGURATION FILE WRITTEN
KLI -- BOOTSTRAP LOADED AND STARTED      KLINIT has loaded and
                                           started BOOT.
                                           BOOT version number.

BOOT V#(##)

BOOT><RET>                               Press RETURN to load the
                                           default monitor from the
                                           file DSKB:SYSTEM.EXE[1,4].
```

When the monitor has been loaded into memory, the monitor startup questions begin. If the system does not print the first monitor startup question, there is a problem with BOOT. See Appendix A for an explanation of the BOOT messages.

3. To start timesharing, answer the monitor startup questions described in Section 11.16.

If KLI messages are printed on your CTY before the BOOT version number, see Chapter 17. KLINIT only prints messages that are applicable to your system's configuration.

STARTING THE KL10 CENTRAL PROCESSOR

11.4.4 Loading RSX-20F from DECTape

Before you load RSX-20F from DECTape using the default parameters, make sure that:

- o The POWER light is on. If it is not, see Section 11.2.
- o All of the software is on DECTape. If it is not, see Section 11.4.1.
- o The DECTape is mounted properly on unit 0. If it is not, see Section 11.5.1.

To load RSX-20F from DECTape using the default parameters, perform the following steps:

1. Press the ENABLE half of the ENABLE/DISABLE load switch and the DECTAPE load switch at the same time.

This causes RSX-20F to load from the DECTape on unit 0 and causes KLINIT to load.

2. Type everything in UPPERCASE BOLD PRINT in the following sample dialog:

```
RSX-20F VA##-## hh:mm dd-mmm-yy          RSX-20F version and
                                           creation time and date.

[SY0: REDIRECTED TO DT0:]                DT0 is the system device
[DT0: MOUNTED]                            for the RSX-20F tasks.

KLI -- VERSION VA##-## RUNNING           KLINIT prints this and
KLI -- KL10 S/N: 1026., MODEL B, 60 HERTZ the next 14 lines.
KLI -- KL10 HARDWARE ENVIRONMENT:
      MCA25 CACHE PAGER
      EXTENDED ADDRESSING
      INTERNAL CHANNELS
      CACHE

| KLI -- SELECT PAGE TABLE [FILE,BOTH,0,1]
|
| KLI>BOTH<RET>
|
| KLI -- PAGE TABLE SELECTED:BOTH

KLI -- MICROCODE VERSION #.#[###] LOADED
KLI -- % NO FILE - ALL CACHE BEING CONFIGURED
KLI -- ALL CACHES ENABLED
KLI -- % NO FILE - ALL MEMORY BEING CONFIGURED

LOGICAL MEMORY CONFIGURATION.
  ADDRESS SIZE INT TYPE CONTROLLER
  00000000 1024K 4 DMA20 4
```

STARTING THE KL10 CENTRAL PROCESSOR

KLI -- CONFIGURATION FILE WRITTEN
KLI -- BOOTSTRAP LOADED AND STARTED KLINIT has loaded and started BOOT.

BOOT V#(##) BOOT version number.

BOOT><RET> Press RETURN to load the default monitor from the file DSKB:SYSTEM.EXE[1,4].

When the monitor has been loaded into memory, the monitor startup questions begin. If the system does not print the first monitor startup question, BOOT prints an error message. (For explanations of BOOT messages, see Appendix A.)

3. Answer the monitor startup questions described in Section 11.6.

If a KLI message is printed on your CTY before the BOOT version number, see Chapter 17.

11.5 LOADING THE SYSTEM USING NONDEFAULT PARAMETERS

Before you begin to load the system using nondefault parameters, make sure that:

- o The hardware and software are properly installed.
- o The disk packs are mounted properly.

If you are installing the system for the first time, or installing a new version of the software, see the TOPS-10 Software Installation Guide.

The default parameters for loading the system are:

- o Unit 0 is the default disk or magnetic-tape drive.
- o DSKB:SYSTEM.EXE[1,4] is the default monitor file.
- o KLINIT performs its default operations. (See Section 11.3.2.)

You must enter the KLINIT dialog if you want to change a default parameter or action. The KLINIT operator dialog allows you to:

- o Configure cache or memory.
- o Load a bootstrap program that does not reside in the BOOT.EXB file.
- o Load from a disk pack, floppy, or DECTape that is not mounted on unit 0.

The file specification of the default monitor is DSKB:SYSTEM.EXE[1,4]. To load a default monitor other than DSKB:SYSTEM.EXE[1,4], you do not have to enter the KLINIT operator dialog. Instead, see Section 11.5.3 to load the monitor.

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After you answer the monitor startup question, INITIA may print a few lines on the CTY. INITIA is a system program that automatically:

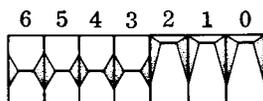
- o Starts those jobs that you always want to run at system startup.
- o Initializes terminal characteristics.

Whether or not your system runs INITIA at system startup is determined when the monitor is generated. See the TOPS-10 Software Installation Guide for more information on INITIA.

11.5.1 Loading RSX-20F Using the Switch Register

To load RSX-20F from disk, floppy, or DECTape using the switch register, perform the following steps:

1. Set (lift up) Switch 0 to enable the other switches in the switch register.



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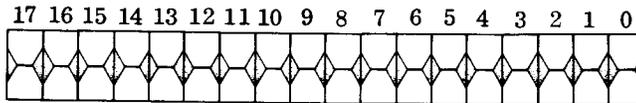
2. Set any other switches in the switch register that you want. See Table 11-3 for an explanation of each switch setting.
3. Press the ENABLE half of the ENABLE/DISABLE load switch and the SW/REG load switches at the same time.

This causes RSX-20F to access the disk drive (Switch 7 on) or the DECTape drive or floppy disk (Switch 7 off) with the unit number specified in Switches 8 through 10. KLINIT is loaded and enters the KLINIT operator dialog. At this point, if you want to load the monitor from a magnetic tape, see Section 11.5.2.

4. Answer the monitor startup questions described in Section 11.6.

STARTING THE KL10 CENTRAL PROCESSOR

Table 11-3: Switch-Register Switch Definitions



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Switch*	Setting	Explanation
0	ON	Enables the other switches in the switch register. Set this bit.
1 and 2	OFF	Loads RSX-20F as if it were being loaded as described in Section 11.4, except that you can specify the unit number of the bootstrap device in Switches 8 through 10.
1 and 2	ON	Loads RSX-20F, and loads and starts KLINIT. Usually, you should set these switches.
1 or 2	ON	Loads RSX-20F, but does not communicate with the central processors.
3 to 6	OFF	Not used. Do not set these switches.
7	OFF	Designates the floppy disk (for 1091) or DECTape (for all systems except 1091) as the bootstrap device. The front-end files on these floppy disks are used for system loading.
7	ON	Designates a disk pack mounted on a dual-ported disk drive as the bootstrap device.
8 to 10	ON	Specifies in binary the unit number of the bootstrap device (0 to 7). For example, no switches set indicate unit 0, Switch 8 set indicates unit 1, Switch 9 set indicates unit 2, Switches 8 and 9 set indicate unit 3, Switch 10 set indicates unit 4, Switches 8 and 10 set indicate unit 5, and Switches 9 and 10 set indicate unit 6.
11 to 14	OFF	Not used. Do not set.
15	OFF	Retries an operation 10 times when an I/O error occurs during bootstrapping. Usually, you should set this switch on.
15	ON	Retries an operation indefinitely when an I/O error occurs during bootstrapping. Usually, you should set this switch on.
16 to 17	OFF	Not used. Do not set these switches.

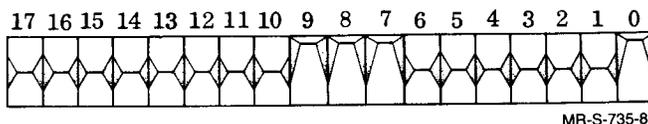
*Switches are numbered 17 to 0 from left to right.

STARTING THE KL10 CENTRAL PROCESSOR

----- Examples -----

Example 1 shows what prints on your CTY when you load from disk pack with Switches 0, 7, 8, and 9 set ON. Example 2 shows what prints on your CTY when you load from disk pack with Switches 0, 1, 2, and 7 set ON. See Table 11-3 for an explanation of each switch setting.

1. Loading from Disk Pack with Switches 0, 7, 8 and 9 set ON.
[MR-S-735-80]



If you set Switches 0, 7, 8, and 9, the following dialog prints on the CTY. Everything that you must type is in UPPERCASE BOLD PRINT. (This is only an example.)

RSX-20F VE##-## hh:mm dd-mmm-yy

RSX-20F version and
creation time and date.

[SY0: REDIRECTED TO DB3:]
[DB3: MOUNTED]

DB3 is the system device
for the RSX-20F tasks.

CLI -- VERSION VE##-## RUNNING
CLI -- KL10 S/N: 2136., MODEL B, 60 HERTZ
CLI -- KL10 HARDWARE ENVIRONMENT:
MCA25 CACHE PAGER

KLINIT prints this and
the following lines.
(MCA25 systems only)

MOS MASTER OSCILLATOR
EXTENDED ADDRESSING
INTERNAL CHANNELS
CACHE

(Prints on 1091 only)

CLI -- SELECT PAGE TABLE [FILE, BOTH, 0, 1]

CLI>BOTH<RET>

CLI -- PAGE TABLE SELECTED:BOTH

CLI -- MICROCODE VERSION #.#[###] LOADED
CLI -- ALL CACHES ENABLED

LOGICAL MEMORY CONFIGURATION.
ADDRESS SIZE INT TYPE CONTROLLER
00000000 1024K 4 DMA20 4

CLI -- CONFIGURATION FILE WRITTEN
CLI -- BOOTSTRAP LOADED AND STARTED

BOOT V#(##)

BOOT version number.

BOOT><RET>

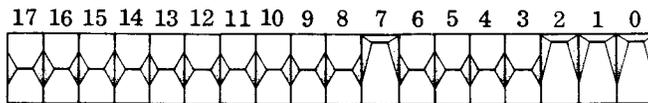
Press RETURN to load the
default monitor from the
file DSKB:SYSTEM.EXE[1,4].

STARTING THE KL10 CENTRAL PROCESSOR

Why reload: SCHED

This is the first monitor startup question. (See Section 11.6 for more information on answering monitor startup questions.)

2. Loading from Disk Pack with Switches 0, 1, 2, and 7 set ON.



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If you set switches 0, 1, 2, and 7, the following sample dialog prints on the CTY. Everything that you must type is in UPPERCASE BOLD PRINT. See Appendix E for more information on answering KLINIT questions. (This is only an example.)

RSX-20F VA##-## hh:mm dd-mmm-yy

RSX-20F version and creation time and date.

[SY0: REDIRECTED TO DB0:]
[DB0: MOUNTED]

DB0 is the system device for the RSX-20F tasks.

KLI -- VERSION VA##-## RUNNING
KLI -- ENTER DIALOG [NO,YES,EXIT,BOOT]?
KLI>YES<RET>
KLI -- KL10 S/N: 1026., MODEL B, 60 HERTZ
KLI -- KL10 HARDWARE ENVIRONMENT:

(Printed on MCA25 systems only.)

MCA25 CACHE PAGER

EXTENDED ADDRESSING
INTERNAL CHANNELS
CACHE

KLI -- SELECT PAGE TABLE [FILE, BOTH, 0, 1]

KLI>BOTH<RET>

KLI -- PAGE TABLE SELECTED:BOTH

KLI -- RELOAD MICROCODE [YES,VERIFY,FIX,NO]?
KLI>YES<RET>
KLI -- MICROCODE VERSION #.#[###]LOADED
KLI -- RECONFIGURE CACHE [FILE,ALL,YES,NO]?
KLI>ALL<RET>
KLI -- ALL CACHES ENABLED
KLI -- CONFIGURE KL MEMORY [FILE,ALL,REVERSE,YES,NO]?
KLI>ALL<RET>

LOGICAL MEMORY CONFIGURATION.
ADDRESS SIZE INT TYPE CONTROLLER
00000000 1024K 4 DMA20 4

STARTING THE KL10 CENTRAL PROCESSOR

```
CLI -- LOAD KL BOOTSTRAP [FILE,YES,NO,FILENAME]?
CLI>YES<RET>
CLI -- WRITE CONFIGURATION FILE [YES,NO]?
CLI>YES<RET>
CLI -- CONFIGURATION FILE WRITTEN
CLI -- BOOTSTRAP LOADED AND STARTED
BOOT V#( #)                                BOOT version number.

BOOT><RET>                                Press RETURN to load the
                                           default monitor from the
                                           file DSKB:SYSTEM.EXE[1,4].

Why reload: SCHED                          This is the first monitor
                                           startup question. (See
                                           Section 11.6 for more
                                           information on answering
                                           monitor startup questions.)
```

11.5.2 Loading from Magnetic Tape

Before you load the monitor from a magnetic tape, make sure that:

- o The magnetic tape that contains the monitor is mounted on drive 0. If it is not, mount it on any drive, but remember to tell BOOTM which drive you mounted it on. To do this, type the controller type and drive number in the command as shown below.
- o BOOTM is on disk, floppy, or DECTape. If it is not, you cannot load from magnetic tape.

To load the monitor from magnetic tape, do the following:

1. Perform the steps listed in Section 11.5.1.
2. Type everything that is in **BOLD PRINT** in the following sample dialog:

```
CLI -- LOAD KL BOOTSTRAP [YES,NO,FILENAME]?
CLI>filename.ext<RET>                    Type the name of the file
                                           that is the magnetic-tape
                                           bootstrap program, BOOTM.

CLI -- WRITE CONFIGURATION FILE [YES,NO]?
CLI>YES<RET>                              Type YES or NO to answer
                                           this question.

CLI -- CONFIGURATION FILE WRITTEN         This line prints if you
                                           answered YES above.

CLI -- BOOTSTRAP LOADED AND STARTED
BOOTM V5 (26)                             BOOTM version number.
BTM><RET>                                Press RETURN to load the
                                           default monitor from the
                                           file DSKB:SYSTEM.EXE[1,4]
                                           on tape drive 0 of a TM10
                                           controller.
```

When the monitor has been loaded into memory, the monitor startup questions begin.

Answer the monitor startup questions described in Section 11.6.

STARTING THE KL10 CENTRAL PROCESSOR

11.5.3 Loading the Monitor from a Nondefault File

To load the monitor from a file that has been saved with a file specification other than the default, DSKB:SYSTEM.EXE[1,4], do the following:

1. Load the system as usual. (See Sections 11.4 through 11.5.2.) When the bootstrap program prompt (BOOT> or BTM>) prints on the CTY, perform Step 2.
2. Type the monitor name (for example, NEWMON.EXE) and press RETURN. Everything that you type is in BOLD PRINT in the following sample dialogs:

```
BOOT>NEWMON.EXE<RET>           This is an example of
                                using BOOT to load the
                                monitor from disk pack,
                                floppy, or DECTape.
```

```
BTM>NEWMON.EXE<RET>           This is an example of
                                using BOOTM to load the
                                monitor from magnetic
                                tape. To specify a
                                nondefault file, instead
                                of pressing RETURN, type:
```

```
BTM>dev:filename.ext[p,pn]/controller:drivenumber
```

where controller is:

```
/TM02:n for TU45 and TU77 tape drives.
/TM03:n for TU45 and TU77 tape drives.
/TM10:n for TU10, TU40, and TU41 tape drives.
/TM78:n for TU78 tape drives.
/TX01:n for TU70, TU71, and TU72 tape drives on
DX10.
/TX02:n for TU72 tape drives.
/DX20:n for TU7x tape drive n on DX20.
```

When the monitor has been loaded into memory, the monitor startup questions begin.

Answer the monitor startup questions described in Section 11.6.

STARTING THE KLIØ CENTRAL PROCESSOR

11.6 ANSWERING MONITOR STARTUP QUESTIONS

After you load RSX-2ØF, the bootstrap program, and the monitor, start timesharing by answering the questions in the monitor startup dialog. See the TOPS-1Ø Software Installation Guide for a detailed discussion of each of the questions in this section.

The following is a sample dialog. Everything that you must supply is in UPPERCASE BOLD PRINT.

```
TOPS-1Ø 7Ø3 Development dd-mm-yy      System name and monitor
                                        creation date.
Why reload:  SCHED<RET>                Type reason for reload.
```

You may type one of the following words and press RETURN to tell the monitor why you want to reload the system. (For example, PM means Preventive Maintenance, CM means Corrective Maintenance, and SA means Stand Alone.) You may want to follow your answer to the Why reload: question with a comment. To do this, before you press RETURN, type a semi-colon (;) followed by a comment and then press RETURN. Your answer and any comment is stored in the system error file and reported by SPEAR.

CM	NEW	PM
HALT	NXM	POWER
HARDWARE	OPR	SA
HUNG	OTHER	SCHED
LOOP	PARITY	STATIC

If you do not reply to this question within 6Ø seconds, the system assumes OTHER, and prompts you for a comment. If you type /H in reply to this question, the system prints a list of valid responses.

```
Date:  OCT 19<RET>                    Type the date.
```

The date must be the current day and month. You may abbreviate the month as long as it is still unique. You may specify the year, however, it is optional. If you omit the year, the system assumes the year in which the monitor was created.

If you type a date or time that is before the last crash or the monitor creation date, the system prints either:

```
%Specified date is prior to last crash.
Last crash date: Apr-14-8Ø  Ø9:12:45
Specified date: Mar-6-8Ø
Is this correct? (Y or N)N<RET>
Please type today's date as MON-DD(-YY)
May 6<RET>
```

or

```
%Specified date is prior to monitor creation date.
Creation date: Jan-11-8Ø  Ø9:14:ØØ
Is this correct? (Y or N)N<RET>
Please type today's date as MON-DD(-YY)
May 6<RET>
```

STARTING THE KL10 CENTRAL PROCESSOR

Time: 1728<RET>

Type time using 24-hour
clock.

The time must be based on a 24-hour clock.
For example, 1:30 p.m. is 13:30. Use of seconds field and
colons is optional.

CAUTION

If you type the date or time incorrectly, you
may cause files to be accidentally deleted
when the file system is backed up. To reset
these values, see the OPR commands SET SYSTEM
DATE and SET SYSTEM DAYTIME in the TOPS-10
Operator's Command Language Reference Manual.

Startup option: QUICK<RET> Type the startup option.

Type one of the following words and press RETURN to tell the monitor
how you want to start the system. The valid answers to the startup
option question fall into two categories:

1. Those that change disk parameters:

CHANGE
DESTROY
LONG
REFRESH
UNITID

2. Those that start the monitor without changing any parameters:

GO
NOINITIA
QUICK

Normally, reply QUICK.

11.7 LOADING A COMMUNICATIONS FRONT END

Each system can have more than one front end connected to its central
processors. The front end that you (the operator) use is called a
console front end. Other front ends are called communications or
network front ends. The central processors in a network are called
hosts. Every communications front end processor is called a node.

There are four types of communications front ends:

1. DN87, which is loaded with the BOOT11 program over a DL10
interface. (See Section 11.7.1.)
2. DN85, which is loaded with the BOOT11 program over a DL10
interface. (See Section 11.7.1.)
3. DN20, which is loaded with the DTELDR program over a DTE20
interface. (See Section 11.7.2.)
4. DN87S, which is loaded with the DTELDR program over a DTE20
interface. (See Section 11.7.2.)

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You can automatically load (and reload) a communications front end by including the appropriate commands in your OPR.ATO file. For example, to automatically reload a communications front end that is interfaced over DTE2, include the following commands in your OPR.ATO file:

:SLOG<RET>	Log in a subjob.
:DEF DTE=<RET>	Call it DTE.
DTE-R DTELDLDR<RET>	Load and start DTELDLDR for this subjob.
DTE-/INIT:2<RET>	Start communicating with this DN87S node.
DTE-/RELOAD:2/NODUMP<RET>	Load (default) DTELDL02.BIN over DTE2 and suppress the dump.
DTE-/AUTO<RET>	Set for automatic reload.

11.7.1 Loading with BOOT11 over a DL10

To load a communications front end over a DL10, use BOOT11. This program should be available on DSKB:[1,2] or on SYS:, the system library.

To run BOOT11, type everything that is in UPPERCASE BOLD PRINT in the following sample dialog:

.R BOOT11<RET>	Run BOOT11.
File:<RET>	
"PDP-11 started	Press RETURN BOOT11 has started the communications front end.

NOTE

You must specify the port number if more than one PDP-11 is interfaced over a DL10 on your host.

Table 11.4 lists the BOOT11 switches. For more information on the BOOT11 switches, see the BOOT11 specification in the TOPS-10 Software Notebooks.

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Table 11-4: BOOT11 Switches

Switch	Explanation
/CLEAR:n	Zeroes PDP-11 memory from location 0 to n-1. To zero front-end memory before you load BOOT11, use /CLEAR with the /LOAD or /START switch. If you omit :n, this switch clears all memory.
/DUMP:n	Dumps front-end memory, starting at octal location n, into the specified host system's file. If you omit :n, BOOT11 assumes 0.
/END:n	Ends a dump at address N-1. If you omit :n, BOOT11 assumes all memory.
/HELP	Types the BOOT11 help file.
/IMAGE	Reads the front-end load file in an unpacked form. When your system reads from a paper-tape reader, it automatically sets the /IMAGE switch.
/LOAD:n	Loads the front-end from the specified host processor file and sets the starting address at octal n. (Do not use the /START switch with /LOAD.) If you omit :n, BOOT11 defaults to the starting address of the file that you loaded.
/PORTNO:n	Performs the specified operation on front-end Port Number n, where n is from 0 through 7.
/START:n	(Default switch.) Loads the front end from the host processor file and starts the front end at octal location n. If you omit :n, BOOT11 defaults to the starting address of the file that you loaded. (If the loaded file's starting address is an odd number, use the /LOAD switch instead of /START.)

The following is an example of clearing the PDP-11 on Port Number 2, and loading and starting a program called DN87.BIN.

```
.R BOOT11<RET>                                Run BOOT11.

File:DN87.BIN/CLEAR/START/PORTNO:2<RET>       Type the file
                                                specification and
                                                switches to load and
                                                start the communications
                                                front end.
"Clearing PDP-11                               BOOT11 prints these four
"PDP-11 loading                               messages to report on
"PDP-11 loaded                                its progress.
"PDP-11 started
```

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11.7.2 Loading with DTELDR Over a DTE20

To load a communications front end over a DTE20, use DTELDR. This program should be available on DSKB:[1,2] or on SYS:, the system library.

To run DTELDR, type the following command. At the * prompt, type the file specification of the .BIN file. The default file specification is assumed if you just press RETURN. The default is DSKB:DTELxy.BIN, where x=CPU number, and y=DTE number. DTE number 0 is reserved for the console front end.

.R DTELDR<RET>

Run DTELDR.

*dev:filename.ext[p,pn]/switch<RET>

You may include one or more switches after the prompt.

Table 11-5 lists some common DTELDR switches.

Table 11-5: DTELDR Switches

Switch	Explanation
/AUTO	Reloads a crashed front end automatically with its default file.
/HELP	Displays the DTELDR help file.
/IMAGE	The .BIN file is in image mode.
/NODUMP	Suppresses the automatic dumping of PDP-11 memory before loading a file.
/NOLOG	Suppresses error logging when loading a front end.
/RELOAD:xy	Reloads the specified file and starts the primary protocol.

See the DTELDR help file and the DTELDR specification in the TOPS-10 Software Notebooks for more information on DTELDR and its switches.

For more information on loading communications front ends, see the TOPS-10 ANF-10 Networks Software Installation Guide.

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11.8 LOADING THE DX10 OR DX20 DATA CHANNEL

To operate the TU70-series magnetic tape drives, load the microcode into the DX10 or DX20 data channel. In addition, if you have an RP20 disk system, load the microcode for the RP20 disk system into its DX20 data channel. To load the microcode, run OPR and use the CONFIG command, LOAD, as shown below:

```
.R OPR
OPR>ENTER CONFIG
CONFIG>LOAD MTA
CONFIG>
14:14:59      CONFIG  -- LOAD microcode --
Microcode loaded on CPU0, device 554, unit 0
CONFIG>
```

The bootstrap program BOOTDX, which runs under timesharing, loads (and, in the case of DX10, dumps) programs from the TOPS-10 disk file system into the PDP-8A (for DX10) or the DX20 microprocessor. These programs must be in PDP-8A (for DX10) or DX20 microprocessor image-mode file format. Normally, BOOTDX resides in the SYS: area.

To run BOOTDX, type the following command. At the prompt, press RETURN to load the DX10 default file using the default switches, SYS:DXMPA.BIN/START/UNIT:0. Type /DX20 to load the tape DX20 default file, SYS:DXMCA.ADX. Type /DX20:RP20 to load the RP20 default file SYS:DXMCD.ADX. To specify a different file, type dev:filename.ext/switches and press RETURN.

```
.R BOOTDX<RET>      Run BOOTDX.
File:/switch<RET>
```

You may include one or more switches at the prompt. Table 11-6 lists the DX10 BOOTDX switches.

Table 11-6: DX10 BOOTDX Switches

Switch	Explanation
/CLEAR:n	Clears memory from 0 to n-1. (Default is 10000.)
/CPU:n	Selects CPU on which DX10 exists. (Default is CPU0.)
/DUMP:n*	Specifies start address of dump. (Default is 0.)
/DX10	Identifies device as DC10.
/END:n*	Specifies dump address+1. (Default is 10000.)
/HELP	Prints help text.
/LOAD:n**	Loads DX10 and sets start address but does not start DX10. (Default is 200 octal.)
/START:n**	Loads and starts DX10 at address n. (Default is 200 octal.)
/UNIT:n	Selects DC10 unit, 0 or 1 <= n. (Default is 0.)

* /DUMP or /END causes BOOTDX to ignore /LOAD and /START.

** /LOAD and /START are mutually exclusive.

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The following is an example of loading and starting the BOOTDX bootstrap program, clearing PDP-8A memory, loading the file DXMPA.BIN or DXMPA.A8 from SYS:, and starting the PDP-8A at location 200 octal.

```
.R BOOTDX<RET>
File:SYS:/CLEAR/START<RET>
"Clearing DX-10
"DX-10 loading
"DX-10 loaded
"DC-10 started
```

Table 11-7 lists the DX20 BOOTDX switches.

Table 11-7: DX20 BOOTDX Switches

Switch	Explanation
/CLEAR:n	Clears memory from 0 to n-1. (Default is all memory.)
/CPU:n	Selects CPU on which DX20 exists. (Default is CPU0.)
/DX20:n	Identifies device as DX20 with controller n. n may be TX02 or RP20. (Default is TX02.)
/HELP	Prints help text.
/LOAD:n*	Loads DC20 and sets start address but does not start DX20. (Default is 1.)
/START:n*	Loads and starts DX20 at address n. (Default is 1.)
/TYPE:n	Specifies that DX20 must have device type n; that is, low-order 6 bits of Massbus register 6. (Default is 60 octal for TX02 controller, 61 octal for RP20 controller).
/UNIT:nm**	Selects DX20 unit m on RH20 n. (Default is 00.) R is assumed to be 0 if only a single number is specified.

* /LOAD and START are mutually exclusive.

** If /UNIT is not specified, BOOTDX searches for another DX20 on the system that meets all other restrictions.

The following is an example of loading and starting the BOOTDX bootstrap program, clearing the KMC-11 memory, loading the DXMCA.ADX file from SYS:, and starting the DX20 on a TX02 controller at address 1 on CPU1.

```
.R BOOTDX<RET>
File:SYS:/CLEAR/DX20/CPU:1/START<RET>
DX20 selected: RH20=3 DX20=0
"Clearing DX20
"DX20 started
Micro code version 1(0)
```

STARTING THE KL10 CENTRAL PROCESSOR

The following is an example of manually loading and starting BOOTDX, clearing the microprocessor memory, loading the DXMCD.ADX file from SYS:, and starting the DX20 on an RP20 controller at address 1 on CPU1.

```
.R BOOTDX<RET>
```

```
File:SYS/CLEAR/DX20:RP20/CPU:1/START<RET>
```

```
DX20 Selected: RH20=4 DX20=0  
" Clearing DX20  
" DX20 started  
Micro code version #(#)
```

11.9 RUNNING SYMMETRIC MULTIPROCESSING (SMP) SYSTEMS

The remainder of this chapter applies only to Symmetric multiprocessing (SMP) systems. SMP is supported for KL processors only.

A symmetric multiprocessing (SMP) system can have multiple central processing units (CPUs), which are numbered sequentially starting from CPU0. An SMP system has symmetric software. This means that each CPU can perform computation and I/O. However, an SMP system does not necessarily have symmetric hardware. For example, one CPU may have two tape controllers, while another CPU has only one.

Each CPU communicates with you through its own console terminal (CTY). Therefore, if an error occurs on CPU1, the error message that tells you about that error is printed on the CTY that is attached to CPU1.

The CPU that you load, which is also the first CPU that you start, is called the Policy or Boot CPU. All other CPUs are called Nonpolicy or Nonboot CPUs.

Although any CPU can be the Policy CPU, your system administrator should tell you which one to use.

If the Policy CPU crashes, and it does not automatically restart, one of the Nonpolicy CPUs assumes the role of the Policy CPU. This is called role switching. (See Figure 11-6.)

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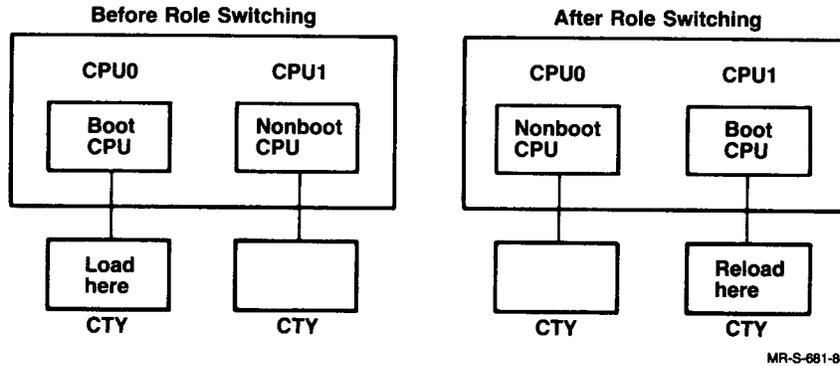


Figure 11-6: Role Switching

When role switching occurs, the following message prints on the CTY that is connected to the new Policy CPU:

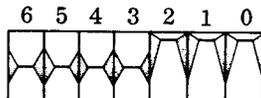
CPUs Has Assumed the Role of Policy CPU at <date/time>

No special procedures are required to operate the Policy CPU.

11.9.1 Loading and Starting an SMP System

To load and start an SMP system, perform the following steps:

1. Make sure that each CPU has its own RSX-20F front-end software on DECTapes or disks that are accessible to its front-end processor.
2. Perform the following steps on each nonpolicy CPU:
 - a. Set Switches 0, 1, and 2 in the switch register. This allows you to enter the KLINIT operator dialog.

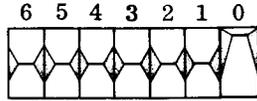


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- b. Set any desired additional switches in the switch register. (See Table 11-3 for a description of each switch in the switch register.)
- c. Press the ENABLE and SW/REG load switches at the same time.

STARTING THE KL10 CENTRAL PROCESSOR

4. Perform the following steps on the Policy CPU.
 - a. Set Switches 0, 1, and 2 in the switch register. This allows you to enter the KLINIT operator dialog.



- b. Set any desired additional switches in the switch register. (See Table 11-3 for a description of each switch in the switch register.)
 - c. Press the ENABLE and SW/REG load switches at the same time.
5. Type everything that is in **UPPERCASE BOLD PRINT** in the following sample dialog on the CTY:

```

RSX-20F VA##-## hh:mm dd-mmm-yy           RSX-20F version and
                                           creation time and date.

[SY0: REDIRECTED TO DB0:]                DB0 is the system device
[DB0: MOUNTED]                            for the RSX-20F tasks.
KLI -- VERSION VA##-## RUNNING
KLI -- ENTER dialog [NO,YES,EXIT,BOOT]?
KLI>YES<RET>
KLI -- KL10 S/N: 1026., MODEL B, 60 HERTZ
KLI -- KL10 HARDWARE ENVIRONMENT:
      MCA25 CACHE PAGER
      EXTENDED ADDRESSING
      INTERNAL CHANNELS
      CACHE

KLI--SELECT PAGE TABLE [FILE, BOTH, 0, 1]

KLI>BOTH<RET>

KLI--PAGE TABLE SELECTED:BOTH

KLI -- RELOAD MICROCODE [YES,VERIFY,FIX,NO]?
KLI>YES<RET>
KLI -- MICROCODE VERSION #.#[###] LOADED
KLI -- RECONFIGURE CACHE [FILE,ALL,YES,NO]?
KLI>ALL<RET>
KLI -- ALL CACHES ENABLED
KLI -- CONFIGURE KL MEMORY [FILE,ALL,REVERSE,YES,NO]?
KLI>ALL<RET>
    
```

STARTING THE KL10 CENTRAL PROCESSOR

LOGICAL MEMORY CONFIGURATION.

ADDRESS	SIZE	INT	TYPE	CONTROLLER
00000000	1024K	4	DMA20	4

KLI -- LOAD KL BOOTSTRAP [FILE,YES,NO,FILENAME]?

KLI>YES<RET>

KLI -- WRITE CONFIGURATION FILE [YES,NO]?

KLI>YES<RET>

KLI -- CONFIGURATION FILE WRITTEN

KLI -- BOOTSTRAP LOADED AND STARTED

BOOT V#(##)<RET>

BOOT version number.

BOOT<RET>

Press RETURN to load the default monitor from DSKB:SYSTEM.EXE[1,4].

| Why reload:

Do not type anything else now. Continue with Step 6.

6. Go to the CTY of the first Nonpolicy CPU.
7. Type J 400 and press RETURN. When the CPU number is printed on its CTY, then that CPU has started.
8. Repeat Steps 6 and 7 for each nonpolicy CPU.
9. Go to the CTY of the Policy CPU.
10. Answer the monitor startup questions.

11.9.2 Restarting a Nonpolicy CPU (SMP Systems Only)

To restart one of the Nonpolicy CPUs on an SMP system, perform the following steps:

1. Make sure the Policy CPU is running.
2. Go to the Nonpolicy CPU that you want to restart.
3. Make sure that the Nonpolicy CPU has its own RSX-20F front-end software on disk or DECTapes that are accessible to its front-end processor.
4. Press ENABLE and DISK, DECTAPE, or SW/REG, depending on how you want to load the front end.

STARTING THE KL10 CENTRAL PROCESSOR

RZ357A KL 1026/1042 14:01:19 TTY471 system 1026/1042
Connected to Node KL1026(26) Line # 471
DSKC: KL1026 System disk DSKC
DSKB: KL1026 System Disk DSKB
Please LOGIN

. The CPU is now ready for
timesharing.

NOTE

You must enter the KLINIT dialog and answer NO to all of the questions to restart a non-Policy CPU in an SMP system. If you attempt to circumvent this process, RSX-20F does not set parity stops.

INSERT TAB 1 "SOFTWARE TASKS" HERE

CHAPTER 12

THE OPERATOR INTERFACE, OPR

12.1 INTRODUCTION TO OPR

The Operator Command Language (OPR) allows you to communicate with the programs that make up the GALAXY batch system. These programs are:

- o QUASAR, the nucleus of the GALAXY and mountable device allocation systems
- o BATCON, the batch job controller
- o LPTSPL, the line printer spooler
- o CDRIVE, the card reader spooler
- o SPROUT, the card punch, paper tape punch, and plotter spooler
- o SPRINT, the card reader input driver
- o PULSAR, the label processor for tapes and structures

In addition, you use OPR to communicate with programs requesting operator action, such as the PLEASE program, and with users on the system.

The program that receives the OPR commands and communicates with all the other system programs is ORION. ORION also logs messages in the operator's log file, OPERAT.LOG. The OPR program also provides the command interface to the NCP, LCP, and CONFIG programs.

12.2 RUNNING OPR

To run OPR, you must have one of the following privileges. (See your system manager to obtain these privileges if you do not already have them.) The REACT program is used to set the privilege level for each user.

- o SYSTEM operator privileges, which enable you to control devices and tasks on the host system and on any remote nodes.
- o HOST operator privileges, which enable you to control devices and tasks at your local host system only.
- o REMOTE operator privileges, which enable you to control devices and tasks only at the ANF-10 remote station node where you are located.

THE OPERATOR INTERFACE, OPR

The tasks in this chapter and in following chapters assume that you have more than one terminal available to perform them. If you have more than one terminal available to you, you may want to dedicate one terminal to running only OPR, and use another terminal for other tasks, for example, running BACKUP.

The following sections explain how to start and exit from OPR.

12.2.1 Starting OPR

To start OPR, type the following:

```
.R OPR<RET>
```

```
OPR>
```

If your installation has more than one terminal assigned to its operators, you can run separate OPR jobs from different terminals. All OPR jobs work the same way. ORION, OPR's controlling program, can handle an unlimited number of OPR jobs.

12.2.2 Exiting from OPR

To exit from OPR, press <CTRL/Z> or type EXIT. OPR returns your job to monitor command level. The period prompt (.) indicates that you are at monitor command level. For example:

```
OPR>EXIT<RET>
```

```
.
```

For a complete description of all OPR commands, their arguments, keywords, and switches, see the TOPS-10 Operator's Command Language Reference Manual.

12.2.3 Issuing OPR Commands to/from ANF-10 Remote Stations

The system operator at the host system has control of all jobs and devices at all nodes in the network system. If you are a Remote Station Operator, you can control only the devices at your remote station. In addition, you have complete control over all active jobs and jobs queued for devices at your node. All your commands default to your location or node. Some OPR commands, however, include the /NODE switch which enables you to send commands to other nodes in the network. The /NODE switch is available with many of the OPR commands described in later sections of this manual. The /NODE switch allows you to specify the logical identifier of any remote station or any node in the network system. The format of the /NODE switch is:

```
/NODE:node-id
```

where the node-id is the number or the name of the remote station.

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12.2.4 Multiple Operators on the System

You can have more than one OPR job running on the same operating system. ORION keeps track of each OPR job and sends the appropriate acknowledgement messages to the OPR job that sent the command.

If you have networking software at your installation, messages sent to a node from a user (with the SEND OPR monitor command) are sent to all OPR jobs running on the node.

You can enable or disable messages displayed at each terminal running OPR. This allows you to assign different OPR terminals to different devices. See Section 12.6 for information on controlling OPR message output.

12.3 OPR COMMAND FEATURES

OPR has features that enable you to:

- o List available commands
- o Use ESCape recognition
- o Obtain help text
- o Reprint faulty commands
- o Continue long command lines

The following sections describe these command features in detail.

In addition, other CTRL/character commands, such as CTRL/R, CTRL/U, and CTRL/W, function at OPR command level as they do at monitor command level.

NOTE

These OPR command features are not applicable when OPR is a subjob of OPSER.

12.3.1 Listing Available Commands

To list all available OPR commands, type a question mark (?) to the OPR> prompt. You can type ? whenever you need help with an OPR command. For example:

- o When you type ? while entering a command, OPR lists command keywords, arguments, or switches for the OPR command and then redisplayes your OPR command up to the point where you typed the ?.
- o When you type ? after the OPR> prompt, OPR lists the available commands.
- o When you type ? after an OPR command, OPR lists the keywords to that command.

THE OPERATOR INTERFACE, OPR

- o When you type ? after the keyword, OPR lists the values, arguments, and/or switches to that keyword.
- o When you type ? after an entire OPR command, OPR displays the message "Confirm with carriage return", redisplayes your entire command, and waits for you to press the RETURN key.

----- Example -----

After you have started OPR and the system displays the OPR> prompt, type ?.

.R OPR <RET>

OPR>? one of the following:

ABORT	ALIGN	BACKSPACE	CANCEL	CLOSE
CONTINUE	DEFINE	DISABLE	DISMOUNT	ENABLE
ENTER	EXIT	FORWARDSpace	HELP	HOLD
IDENTIFY	LOCK	MODIFY	MOUNT	NEXT
PUSH	RECOGNIZE	RELEASE	REPORT	REQUEUE
RESPOND	RESTRICT	ROUTE	SEND	SET
SHOW	SHUTDOWN	START	STOP	SUPPRESS
TAKE	UNLOCK	UNRESTRICT	WAIT	

or one of the following

CATALOG	CONFIG	LCP	NCP	QUOTA
---------	--------	-----	-----	-------

OPR>

NOTES

The DEFINE command is valid only if your installation has IBM communications software. The TOPS-10 IBM Emulation/Termination Manual describes the DEFINE command.

The NCP command applies only if your installation uses DECnet software. See the TOPS-10 DECnet-10 System Manager's and Operator's Guide for more information about NCP.

The LCP command applies only if your installation uses LAT software. See the Local Area Transport Network Manager's Guide for more information about LCP.

12.3.2 Using ESCape Recognition

ESCape recognition helps you to enter commands by:

- o Enabling you to type shortened versions of commands
- o Providing guide words that prompt you for more information

You can press the ESCape key as soon as you have typed enough characters to uniquely identify a command to OPR. The number of characters necessary for OPR to accept the command varies and requires some experimentation on your part.

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NOTE

The terminal bell rings when you press the ESCape key if you have not typed enough characters to uniquely identify a command. If this happens, type another character and press the ESCape key. Continue to do this until the characters you have typed identify a specific command.

The following example illustrates the ESCape recognition feature:

----- Example -----

1. Type the ABORT command.
2. Press the ESCape key to display the ABORT guide words.

```
OPR>ABORT<ESC>(current job on) BATCH-STREAM<ESC>(stream number)
Ø<RET>
```

```
1Ø:37:21 Batch-Stream Ø -- Abort request queued --
```

```
OPR>
```

```
1Ø:37:42 Batch-Stream Ø -- End --
```

```
Job TBUILD Req 145 for HURLEY [33,2623]
```

```
OPR>
```

12.3.3 Reprinting Faulty Commands

When you issue a correct command to OPR, OPR passes the command to ORION. If the command is incorrect, OPR displays an error message. If you receive an error message, you can retype the entire OPR command, or press <CTRL/H> to reprint the command up to the point where the error occurred.

To use the <CTRL/H> feature do the following:

1. Press <CTRL/H> to redisplay the command up to the point where the error occurred.
2. Enter the correct information.

----- Example -----

```
OPR>FORWARDSPACE PRINTER Ø /PAGES:3) <RET>
? First nonspace character is not a digit
```

```
OPR> <CTRL/H> FORWARDSPACE PRINTER Ø /PAGES:3Ø <RET>
```

```
OPR>
```

```
13:25:Ø4 Printer Ø -- Forwardspaced 3Ø Pages --
```

```
OPR>
```

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12.3.4 Getting Help

The OPR HELP command provides information about specific commands. When you type HELP, followed by an OPR command name, OPR displays the command's function and its format, keywords, arguments, and switches.

The following example illustrates the HELP feature:

----- Example -----

If you specify HELP RELEASE, OPR displays the function, format, keywords, and arguments of the RELEASE command.

```
OPR>HELP RELEASE <RET>
```

The RELEASE command allows you to release a job request that was held with the HOLD command.
The format is:

```
RELEASE keyword
```

where keyword must be one of the following:

```
BATCH-JOBS  
CARD-PUNCH-JOBS  
PAPER-TAPE-PUNCH-JOBS  
PLOTTER-JOBS  
PRINTER-JOBS
```

followed by one of these arguments:

```
<request-id-number> (for a single job)  
[user name] (for all jobs of a user)  
* (for all job requests)
```

```
OPR>
```

12.3.5 Line Continuation

Commands to OPR are often long and cumbersome, especially if you use ESCape recognition. The OPR program enables you to continue a command on the next line. To continue a command line, type a hyphen (-) before you press <RET>. This prevents OPR from processing the line until it reaches a <RET> that is not preceded by a hyphen.

For example, the following command line uses line continuation:

```
OPR>SET TAPE-DRIVE MTA3: INITIALIZE /LABEL-TYPE:ANSI- <RET>  
/OWNER:[31,5723]/TAPE-DISPOSITION:HOLD/VOLUME-ID:TAPE01 <RET>  
OPR>
```

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12.4 CONTROLLING SYSTEM EVENTS

OPR enables you to control certain system activities known as "events."
These events are:

- o Billing file closure (BILCLS)
- o Scheduled system shutdown (KSYS)
- o ORION log file closure (OPRFIL)
- o Command file execution (TAKFIL)
- o USAGE file closure (USGFIL)

The commands that control system events enable you to include a time and date argument. These commands are:

- o CLOSE
- o SET KSYS
- o SET USAGE
- o TAKE

OPR uses the following conventions for the time and date arguments. hh:mm:ss stands for hours, minutes and seconds. dd-mmm-yy stands for day, month, year. DAY is a day of the week.

NOW	causes the event to occur immediately.
+hh:mm:ss	schedules the event to occur in the number of hours from the current time as specified by hh:mm:ss. (Specifies a relative time for the event to occur.)
	hh:mm:ss schedules the event to occur at the time specified by hh:mm:ss. (Specifies an absolute time for the event to occur.)
dd-mmm-yy:hh:mm:ss	
	schedules the event to occur on the date and time specified by dd-mmm-yy:hh:mm:ss.
DAILY hh:mm:ss	schedules the event to occur every day at the time specified by hh:mm:ss.
EVERY "DAY" hh:mm:ss	
	schedules the event to occur every week on the day and time you specify. DAY specifies a particular day of the week.

Other commands that control system events are the CANCEL and SHOW QUEUES EVENTS commands.

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12.5 CONTROLLING FAL

FAL, the File Access Listener, provides remote access to the TOPS-10 file system, and is an integral part of network communications. FAL makes network file transfers possible in the following ways:

- o It acts as a target for NFT (Network File Transfer) programs on other DECnet and ANF-10 hosts.
- o It determines a user's access privileges to a requested file.

A single FAL job can run multiple FAL-streams. Each FAL-stream controls a network connection. The following commands allow you to list and control FAL-streams:

- o SET
- o START
- o ABORT
- o SHOW
- o SHUTDOWN
- o STOP
- o CONTINUE
- o DEFINE

These commands function similarly to the commands that control batch streams. For example, to define the network with which each FAL stream will communicate, use the SET command as follows:

----- Example -----

```
OPR>SET FAL-STREAM 3 NETWORK ANF-10
OPR>
15:16:38      Fal-Stream 3  -- Set Accepted --
OPR>
```

12.6 CONTROLLING ORION TO OPR MESSAGES

OPR displays two types of messages: messages from OPR and messages from ORION. The following types of ORION messages are displayed on your terminal:

- o Error messages showing that ORION does not have the appropriate devices, streams, nodes, or jobs to process a command
- o Messages from jobs that start processing in a stream or on a device
- o Messages from jobs that end processing in a stream or on a device

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- o Messages specifying actions you must take for various devices, streams, or jobs
- o Results of TAKE command files

The first eight characters of the message is the time stamp. ORION time-stamps each OPR command it accepts and executes, as well as all error messages.

In the following example, ORION displays the time (in hours, minutes, and seconds) that it accepted and executed the SET PRINTER command.

```
OPR>SET PRINTER 0 FORMS-TYPE NARROW <RET>
```

```
12:00:00      Printer 0 -- Set Accepted --
```

ORION displays error messages in the same format. In the following example, ORION acknowledges the SHOW MESSAGES command by displaying the information message shown below:

```
OPR>SHOW MESSAGES <RET>
```

```
12:00:00      -- No Outstanding Messages --
```

When a particular job starts to process in a batch stream or on a device, ORION displays a message to notify you that the stream or device is active. For example, ORION displays the following message when a job named TEST begins to process in batch stream 0 for user ZINA:

```
hh:mm:ss      Batch-stream 0 -- Begin --  
                Job TEST Req #274 for ZINA [27,1234]
```

```
OPR>
```

Likewise, when a particular job ends processing, ORION displays a message to notify you that the stream or device is not active and the job has completed. For example, ORION displays the following message when the job named TEST ends the process in batch stream 0 for user ZINA.

```
hh:mm:ss      Batch-stream 0 -- End --  
                Job TEST Req #274 for ZINA [27,1234]
```

```
OPR>
```

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You may want to control the types of messages displayed at your terminal. For example, if you have multiple terminals running OPR, you can set the OUTPUT-DISPLAY to suit the needs of each OPR job. To control OPR message output, enter the ENABLE or DISABLE command followed by the keyword, OUTPUT-DISPLAY, and one or more of the following arguments:

ALL-MESSAGES (the default argument)
BATCH-MESSAGES
CARD-PUNCH-MESSAGES
CARD-READER-INTERPRETER-MESSAGES
FAL-MESSAGES
MOUNT-MESSAGES
PAPER-TAPE-PUNCH-MESSAGES
PLOTTER-MESSAGES
PRINTER-MESSAGES
READER-MESSAGES
USER-MESSAGES

The ENABLE and DISABLE commands also have the following switches. If you do not specify one of these switches with one of the above arguments, the system assumes all three types of messages.

/INFORMATION-MESSAGES
/JOB-MESSAGES
/OPR-ACTION-MESSAGES

For more information about these commands and switches see the TOPS-10 Operator's Command Language Reference Manual.

12.7 OPR ERROR MESSAGE DESCRIPTIONS

OPR error messages are also displayed on your terminal. All OPR error messages begin with "?" and are followed by the message explaining the error. Note that "?" does not represent a fatal error in OPR, as it does in some other system programs.

When you receive an error message, you can type <CTRL/H> to retype your OPR command up to the point where you entered the incorrect keyword, switch, or value and specify the correct input to the command. See the TOPS-10 Operator's Command Language Reference Manual for a complete list of OPR error messages, their causes, and how to recover from them.

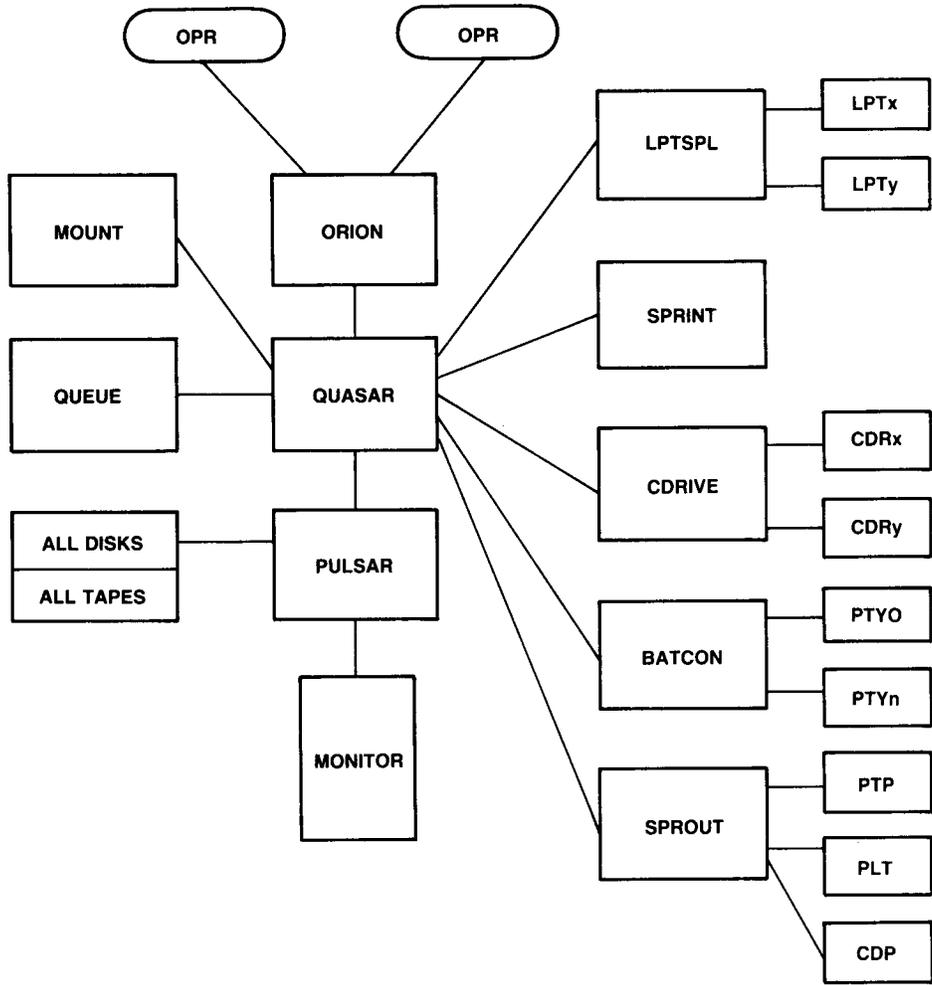
CHAPTER 13
GALAXY SOFTWARE TASKS

This chapter explains the relationships among the GALAXY programs and the devices they operate. It explains how to use the GALAXY system to control the following:

- o Batch streams
- o Card punches
- o Card readers
- o Line printers
- o Paper-tape-punches
- o Plotters

Figure 13-1 and Table 13-1 on the following pages explain the components of the GALAXY system.

GALAXY SOFTWARE TASKS



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Figure 13-1: The GALAXY System

GALAXY SOFTWARE TASKS

Table 13-1: GALAXY Components

Program	Function
OPR	allows you to communicate with the various system components and with the users requesting jobs on the devices controlled by these components. This chapter describes the OPR commands that accomplish these tasks. For more information about OPR see the <u>TOPS-10 Operator's Command Language Reference Manual</u> .
ORION	is the interface between OPR and all other components. ORION logs each OPR command it receives, and passes the command to the appropriate program.
QUASAR	the queue manager, is the heart of the spooling system. It is responsible for scheduling all jobs entered into the spooler and mount queues.
PULSAR	the tape label and disk structure processor, is the program that handles the reading and writing of tape labels. The mountable device allocation (MDA) system is composed of QUASAR and PULSAR. The MDA system is a set of functions within these two programs that control mountable devices (tapes and disks). To place a device under control of MDA, set it to be AVAILABLE.
LPTSPL	the line printer spooler, is a program that can drive up to 8 local and remote printers per spooler per node. LPTSPL processes print requests that include those submitted with the PRINT command, spooled requests generated by user programs, and batch log files. QUASAR selects jobs to be printed according to a variety of parameters. The OPR commands that have PRINTER as an argument are those that allow you to control line printer processing.
CDRIVE SPRINT	are responsible for the card reader input. CDRIVE reads cards from the card reader(s), places the data on the cards on disk, and queues a request for SPRINT. SPRINT reads the data, interprets the \$JOB card and other control cards, and then creates and submits the user's batch job to BATCON. The OPR commands that have READER as an argument or keyword are those that allow you to control card reader processing.
BATCON	the batch controller, is the program that initiates and controls the processing of batch jobs. QUASAR selects jobs from the batch input queue and gives them to BATCON for processing. The OPR commands that have BATCH-STREAM as an argument are those that allow you to control batch job processing.
SPROUT	is the card punch, paper-tape punch, and plotter spooler. It handles all the output requests other than line printer requests. QUASAR selects data to be output on these devices according to a variety of parameters. The OPR commands that have CARD-PUNCH, PAPER-TAPE-PUNCH, and PLOTTER as arguments are those that enable you to control the output processing on these devices.

GALAXY SOFTWARE TASKS

13.1 BATCH RESPONSIBILITIES

The batch system increases the efficiency of the system by processing jobs that do not require human interaction. Your batch responsibilities are to:

- o Start batch streams
- o Set parameters for batch streams and parameters
- o Adjust the parameters, if necessary
- o Service action requests from user jobs
- o Maintain peripheral devices
- o Examine the queues periodically and modify the requests if necessary.

If users are submitting batch jobs on card decks, your system manager should tell you:

- o Where the decks must be placed for submission
- o When the decks are read
- o Where and when the decks and output are returned to users

13.2 CONTROLLING BATCH STREAMS

You must start the batch streams before the batch system can process batch requests. In addition, you must check to see that QUEUE-REQUESTS are enabled. Issue the PRINT or SUBMIT commands to verify that QUEUE-REQUESTS are enabled. If QUEUE-REQUESTS are disabled, the system responds with a message stating that they are disabled. The following example illustrates the ENABLE QUEUE-REQUESTS command.

```
OPR>ENABLE QUEUE-REQUESTS<RET>
```

```
OPR>
```

13.2.1 Setting Parameters

Normally, the SYSTEM.COMD file starts a defined number of batch streams automatically at system start-up. However, you might start an additional batch stream when there are many batch jobs waiting in the queue. Batch stream parameters limit the use of a stream to requests that meet a particular set of criteria. The default batch stream parameters are:

- o ATTRIBUTE BATCON
- o MEMORY-LIMITS 0:512
- o OPR-INTERVENTION
- o PRIORITY-LIMITS 1:63
- o TIME-LIMITS 0:600

GALAXY SOFTWARE TASKS

The ATTRIBUTE parameter enables you to specify whether the batch stream uses BATCON or SITGO to process jobs. Use SITGO when you need a batch processor that contains a fast, batch-oriented FORTRAN compiler.

The MEMORY-LIMITS parameter specifies the memory requirements of batch jobs in the batch stream. MEMORY-LIMITS is expressed in terms of the number of memory pages a batch job needs in order to process. Only batch jobs with memory requirements within the specified range can run in the stream.

The OPR-INTERVENTION parameter enables users to pass messages to you through the batch job. For example, a user might send a message requesting you to mount a tape. To disable the OPR-INTERVENTION parameter set the parameter to NOOPR-INTERVENTION. With NOOPR-INTERVENTION in effect, the system automatically logs out batch jobs that request operator intervention.

The PRIORITY-LIMITS parameter enables you to specify the priorities for a batch stream or a range of batch streams. The default limits are from 1 to 63. The greater the number, the higher the priority. If you set a batch stream to have a priority limit of 31:41, the system only processes batch requests submitted with a priority between 31 and 41 (inclusive) in that stream.

The TIME-LIMITS parameter enables you to specify a range of time limits for batch jobs running in a specified stream. The default minimum:maximum range is 0:600 minutes. If you set a batch stream to have time limits from 0 to 5 minutes, the system only processes requests submitted with a time limit of 5 minutes or less in that batch stream.

----- Example -----

Set a batch stream for NOOPR-INTERVENTION with a priority limit of 50 and with a time range of 60 to 90 minutes.

```
OPR>SET BATCH-STREAM 4 NOOPR-INTERVENTION <RET>
```

```
OPR>
9:20:55          Batch-stream 4  -- Set Accepted --
```

```
OPR>SET BATCH-STREAM 4 PRIORITY-LIMITS 50 <RET>
```

```
OPR>
9:21:15          Batch-stream 4  -- Set Accepted --
```

```
OPR>SET BATCH-STREAM 4 TIME-LIMITS 60:90 <RET>
```

```
OPR>
9:21:40          Batch-stream    -- Set Accepted --
```

```
OPR>
```

GALAXY SOFTWARE TASKS

13.2.2 Starting Batch Streams

After you set the parameters for a particular batch stream or a range of batch streams, you can start the stream(s). If you do not set any parameters for the stream, the stream takes the default values. You can start one or more batch streams at a time.

----- Example -----

Issue the START BATCH-STREAM command to start up streams 6 and 7.

```
OPR>START BATCH-STREAM 6:7 <RET>
```

```
OPR>
10:00:15      Batch-stream 6  -- Startup Scheduled --
```

```
OPR>
10:00:20      Batch-stream 7  -- Startup Scheduled --
```

```
OPR>
```

13.2.3 Stopping Batch Streams Temporarily

To stop a batch stream or a range of batch streams temporarily, use the STOP command. The STOP BATCH-STREAM command temporarily stops a batch stream from processing a job. You must use the CONTINUE command to resume the batch stream.

The STOP command has the following optional arguments:

- o AFTER CURRENT-REQUEST
- o AFTER EVERY-REQUEST
- o IMMEDIATELY

The default is to stop processing immediately.

----- Example -----

Stop the processing of a job in batch stream 4 temporarily.

```
OPR>STOP BATCH-STREAM 4 <RET>
```

```
OPR>
11:23:09      Batch-stream 4  -- Stopped --
```

```
OPR>
```

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13.2.4 Continuing Batch Streams

Use the CONTINUE command to continue processing a stopped job in a batch stream or jobs in a range of batch streams.

----- Example -----

Continue processing the job in batch stream 4.

```
OPR>CONTINUE BATCH-STREAM 4 <RET>
```

```
OPR>
11:41:18          Batch-stream 4  -- Continued --
```

```
OPR>
```

13.2.5 Shutting Down Batch Streams

To permanently stop a batch stream or a range of batch streams, use the SHUTDOWN command. If a job is currently processing in the batch stream, the shutdown occurs when the job is completed, and no new batch requests are accepted.

To start a batch stream after it has been shut down use the START command.

----- Example -----

Shut down batch stream 5 while a job is still processing in it.

```
OPR>SHUTDOWN BATCH-STREAM 5 <RET>
```

```
OPR>
13:34:45          Batch-stream 5  -- Shutdown Scheduled --
```

```
OPR>
```

When the job in the batch stream has completed processing, the following message appears:

```
OPR>
13:38:25          Batch-stream 5  -- Shutdown --
```

```
OPR>
```

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13.2.6 Sending Messages

To send a message to a job in a batch stream, use the SEND BATCH-STREAM command. You can specify single-line messages or multi-line messages. To send multi-line messages do the following:

1. Type SEND BATCH-STREAM.
2. Enter the stream number to which you want the message sent.
3. Press RETURN.
4. Type your message.
5. Press <CTRL/Z> to terminate the SEND command.

----- Example -----

A batch job in batch stream 2 requests a tape mount. After you have mounted and readied the tape, you SEND a message to the batch stream to identify the tape volume id to the batch user. You can specify only one batch stream in the SEND command.

```
OPR>SEND BATCH-STREAM 2 <RET>
Enter text and terminate with ^Z
THE TAPE VOLUME ID IS 120124.^Z
```

```
OPR>
```

----- Restriction -----

If you send a message to a stream that is not processing a job, you receive the following error message:

```
hh:mm:ss          Batch-stream n -- Not Active --
```

13.2.7 Displaying Batch Stream Parameters

To display current batch stream parameters for one or more batch streams use the SHOW PARAMETERS BATCH-STREAM command. If you do not specify a stream number or a range of stream numbers, the command displays all the batch streams.

The SHOW PARAMETERS BATCH-STREAM command displays the following information for each batch stream:

- o The number of the batch stream
- o The range of processing minutes set for the batch stream
- o The priority range set for the batch stream
- o The memory range set for the batch stream
- o Whether or not operator intervention has been set for the batch stream

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----- Example -----

Use the SHOW PARAMETERS BATCH-STREAM command to display the parameters of all current batch streams in the system.

OPR>SHOW PARAMETERS BATCH-STREAM <RET>

OPR>
12:09:33 -- System Device Parameters --

Batch-stream Parameters:

Strm	Minutes	Prio	Core	Opr-Intvn
0	0:10	1:19	1:512	Yes
1	11:30	1:19	1:512	Yes
2	31:480	1:19	1:512	Yes
3	0:11000	20:63	1:512	Yes

OPR>

13.2.8 Displaying Batch Stream Status

To display the status of one or more batch streams use the SHOW STATUS BATCH-STREAM command. If you do not specify a batch stream number or a range of numbers, the command defaults to all batch streams in the system.

The SHOW STATUS BATCH-STREAM command displays the following information for each batch stream:

- o The number of the batch stream
- o The current status of the batch stream (idle or active)
- o The name of the job currently active in the batch stream, if a job is running
- o The request-id of the job
- o The name and PPN of the user who made the job request
- o The label last referenced
- o The name of program being run
- o The runtime, if any

If you only want to see information about idle streams, specify the /SHORT switch before you press RETURN.

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----- Example -----

Use the SHOW STATUS BATCH-STREAM command to display the current status of all batch streams in the system.

```
OPR>SHOW STATUS BATCH-STREAM <RET>
```

```
OPR>
19:19:57                -- System Device Status --
```

Batch-stream Status:

Strm	Status	Jobname	Req#	User
0	Idle			
1	Active	FDLBLD	59	BROWN.E [27,5107]
	Job 18 Running	MACRO Last Label: MACRO		Runtime 0:00:42
2	Idle			
3	Active	PHYCAL	41	MANUFACTURING [10,1221]
	Job 31 Running	COBOL Runtime 2:31:27		

```
OPR>
```

13.3 CONTROLLING BATCH JOBS

Users enter batch jobs into the batch queue with the monitor command, SUBMIT. This section explains how to control these jobs.

13.3.1 Examining the Batch Queue

Batch queues hold user-submitted batch jobs until the batch system selects one for execution. To examine batch job queues use the SHOW QUEUES BATCH-JOBS command.

The SHOW QUEUES BATCH-JOBS command displays the following information for each job that is waiting or running:

- o The name of the batch job
- o The request-id number of the batch job
- o The scheduled runtime of the batch job
- o The name of the user who submitted the batch job
- o Any special requirements the user included in the SUBMIT command line.

The system displays this information whether the batch job is active (currently running) or not active (not running).

An asterisk (*) to the left of the job name indicates an active job. The system displays the following information for active jobs:

- o The stream in which the job is running
- o The job number

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- o The last control file label encountered by the job
- o The runtime used

The SHOW QUEUES BATCH-JOBS has optional switches, including /ALL and /SHORT. The /ALL switch displays all batch jobs in the queue with their appropriate column headers, and any switches that the user specified when the batch job was submitted. If the user did not specify switches, the /ALL switch displays the default settings of the SUBMIT switches for the batch job. In addition, the /ALL switch displays any switches you specified, such as /HOLD. The /SHORT switch displays only the job name, the request number, the scheduled runtime, and the user name. The /SHORT switch does not display column headers or switches.

----- Example -----

1. Use the SHOW QUEUES BATCH-JOBS command with the /ALL switch to display the batch jobs in the queue with all their switches.

OPR>SHOW QUEUES BATCH-JOBS /ALL <RET>

```
OPR>
13:40:22                -- System Queues Listing --

Batch Queue:
Job Name   Req    Run Time  Core           User
-----
* OPSEK    330   01:00:00   512  Mike Boucher [30,5664]
  In Stream:2 /Uniq:Yes /Restart:No /Assist:Yes
  /Output:Log /Batlog:Append /Seq:460
  Job 52 Runtime 0:00:00
SAVE      24   00:01:00   200  DPM      [10,56]
  /After:28-May-82 8:00 /Uniq:No /Restart:No
  /Assist:Yes /Output:Error /Batlog:Append
  /Seq:3047
SML20     18   00:05:00   200  Hayes, R [10,3354]
  /Proc:K26E /Uniq:No /Restart:No /Assist:Yes
  /Output:Nolog /Batlog:Append /Seq:102
ACCT      14   00:05:00   200  Mary Marotta [27,5443]
  /After:27-May-82 0:00 /Uniq:No /Restart:No
  /Assist:Yes /Output:Nolog /Batlog:Super
  /Seq:784
There are 4 jobs in the queue (1 in progress)
```

OPR>

2. Use the SHOW QUEUES BATCH-JOBS command with the /SHORT switch.

OPR>SHOW QUEUES BATCH-JOBS /SHORT <RET>

```
OPR>
13:40:45                -- System Queues Listing --

Batch Queue:
* OPSEK    330   01:00:00  200  MEIER,B [10,3146]
  TWAIT    295   00:01:00  512   [RDH] [226,4563]
  SUB15    302   00:05:00  200  ANTHONY [10,5757]

OPR>
```

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13.3.2 Holding Batch Jobs

To prevent a batch job from processing, use the HOLD BATCH-JOBS command. The HOLD BATCH-JOBS command keeps the current job(s) in the queue from processing until you use the RELEASE command to free the job(s). Any batch jobs submitted after the HOLD command are not held and are processed when a batch stream is available. You must specify one of the following arguments with this command:

- o The request-id number, to hold a single batch job.
- o The PPN for a particular user, to hold all batch jobs submitted by that user.
- o An asterisk (*), to hold all batch jobs submitted by all users.

NOTE

You cannot HOLD a batch job that is currently active in a batch stream. Use the ABORT or STOP command to stop the batch stream that is running the job.

----- Example -----

Use the HOLD BATCH-JOBS command to hold all batch requests for user SMITH, whose PPN is [10,147].

```
OPR>HOLD BATCH-JOBS [10,147] <RET>
```

```
OPR>  
9:01:54          -- 6 Jobs Held --
```

```
OPR>
```

13.3.3 Releasing Batch Jobs

The RELEASE command releases a batch request that has been previously held with the HOLD command, and reschedules the job processing. To specify the request you want to RELEASE, supply one of the following:

- o A single request-id number to release one request
- o A user name to release all requests for that user
- o An asterisk (*) to release all requests

----- Restriction -----

You must have one or more batch streams started or in the idle state to get a batch job processed.

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----- Example -----

Use the RELEASE command to reschedule all batch requests that were previously held.

```
OPR>RELEASE BATCH-JOBS * <RET>
```

```
OPR>
10:38:09          -- 6 Jobs Released --
```

```
OPR>
```

13.3.4 Aborting Running Batch Jobs

To cancel a batch job while it is active, use the ABORT command with the batch stream number and one or more of the following switches:

- o /ERROR-PROCESSING or /NOERROR-PROCESSING,
- o /PURGE
- o /REASON

The /ERROR-PROCESSING and /NOERROR-PROCESSING switches specify whether to complete any error recovery procedures that may have been included in the batch job. By default, if you ABORT a batch job, BATCON does error processing. The /NOERROR-PROCESSING switch prevents BATCON from completing error recovery procedures.

The /PURGE switch cancels all output from the batch job, preventing the log file from being printed.

The /REASON switch allows you to enter one or more lines of text to explain why you are aborting the batch job.

----- Example -----

Use the ABORT command to cancel a batch job that requested a structure that does not exist.

```
OPR>ABORT BATCH-STREAM 0 /REASON:NO SUCH STRUCTURE<RET>
```

```
OPR>
11:32:08          Batch-stream 0  --Aborted--
                   Job TEST01 Req #35 for PACELLI [27,4615]
```

```
OPR>
11:32:12          Batch-stream 0  --End--
                   Job TEST01 Req #35 for PACELLI [27,4615]
```

```
OPR>
```

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13.3.5 Requeuing Batch Jobs

The REQUEUE command stops a job that is processing and puts the job back into the batch queue, to be restarted later. A requeued job is in a HOLD state until it can start running again. To start processing the job again, use the RELEASE command.

For example, you might want to REQUEUE a batch job that requires additional structures for its processing, because you do not have any available disk drives. Thus, you REQUEUE the job to be processed when the disk drives become available.

You can specify the /REASON switch to explain why you are requeuing the job.

----- Example -----

Use the REQUEUE command to hold a batch job that, when started, requested a structure that could not be mounted.

```
OPR>REQUEUE BATCH-STREAM 2 /REASON: <RET>
Enter text and terminate with ^Z
JOB WILL BE RELEASED LATER WHEN DISK DRIVE BECOMES AVAILABLE ^Z
OPR>
13:21:03          Batch-stream 2  -- REQUEUE command queued --

OPR>
13:21:05          Batch-stream 2  -- End --
                  Job TAPE01 Req #27 for LATTA [2,134]

OPR>
```

13.3.6 Modifying Batch Requests

To change the priority of a batch request in the queue use the MODIFY BATCH-REQUEST command and specify one of the following:

- o A single batch request-id number to modify a single request
- o A user name to modify all requests by a user
- o An asterisk (*) to modify all batch requests in the queue

You must include the PRIORITY keyword, followed by a priority from 1 to 63. You must specify a new PRIORITY number from 1 to 63. The higher the number, the greater the priority.

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----- Example -----

Use the MODIFY command to change the priority of batch request 135 to 63.

```
OPR>MODIFY BATCH-REQUEST 135 PRIORITY 63 <RET>
```

```
OPR>
8:51:21          -- 1 Request Modified --
```

```
OPR>
```

```
8:52:03          -- Batch-Stream ) -- Begin --
Job SUB15 Req #135 for M.MAROTTA [27,5434]
Control file: DSKB:SUB15.CTL[27,5434]
Log file:      DSKB:SUB15.LOG[27,5434]
```

```
OPR>
```

13.3.7 Deleting Batch Requests

To cancel a batch request from the batch queue, use the CANCEL BATCH-REQUEST command and supply one of the following:

- o A single request-id number to cancel one request
- o A user name to cancel all requests for that user
- o An asterisk (*) to cancel all requests

If you CANCEL a batch request that is active, the batch job is stopped immediately. In this way the CANCEL command is the same as the ABORT command. (ABORT is useful with active batch jobs only.) The log file shows a message indicating that the job was deleted by the operator.

----- Example -----

Cancel batch request 168 from the batch request queue.

```
OPR>CANCEL BATCH-REQUEST 168 <RET>
```

```
OPR>
10:25:11         -- 1 Job Canceled --
```

```
OPR>
10:25:29         Batch-Stream 2 --Canceled by Operator [1,2] --
                  Job IPCUS Req #168 for MANJU [25,1026]
```

```
OPR>
```

```
10:25:34         Batch-Stream 2 -- End --
                  Job IPCUS Req #168 for MANJU [25,1026]
```

```
OPR>
```

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13.4 CONTROLLING THE LINE PRINTER

To process printer requests, the system must have one or more line printers with the parameters set to allow processing of user requests, and the line printer(s) must be started. Normally, the line printer(s) are automatically started at system start-up when the SYSTEM.CMD file is executed. See the TOPS-10 Operator's Command Language Reference Manual for more information about SYSTEM.CMD.

After one or more listings have been printed, you must remove them from the line printer, separate them, and distribute them. Your system manager should set up the distribution method, and should tell you:

- o Where you must put the listings so that users can pick them up
- o When you must distribute them

The following sections describe the OPR commands that enable you to control the following line printer functions:

- o Setting printer parameters
- o Stopping a printer
- o Continuing a printer job
- o Shutting down a printer
- o Displaying a printer's parameters
- o Displaying a printer's status

13.4.1 Setting Line Printer Parameters

Normally, the SYSTEM.CMD file starts a defined number of line printers at system start-up. However, you might have to start a line printer, for example, when a user requests a printer for his own use. Before you start a line printer, you can set the parameters for the line printer with the SET PRINTER command. The parameters you can set are:

- o The FORMS-TYPE parameter, which specifies the type of paper to be used. The name of the form should be the same as the form name in the LPFORM.INI file. See Section 13.4.2 for more information about the LPFORM.INI file.
- o The LIMIT-EXCEEDED-ACTION parameter, which specifies what action, if any, should be taken if a printer job exceeds the output limit set by the user. You can set this parameter to take one of the following actions:
 - ASK the operator what action to take. The operator can reply with either PROCEED (to continue the print job) or ABORT (to cancel the print job).
 - Always ABORT the print job when the limit has been exceeded.
 - Always PROCEED, ignoring the job limit.

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- o The PAGE-LIMITS parameter, which specifies the minimum-to-maximum range of pages allowed to be printed per job on the line printer. This is checked against the /LIMIT value on the request.
- o The PRIORITY-LIMITS parameter, which specifies the range of print job priorities that the printer accepts. For example, if a print job is queued with a priority of 19 and there are no line printers that have been set to accept a priority of 19, the print request is queued but not printed. The request remains in the print queue until a line printer has been set to accept that priority. But you can change the priority of a print request with the MODIFY PRINT-REQUESTS command.

These parameters are initially set by your system manager with GALGEN. (Refer to the TOPS-10 Software Installation Guide for the GALGEN procedures.) When you change the FORMS-TYPE, LIMIT-EXCEEDED-ACTION, PAGE-LIMITS, or PRIORITY-LIMITS for a printer, the change remains in effect until you change it again, or until the GALAXY system is restarted.

----- Example -----

Set line printer 0 to print requests with a priority from 1 to 21 and a page limit from 1 to 1000.

```
OPR>SET PRINTER 0 PRIORITY-LIMITS 21 <RET>
```

```
OPR>
12:01:21      Printer 0  -- Set Accepted --
```

```
OPR>SET PRINTER 0 PAGE-LIMITS 1000 <RET>
```

```
OPR>
12:01:40      Printer 0  -- Set Accepted --
```

```
OPR>
```

13.4.2 Using the LPFORM.INI File

The LPFORM.INI file allows you to set various printer parameters on the basis of form names.

Each line in the LPFORM.INI file is written in the following format:

```
formname:locator/switch1/switch2/switch3...
```

where:

formname is a 1- to 6-character form name. The system manager should specify form names that are descriptive of the types of forms used at your installation. The default is NORMAL.

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:locator

is an optional locator field containing:

ALL all devices (the default)
 LPT xx y a specific line printer, where xx
 is the node number, and y is the
 printer unit number
 LOC to specify all local line printers
 REM to specify line printers at remote
 stations

/switch1...

are one or more switches you can use to describe the way the forms are to be used. Refer to Table 13-2 for a description of the available switches.

Table 13-2: LPFORM.INI Switches

Switch	Meaning
/ALIGN:filespec	The filespec specifies the file with the extension .ALP, which is used to align the forms on the line printer. If no filespec is specified, the system uses the file whose filespec is the name of the form. For example, /ALIGN for NARROW uses SYS:NARROW.ALP by default. The alignment occurs before the requested file is printed and is not repeated if multiple requests for the same forms occur for the same line printer.
/BANNER:nn	The value of nn specifies the number of banner pages (job header pages) desired. The default is 2 pages and may be changed with GALGEN.
/CHAIN:xxx or /DRUM:xxx	The xxx represents a 1- to 6-character ASCII string that specifies the chain or drum to be used on the printer. The system displays the switch name and argument on your terminal when the forms are scheduled. If you specify both the /CHAIN and /DRUM switches for the same entry in the LPFORM.INI file, OPR prints only the last one it encounters.
/HEADER:nn	The value of nn specifies the number of file header pages to be printed before each file. The default is 2 pages and may be changed with GALGEN.

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Table 13-2: LPFORM.INI Switches (Cont.)

Switch	Meaning
/LINES:nn	The value of nn specifies the number of lines that can be printed on each page. The default is 60. This switch should be included whenever a form type is longer or shorter than the normal 60 lines.
/NOTE:text	The text represents text of up to 50 characters that is displayed on your OPR terminal at the time the forms and/or print request are scheduled.
/RAM:name	<p>The name represents a 1- to 6-character ASCII string that specifies the name of the control RAM to be used. The /RAM switch loads a special program that allows character translation on the line printer. If the line printer has a program RAM (DARAM), the system automatically loads it from the file SYS:name.RAM. If the line printer does not have a DARAM, the system notifies you of the need to load your own RAM program.</p> <p>For example, if your line printer doesn't print left and right angle brackets, you could specify a RAM file that would convert angle brackets to square brackets in the line printer output.</p>
/RIBBON:name	The name represents a 1- to 6-character ASCII string that specifies the type of ribbon to be used on the line printer. The system displays the switch name and argument on your terminal at the time that the forms are scheduled.
/TAPE:name or /VFU:name	The name represents a 1- to 6-character ASCII string that specifies the name of the vertical forms control tape to be used. If the line printer has a program-loaded VFU (DAVFU), the system automatically loads it from the file SYS:name.VFU. If the line printer does not have a DAVFU, the system notifies you of the need to change the VFU tape. The default VFU name is NORMAL.
/TRAILER:nn	The value of nn specifies the number of job trailer pages to be printed after each file. The default is 2 pages and may be changed with GALGEN.
/WIDTH:nn	The value of nn specifies the number of characters per line for the form. The default width is 132 if the /WIDTH switch is not specified. The /WIDTH switch should be included whenever a form is narrower than the standard 14-inch wide paper.

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The form name in LPFORM.INI need not be the name of a physical form; however, it ought to specify the type of form (such as NORMAL forms, NARROW forms, and so forth). When a print request is made, LPTSPL compares the form name associated with the request with the form name of the form currently mounted on the line printer. If the first four characters of the name are not the same, then LPTSPL requests you to change the forms on the line printer. If the first four characters of the name are the same, then LPTSPL checks the switches associated with the requested form name and uses those values when printing the job. If there are no printers that satisfy the print request, the request will remain in the queue until a printer with the correct forms becomes available.

If the forms type specified by the user is not the same as the form that is currently in the printer, the system uses the first four characters to check against the LPFORM.INI file. (This four-character uniqueness can be changed by GALGEN; the default is four.) If the forms type matches one in the file, a request is made for you to supply the appropriate form. If the forms type is not in the LPFORM.INI file, the user receives an error.

For example, note the following LPFORM.INI file:

```
NARROW/HEADER:1/BANNER:1/TRAILER:1
NARR01/HEADER:0/BANNER:1/TRAILER:1
NARR02/HEADER:0/BANNER:0/TRAILER:0/NOTE:SPECIAL
```

Now, suppose that NARR01 forms are currently mounted on the line printer and a user makes a print request that requires NARR02 forms. The system compares the first four characters of the requested form name (NARR02) with the first four characters of the form name for the form that is currently mounted on the line printer (NARR01). Because they are the same, the system takes the switch values associated with NARR01 and applies them incorrectly to the user's print request. Therefore, the LPFORM.INI file should contain unique forms names for each different type of form. This ensures that the correct forms are mounted when a user submits a print request. The alternative is to change the GALGEN parameter and rebuild GALAXY.

Each line in LPFORM.INI can also contain a locator field, which specifies the parameters a form should have when it is mounted on specific line printers. For example:

```
NORMAL:LPT263/HEADER:1/BANNER:1/TRAILER:0
NORMAL:ALL/HEADER:2/BANNER:2/TRAILER:2
```

If form NORMAL is on line printer LPT263, it takes the forms parameters given in the first entry of the LPFORM.INI file shown above. If form NORMAL is on any other line printer, then it takes the forms parameters given in the second entry of the file.

Note that entries in LPFORM.INI having identical form names but having different locators must be listed from specific locator to more general locator. In the example above, the entry specifying device LPT263 for form NORMAL appears before the entry specifying locator ALL for the same form name. This order is important because LPTSPL uses the first entry in LPFORM.INI that can be applied to the device on which the request is printed.

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Also, note that ALL is the default locator value. For example,

NORMAL/switches

is equivalent to:

NORMAL:ALL/switches

13.4.3 Using the LPFONT.INI File

The LPFONT.INI file contains a list of font specifications for the LN01 laser printer. For more information about LN01 font specifications, see the LN01 Programmer's Reference Manual and the TOPS-10 Operating System Commands Manual. The following example illustrates the format for each line in the LPFONT.INI file:

```
filenm=namel<TAB>name2<TAB>name3
```

where:

filenm is the name of a file containing a single font specification. The default file extension is .SIX.

```
namel<TAB>name2<TAB>name3
```

specifies font names. Namel must be an actual font name found in the font file. Name2 and subsequent names can be any name chosen by your system manager. To access a font you must specify uppercase or lowercase exactly as shown in the LPFONT.INI file.

----- Example -----

The following is a brief illustration of font specifications contained in a LPFONT.INI file.

```
003665 = 002249L36V010005C    VL36TRIUMVIRATEBDITNM
003674 = 002249P36V010004C    VP36TRIUMVIRATEBDITCP    36PTBOLD
003675 = 002249P36V010005C    VP36TRIUMVIRATEBDITNM
010601 = 002500L06V010001C    VL6TIMES
```

13.4.4 Starting the Line Printer

After you set the parameters for the line printers, you must start the printer(s) so that print requests can be processed. If you do not set parameters for the printer, the parameters are those set by your system manager with GALGEN.

You can start one or more line printers at a time by specifying a unit number (n) or a range of unit numbers (n:m).

To stop the scheduling of jobs on a line printer, use the SHUTDOWN command.

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----- Example -----

Use the START PRINTER command to start line printer 0.

```
OPR>START PRINTER 0 <RET>
```

```
OPR>
10:11:15      Printer 0  -- Startup Scheduled --
```

```
OPR>
```

13.4.5 Stopping the Line Printer Temporarily

To stop one or more line printers, use the STOP PRINTER command. The STOP PRINTER command temporarily stops the line printer from completing its current job. You must use the CONTINUE command (Section 13.4.6) to allow the line printer to continue printing the job.

The STOP command has three optional arguments that you can use to specify when the printer must stop. They are:

- o AFTER CURRENT-REQUEST
- o AFTER EVERY-REQUEST
- o IMMEDIATELY

The IMMEDIATELY argument is the default argument of the STOP command. See the TOPS-10 Operator's Command Language Reference Manual for a complete description of these arguments.

----- Example -----

Stop the current job on line printer 2 to change the printer's ribbon.

```
OPR>STOP PRINTER 2 <RET>
```

```
OPR>
18:24:09      Printer 2  -- Stopped --
```

```
OPR>
```

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13.4.6 Continuing the Line Printer

Use the CONTINUE command to continue the processing of a print request on one or more line printers that were temporarily stopped with the STOP command.

----- Example -----

After stopping the line printer to change the printer's ribbon, continue the processing of the current print job.

```
OPR>CONTINUE PRINTER 2 <RET>
```

```
OPR>  
18:30:41          Printer 2  -- Continued --
```

```
OPR>
```

13.4.7 Shutting Down the Line Printer

To prevent the scheduling of further print requests for one or more line printers, use the SHUTDOWN command. If a print request is currently printing on the line printer, the request is completed before the line printer is shut down.

To start the scheduling of jobs on the line printer, use the START command.

----- Example -----

Shut down line printer 2 while a request is still printing on it.

```
OPR>SHUTDOWN PRINTER 2 <RET>
```

```
OPR>  
19:21:03          Printer 2  -- Shutdown AT EOJ Scheduled --
```

```
OPR>
```

When the request on the line printer has been completed, the following message is displayed:

```
OPR>  
19:22:54          Printer 2  -- Shutdown --
```

```
OPR>
```

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13.4.8 Displaying Line Printer Parameters

To display the current parameters for one or more line printers, use the SHOW PARAMETERS PRINTER command. If you do not specify a single line printer unit number or a range of unit numbers, the SHOW command displays information for all line printers on the system.

The SHOW PARAMETERS PRINTER command displays the following information for each printer:

- o The printer unit number
- o The page limits set for the line printer
- o The type of forms set for the line printer
- o The priority range set for the line printer
- o The limit-exceeded-action set for the line printer
- o The case setting for the line printer (uppercase or lowercase)

----- Example -----

Use the SHOW PARAMETERS PRINTER command to display the parameters of all line printers on the system.

```
OPR>SHOW PARAMETERS PRINTER <RET>
```

```
OPR>
```

```
13:09:42
```

```
-- System Device Parameters --
```

```
Printer Parameters:
```

Unit	Page Limits	Form	Prio	Lim-Ex	Dev-Chars
0	0:20000	NORMAL	1:63	Ask	Lower
1	0:500	NARROW	1:63	Ask	Lower

```
OPR>
```

If jobs are waiting in the print queue because they do not meet the limitations of any line printer, use this command to check the parameters. After you check the parameters, use the SET PRINTER command to modify the parameters so that the printer accepts the user requests.

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13.4.9 Displaying Line Printer Status

To display the status of the line printers use the SHOW STATUS PRINTER command. If you do not specify a line printer unit number or a range of unit numbers, the command displays information for all line printers on the system.

| The SHOW STATUS PRINTER command displays the following information:

- o The printer unit number
- o The current status of the printer
- o The name of the job currently active on the printer
- o The request-id number for the job
- o The name and PPN of the user who made the print request

If the line printer is not active, the word "Idle" appears in the status column with no job name, request-id, or user name. If none of the line printers are active, only the stream number and status appear in the display.

If a printer is active, the display also shows the time that the print request started to print and the number of pages printed thus far. If you do not need this information, specify the /SHORT switch before you press RETURN.

----- Example -----

Use the SHOW STATUS PRINTER command to display the current status of all line printers on the system.

```
OPR>SHOW STATUS PRINTER<RET>
```

```
OPR>
13:51:39          -- System Device Status --
```

Printer Status:

Unit	Status	Jobname	Req#	User
0	Active	R4PPR2	106	MEIDELL [27,1345]
		Started at 13:44:40, printed 142 of 1012 pages		
1	Idle			

```
OPR>
```

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13.5 CONTROLLING FORMS ON THE LINE PRINTER

OPR commands enable you to do the following line printer tasks:

- o Align printer forms
- o Backspace printer forms
- o Forwardspace printer forms
- o Suppress printer forms

You can use the OPR commands that control printer forms while the line printer is printing a job, or after you set the line printer off-line. When you set the line printer off-line, OPR sends the following message to the CTY.

```
hh:mm:ss          Printer n -- Offline --
```

When you put the line printer on line, the line printer resumes printing.

In addition, the SET PRINTER command allows you to change the type of forms on the line printer. If you specify a form type that does not have an entry in the LPFORM.INI file, the forms characteristics default to:

- o /BANNER:2
- o /HEADER:2
- o /LINES:60
- o /VFU:NORMAL
- o /WIDTH:132
- o /TRAILER:2

These defaults can be set by running GALGEN. Refer to Section 13.4.2 for a complete description of the SYS:LPFORM.INI file and the switches you can place in it.

When the first request starts to print, the following message appears, indicating the forms type being loaded into the printer's vertical format unit (VFU):

```
hh:mm:ss          Print n --Loading VFU with 'forms-type'--
```

This is only an informational message that appears because the system reads the LPFORM.INI file when you start a line printer.

The following sections describe how to use each of the commands listed above.

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13.5.1 Aligning Forms

Occasionally, during your daily system operation, you might have to correct the alignment of special forms for a particular line printer job. For example, you have loaded payroll checks on the line printer for your scheduled payroll process and they did not align correctly. The ALIGN command allows you to adjust the forms on the line printer as many times as necessary to print the job correctly.

When you give the ALIGN PRINTER command, the system uses an alignment file that is specified as "formsname.ALP" for the print request, where formsname is the name of the form that was specified in the user's print request. The "formsname.ALP" file contains a pattern applicable to the special forms being mounted. If you do not want the default .ALP file used, you can specify another alignment file in the ALIGN PRINTER command. For example, the file for NORMAL forms at your installation could be:

```
SYS:NORMAL.ALP
```

In addition, the ALIGN PRINTER command has three optional switches that you can specify. These are:

- o /PAUSE to change the number of seconds between each printing of the .ALP file
- o /REPEAT-COUNT to change the number of times the .ALP file is printed.
- o /STOP to resume normal printing and stop aligning forms

When you specify one of these switches, you are changing the default for the current job on the printer. When you specify the /STOP switch, the printer stops printing the contents of the .ALP file and resumes printing the job.

----- Example -----

Use the ALIGN PRINTER command to align forms for a print request for payroll checks. The /PAUSE switch was set for 10 seconds and the /REPEAT-COUNT switch was set for 25 times. Change the /REPEAT-COUNT to 15.

```
OPR>ALIGN PRINTER 0 /REPEAT-COUNT:15 <RET>
```

```
OPR>
12:46:02           Printer 0 -- Alignment --
                  Job PAYROL Req #32 for ACCOUNTING [10,3112]
```

```
OPR>
```

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Use the ALIGN PRINTER command again after you have correctly aligned the form for the checks. Specify the /STOP switch to resume the normal printing of the payroll checks.

```
OPR>ALIGN PRINTER 0 /STOP <RET>
```

```
OPR>
12:52:43          Printer 0  -- Alignment Stopped --
                  Job PAYROL Req #32 for ACCOUNTING [10,3112]
```

```
OPR>
```

13.5.2 Backspacing Forms

Occasionally, you might have to backspace a particular file that is being printed on the line printer, for example, when the forms become jammed in the printing mechanism. The BACKSPACE command allows you to backspace the print file so that the pages of the file that were jammed or incorrectly printed can be reprinted.

With the BACKSPACE PRINTER command, you must specify one of the following switches:

- o /COPIES specifies the number of copies to backspace
- o /FILE specifies that the file should be reprinted from the beginning
- o /PAGES specifies the number of pages to be backspaced

When you use the BACKSPACE PRINTER command, LPTSPL first clears the printer buffer by printing its contents, and then executes your command. The number of pages that are printed to clear the buffer are included in the number of pages you specify in the BACKSPACE PRINTER command. Therefore, when you specify the /PAGES switch, you should add two or three pages to the total number given as the /PAGES value. With the /COPIES switch and the /FILE switch, you do not have to consider these additional pages.

----- Example -----

Printer 1 has just had a VFU error, which has put the printer off line. The following messages appear at your console:

```
OPR>
09:38:18          Printer 1  -- Offline --
```

```
OPR>
09:39:39 <12>     Printer 1  -- VFU error --
                  Re-align forms and put on-line
                  Type 'Respond <number> PROCEED when ready
```

```
OPR>
```

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You must now realign the forms on the printer. Before you put the printer on line, give the BACKSPACE PRINTER command to repeat the number of pages that were jammed and add a couple of pages for the printer buffer. (The following example describes backspacing printer 1 by 25 pages.) Then RESPOND to message 12:

```
OPR>BACKSPACE PRINTER 1 /PAGES:25 <RET>
```

```
OPR>  
09:45:06          Printer 1  -- Backspaced 25 Pages  --
```

```
OPR>RESPOND 12 PROCEED <RET>
```

```
OPR>
```

At this point, the line printer prints the remaining contents of the printer buffer and then backspaces 25 pages to reprint what was jammed or incorrectly printed.

13.5.3 Forwardspacing Forms

Occasionally, you might have to forwardspace a particular file that is being printed on the line printer, such as when a user requests only a portion of some file to be printed. The FORWARDSPACE command allows you to forwardspace the file so that you can save paper and print only what is needed. With the FORWARDSPACE PRINTER command, you must specify one of the following switches:

- o /COPIES specifies the number of copies to be skipped
- o /FILE skips one file in the request
- o /PAGES specifies the number of pages in the print request to skip

When you use the FORWARDSPACE PRINTER command, LPTSPL first clears the printer buffer by printing its contents and then executes your command. The number of pages that are printed to clear the buffer is included with the number of pages you specify in the FORWARDSPACE PRINTER command. Therefore, when you specify the /PAGES switch, you should add two or three pages to the value of /PAGES. With the /COPIES switch and the /FILE switch, you do not have to consider these additional pages.

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----- Example -----

A user issued the command PRINT A.TXT,B.TXT,C.TXT,D.TXT and has requested you to forward space line printer 2, so that the file A.TXT is skipped, and file B.TXT is the first file printed. After the printer has printed the header and banner pages, give the FORWARDSPACE PRINTER command for one file.

OPR>

OPR>FORWARDSPACE PRINTER 2 /FILE <RET>

OPR>

9:45:26 Printer 2 -- Forwardspaced 1 File --

OPR>

At this point, the line printer prints the remaining contents of the printer buffer and then skips one file of the print job.

13.5.4 Suppressing Carriage Control

Occasionally, you might have to suppress the carriage control on the line printer for a particular job, such as when a user's program causes a print loop that makes the forms in the line printer pass through with one line written on each form. The SUPPRESS command allows you to suppress the carriage control.

The SUPPRESS PRINTER command suppresses all blank lines and form feeds. For example, if you have a 25-page file with one line of text per page, the SUPPRESS PRINTER command causes all the lines of text to be printed on one page.

With the SUPPRESS PRINTER command, you can specify one of the following switches:

- o /FILE suppresses blank lines and form feeds for the current file being printed
- o /JOB suppresses blank lines and form feeds for the entire job
- o /STOP stops the suppression of printing and resumes normal printing with blank lines and form feeds.

The /JOB switch is the default if you do not specify any of the above switches.

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----- Example -----

A user's program has caused a print loop. Use the SUPPRESS PRINTER command to stop the form feeds, thus saving paper.

```
OPR>SUPPRESS PRINTER 1 <RET>
```

```
OPR>
10:43:47      Printer 1  -- Carriage control suppressed --
              Job TEST01 Req #55 for PTAYLOR [10,2772]
```

```
OPR>
```

13.6 CONTROLLING LINE PRINTER JOBS

The following sections explain the OPR commands that allow you to do the following line printer tasks:

- o Display the printer queue
- o Prevent print requests from processing
- o Reschedule print requests that were previously held
- o Cancel printer jobs
- o Requeue a printer job to be processed at a later time
- o Change the priority of a print request
- o Delete a print request from the queue
- o Force the printer to process a particular request immediately

13.6.1 Examining the Printer Queue

When a user issues a request for the printer, the request is placed in a queue where it waits to be printed. To examine the queues for print jobs, use the OPR command SHOW QUEUES PRINTER-JOBS.

The SHOW QUEUES PRINTER-JOBS command displays the following information for each job:

- o The name of the print job
- o The request-id number of the print job
- o The page limit of the print job
- o The name and PPN of the user who requested the print job

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These four columns of the display appear whether the print job is active (currently printing) or is inactive (not printing). A job may be inactive because it is waiting for other jobs with lower limits or a higher priority. If no other printer requests are running, the job may be waiting because no printer has the required parameters or forms.

In addition to the above, if the job is active, the display also shows the unit number of the printer on which the job is printing, the time that the print job started, and the total number of pages printed.

The SHOW QUEUES PRINTER-JOBS command has two optional switches: /ALL and /SHORT. The /ALL switch displays a detailed list of all printer jobs in the queue, with their appropriate column headers and any additional switches that the user specified with the PRINT command. If there were no switches specified, the /ALL switch displays the default switches of the PRINT command for the printer job. In addition, the /ALL switch displays any additional characteristics of the request, for example, if the job is being held. The /SHORT switch requests a display of the job name, the request number, the scheduled runtime, and the user name. There are no column headers and there are no switches displayed on the /SHORT output listing.

The asterisk (*) before the job name column (see examples) indicates that the job is currently printing.

----- Example -----

1. Use the /ALL switch to display the printer jobs in the queue with all their switches.

```
OPR>SHOW QUEUES PRINTER-JOBS /ALL <RET>
```

```
OPR>
10:49:07          -- System Queues Listing --
```

```
Printer Queue:
Job Name  Req#  Limit      User
-----  -
* DAILY   11    24  OPERATOR [1,2]      On Unit:0
/Seq:3320
  Started at 10:47, printed 5 of 24 pages
* TRAP79  12   161  BELANGER [12,5521]  On Unit:1
/Seq:3321
  Started at 10:44, printed 15 of 161 pages
MF20     13    23  SROBINSON [10,5432] /Seq:3322
WEEKLY   14    17  OPERATOR [1,2]     /Seq:3323
SYSERR   15    10  OPERATOR [1,2]     /Seq:3324
There are 5 jobs in the queue (2 in progress)
```

```
OPR>
```

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2. Use the SHOW QUEUES PRINTER-JOBS command with the /SHORT switch.

```
OPR>SHOW QUEUES PRINTER-JOBS /SHORT <RET>
```

```
OPR>
10:49:07          -- System Queues Listing --
```

```
Printer Queue:
* DAILY          11      24  OPERATOR [1,2]
- TRAP79         12     161  BELANGER [12,5521]
  MF20           13      23  SROBINSON [10,5432]
  WEEKLY         14      17  OPERATOR [1,2]
  SYSERR         15      10  OPERATOR [1,2]
```

```
OPR>
```

13.6.2 Holding Line Printer Jobs

To prevent print requests from processing, use the HOLD PRINTER-JOBS command. When you use this command, the print request in the queue is held. Any other requests for the line printer are not held and are processed as soon as a line printer becomes available. You must specify one of the following with this command:

- o The request-id number, which holds a single printer job
- o The PPN for a particular user, which holds all printer jobs queued by that user.
- o An asterisk (*), which holds all printer jobs in the queue

NOTE

You cannot HOLD a printer job that is currently being printed on a line printer.

----- Example -----

Use the HOLD PRINTER-JOBS command to hold all printer requests for user SMITH, whose PPN is [27,5112].

```
OPR>HOLD PRINTER-JOBS [27,5112] <RET>
```

```
OPR>
9:01:54          -- 6 Jobs Held --
```

```
OPR>
```

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13.6.3 Releasing Line Printer Jobs

Use the RELEASE command to allow the printing of a job that has been previously held with the HOLD command. To specify the job you want to release, supply one of the following:

- o A single request-id number to release one job
- o A user name to release all jobs for that user
- o An asterisk (*) to release all jobs

----- Example -----

Use the RELEASE command to reschedule all printer jobs that were previously held.

```
OPR>RELEASE PRINTER-JOBS * <RET>
```

```
OPR>  
10:38:09          -- 6 Jobs Released --
```

```
OPR>
```

13.6.4 Canceling Line Printer Jobs

Occasionally, you might have to cancel a printer job while it is printing. You can use the ABORT command with the printer unit number and one or more of the following switches:

- o /PURGE
- o /REASON

The /PURGE switch flushes the entire request from the system when it is canceled. There are no header, banner, or trailer pages printed when the print request is purged.

The /REASON switch allows you to enter one or more lines of text to explain why the printer job was canceled.

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----- Example -----

Use the ABORT command to cancel a printer job because a user has requested that you do so.

```
OPR>ABORT PRINTER 1 - <RET>
```

```
/REASON:USER REQUEST <RET>
```

```
OPR>
11:32:08          Printer 1 -- Aborted --
                   Job TEST01 Req #35 for JONES [2,187]
                   USER REQUEST
```

```
OPR>
11:32:12          Printer 1 -- End --
                   Job TEST01 Req #35 for JONES [2,187]
```

```
OPR>
```

13.6.5 Requeuing Line Printer Jobs

Occasionally, you might want to cancel a printer job and then reschedule it to be printed at a later time. You can use the REQUEUE command to hold the printer job in its entirety and ABORT its current printing. This command can be used only when the job is active.

For example, you might want to REQUEUE a printer job that requires many boxes of forms so that it prints at a later time when fewer users are requesting printer jobs. Thus, you REQUEUE the job for printing when the time becomes available.

You can specify the /REASON switch to explain why the job is being requeued.

----- Example -----

Use the REQUEUE command to hold a printer job that requires four hours to print.

```
OPR>REQUEUE PRINTER 2 /REASON:<RET>
```

```
Enter text and terminate with ^Z
JOB REQUIRES FOUR HOURS TO PRINT. <RET>
JOB WILL BE RELEASED FOR PRINT ON 2ND SHIFT. ^Z
```

```
OPR>
13:21:03          Printer 2 -- Requeued --
                   Job ARFORM Req #37 for AR.OFFICE [10,2312]
```

```
OPR>
13:21:25          Printer 2 -- End --
                   Job ARFORM Req #37 for AR.OFFICE [10,2312]
```

```
OPR>
```

13.6.6 Modifying Line Printer Requests

To change the priority of a printer request in the queue, use the `MODIFY PRINTER-REQUEST` command. To specify the request you want to modify, supply one of the following:

- o A single request-id number to modify one request
- o A user name to modify all requests for that user
- o An asterisk (*) to modify all requests

You must specify a new `PRIORITY` number from 1 to 63. The higher the number, the greater the priority.

----- Example -----

Use the `MODIFY` command to change the priority of batch request 135 to 63. This causes the request to be the next job processed.

```
OPR>MODIFY PRINTER-REQUEST 135 PRIORITY 63 <RET>
```

```
OPR>  
08:51:21      -- 1 Request Modified --
```

```
OPR>
```

13.6.7 Deleting Line Printer Requests

To delete a printer request from the printer queue, use the `CANCEL PRINTER-REQUEST` command. To specify the request you want to `CANCEL`, supply one of the following:

- o A single request-id number to cancel one request
- o A user name to cancel all requests for that user
- o An asterisk (*) to cancel all requests

When you delete a print request that is currently printing on the printer, the printer stops printing the data, prints the trailer pages, and starts printing the next job in the queue.

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----- Example -----

Use the CANCEL command to delete print request 168 from the queue.

```
OPR>CANCEL PRINTER-REQUEST 168 <RET>
```

```
OPR>
10:25:11      -- 1 Job Canceled --
```

```
OPR>
10:26:01      Printer 0  -- Canceled by Operator [1,2] --
                Job NEW Req 168 for M.MAROTTA [27,5434]
```

```
OPR>
10:26:10      Printer 0  -- End --
                Job NEW Req 168 for M.MAROTTA [27,5434]
```

13.6.8 Specifying the next Line Printer Job

You can force the printer to service a particular request immediately by using the NEXT command. This command starts the specified print request immediately after the current request is finished. The NEXT command does not alter the sequence of other requests in the queue.

You may, for example, have several jobs in the queue which have requested narrow forms. By giving the NEXT command, you can service them before restoring normal forms to your printer.

----- Example -----

A user (SEN) requests that her print job be moved to the top of the print queue to be printed when a printer is available. You must examine the print queue to obtain the request-identification number for her print request. Then you use the NEXT command to place her request next in the queue.

```
OPR>SHOW QUEUES PRINTER<RET>
```

```
OPR>
11:35:43      -- System Queues Listing --
```

```
Printer Queue:
Job Name      Req      Limit      User
-----
* BREAK          14       200    KOVALCIN, D [10,4635] On Unit:0
  Started at 11:30:44, printed 20 of 200 pages
MAIL           145        35    MAROTTA, M [27,5555]
SNOOPY          10         65    SEN, M [443,2520]
  /After:29-MAY-82 12:00
  There are 3 jobs in the queue (1 in progress)
```

```
OPR>NEXT PRINTER 0 REQUEST-ID 10<RET>
```

```
OPR>
11:36:17 Printer 0  -- NEXT request #10 scheduled --
```

```
OPR>
```

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13.7 SENDING PRINTER OUTPUT TO MAGNETIC TAPE

You can send output to another device (such as magnetic tape) instead of a line printer with the OPR command, START PRINTER nn /DEVICE:MTAn:.

The advantages for doing this are:

- o When your line printers are down due to a hardware problem, you can spool the output to tape and then copy this output on a system where the printer(s) is not down.
- o When you want to microfiche the output, you can send the output to tape instead of printing it on the line printer.
- o When you want to transfer the output from one site to another, or to another system, you can put it on tape. Transferring a tape is easier than mailing or carrying the printed output.

To perform this task, do the following:

1. Type to OPR:

```
SET TAPE-DRIVE MTxn: UNAVAILABLE <RET>
```

where x is the tape controller identification and n is the tape drive number. (Refer to Chapter 15 for additional information on the SET TAPE-DRIVE command.)

2. Physically mount and bring on line a tape on the tape drive that has been made UNAVAILABLE. Make sure that the write-ring has been inserted in the tape, so that the tape is write-enabled.

3. Type to OPR:

```
HOLD PRINTER-JOBS * <RET>
```

to hold all printer job requests in the printer(s) queue. (Refer to Section 13.6.2.)

4. Type to OPR:

```
START PRINTER nn /DEVICE:MTxn: <RET>
```

where nn is a line printer unit number other than the printers already in use, and MTxn is the tape drive number.

5. If you are to print a type of form other than that used when a printer is started (the default) at your installation, type to OPR:.

```
SET PRINTER nn FORMS-TYPE forms-name <RET>
```

where forms-name is the desired type of form to be spooled to the tape.

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6. Type to OPR:

RELEASE PRINTER-JOBS * <RET>

to release those printer requests that were held.

7. When the printer requests have completed being output to the tape, type to OPR:

SHUTDOWN PRINTER nn <RET>

to rewind and unload the tape automatically.

8. Type to OPR:

SET TAPE-DRIVE MTxn: AVAILABLE <RET>

to make the tape drive available for user tape mount requests.

----- Example -----

Start printer 2 on MTA0: to output all printer requests in the printer queue for NARROW forms, because there are no NARROW forms at your site.

OPR>SET TAPE-DRIVE MTA0: UNAVAILABLE<RET>

Enter text and terminate with ^Z

ALL NARROW FORMS WILL BE PRINTED AT ANOTHER SITE. <RET>

THERE ARE NO NARROW FORMS IN STOCK.^Z

OPR>

7:52:19 Device MTA260 -- Set Unavailable --

OPR>HOLD PRINTER-JOBS * <RET>

OPR>

7:53:45 -- 10 Jobs Held --

OPR>START PRINTER 2 /DEVICE:MTA260 <RET>

7:55:34 Printer 2 -- Startup Scheduled --

OPR>SET PRINTER 2 FORMS-TYPE NARROW <RET>

OPR>

7:56:15 Printer 2 -- Set Accepted --

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OPR>RELEASE PRINTER-JOBS * <RET>

7:57:23 -- 10 Jobs Released --

OPR>

7:57:37 Printer 2 -- Started --

OPR>

7:57:38 Printer 2 -- Begin --
Job DAILY Req #11 for PAYROLL[2,147]

OPR>

7:58:29 Printer 2 -- End --
Job DAILY Req #11 for PAYROLL [2,147]

OPR>

7:59:01 Printer 2 -- Begin --
Job WEEKLY Req #12 for PAYROLL [2,147]

OPR>

.
.
.

OPR>

8:09:10 Printer 2 -- End --
Job YEARLY Req #20 for PAYROLL [2,147]

OPR>SHUTDOWN PRINTER 2 <RET>

OPR>

8:10:12 Printer 2 -- Shutdown --

OPR>SET TAPE-DRIVE MTA260: AVAILABLE<RET>

OPR>

8:12:30 Device MTA260 -- Set Available --

OPR>

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13.8 CONTROLLING THE CARD READER

To handle a user's request to have card decks read into the system for batch processing, you must start one (or possibly more) card reader(s) at your site. The card reader may be automatically started at system startup when the SYSTEM.CMD file is executed.

Your system manager should establish the following when you have batch users submitting their jobs as card input:

- o Where the users place the card decks for submission
- o When you load the card decks into the card reader for reading
- o When and where you place the card decks and output from the batch jobs to return to the users

The following sections explain how to use the OPR commands that enable you to do these card reader tasks:

- o Load and read cards through the card reader
- o Stop the card reader from processing the current request
- o Continue to process a request that was stopped
- o Prohibit the scheduling of card reader requests
- o Display the status of the card reader
- o Cancel a card reader job

13.8.1 Starting the Card Reader

To load and read cards through the card reader, use the START READER command. Starting the card reader allows card jobs to be scheduled for processing in the batch system. You can specify one or more unit numbers with the START command. The SYSTEM.CMD file usually includes this command.

To stop the scheduling of card batch jobs on a card reader, use the SHUTDOWN command.

----- Example -----

Use the START READER command to start up card reader 0.

```
OPR>START READER 0 <RET>
```

```
OPR>  
10:11:15      Reader 0  -- Startup Scheduled --
```

```
OPR>
```

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13.8.2 Stopping the Card Reader

To stop one or more card readers, use the STOP command. This temporarily STOPS the card reader from processing its current job. You must use the CONTINUE command to allow the card reader to continue reading the input job.

The default of the STOP command is IMMEDIATELY.

----- Example -----

Stop the current job on card reader 0 temporarily to fix a card in the deck that was folded.

```
OPR>STOP READER 0 <RET>
```

```
OPR>  
18:24:09          Reader 0  -- Stopped --
```

```
OPR>
```

13.8.3 Continuing the Card Reader

To continue one or more card readers that were temporarily stopped with the STOP command use the CONTINUE command.

----- Example -----

After stopping the card reader to fix a folded card, continue the current card reader job.

```
OPR>CONTINUE READER 0 <RET>
```

```
OPR>  
18:30:41          Reader 0  -- Continued --
```

```
OPR>
```

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13.8.4 Shutting Down the Card Reader

To stop the scheduling of card reader requests, use the SHUTDOWN command. If a card reader job is currently being read from the card reader, the request is completed before the card reader is shut down. No further requests will be accepted.

----- Example -----

Shut down card reader 0 while a card deck is still being read into the system.

```
OPR>SHUTDOWN READER 0 <RET>
```

```
OPR>
19:21:01      Reader 0  -- Shutdown Scheduled --
```

```
OPR>
```

When the card deck has finished being read into the system, the following message appears:

```
OPR>
19:22:44      Reader 0  -- Shutdown --
```

```
OPR>
```

13.8.5 Displaying Card Reader Status

To display the status of one or more card readers, use the SHOW STATUS READER command. If you do not specify a number or a range of unit numbers, the default is all card readers on the system.

The output from the SHOW STATUS READER command displays:

- o The card reader unit number
- o The current status of the card reader (either Idle or Active)

If the card reader is active, there is currently a deck of cards being read into the system. The system does not recognize a job name, request-id, or user name until the last card of the deck has been read and the card reader is idle. At this time, the card deck becomes a batch request and can be displayed with the SHOW QUEUES BATCH-JOBS command.

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----- Example -----

Use the SHOW STATUS READER command to display the current status of the card reader at your installation.

```
OPR>SHOW STATUS READER <RET>
```

```
OPR>
13:51:39          -- System Device Status --
```

```
Reader Status:
  Unit      Status
-----
   0      Active
```

```
OPR>
```

13.8.6 Canceling a Card Reader Job

Occasionally, you may have to cancel a card job being read, for example, when a card jam occurs in the card reader. To cancel a card job, use the ABORT READER command, and specify the reader unit number that is processing the job.

----- Example -----

Use the ABORT command to cancel a card reader job because of a card jam.

```
OPR>ABORT READER 0 <RET>
```

```
OPR>
12:32:09          Reader 0 -- Aborted --
```

```
OPR>
```

13.9 CONTROLLING CARD PUNCH, PAPERTAPE PUNCH, AND PLOTTERS

The commands and descriptions in this section are applicable only if you have the hardware available at your installation.

Other output devices available to users are:

- o CARD-PUNCH
- o PAPER-TAPE-PUNCH
- o PLOTTER

If your installation has one or more of these output devices, you must set the parameters so that user requests can be processed. If your installation has these devices, they may be automatically started at system startup when the SYSTEM.COMD file is executed.

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When the output from the card punch, paper tape punch, or plotter has been completed, you must remove the output and distribute it. Your system manager should set up the distribution method, which includes:

- o When to distribute the output
- o Where to put the output so that users can pick it up

The following sections explain the OPR commands that control the card punch, paper tape punch, and plotter. These commands enable you to do the following:

- o Set the parameters for an output device
- o Start output devices
- o Stop output devices temporarily
- o Continue processing on an output device
- o Stop the scheduling of output requests on an output device
- o Display output device parameters
- o Display the status of an output device

13.9.1 Setting Output Device Parameters

Normally, the SYSTEM.CMD file starts a defined number of output devices at system startup. The SYSTEM.CMD file may also set parameters for the output devices. However, you might have to start an output device when a user requests output from the device. You may also need to change the default parameters for the output device. The following are the output device parameters that you can set:

- o FORMS-TYPE name

Where "name" is the name of the forms type. The default is NORMAL and is defined in the SPFORM.INI file for each device type. Refer to the following section for the description and use of the SPFORM.INI file.

- o LIMIT-EXCEEDED-ACTION action

The "action" of the LIMIT-EXCEEDED-ACTION parameter refers to what action, if any, should be taken if the device that is currently processing the job request exceeds the OUTPUT-LIMIT. You can set this parameter to:

- ASK the operator to RESPOND with either PROCEED to finish processing the output job or ABORT to cancel the output job
- Always ABORT the output job when the limit has been exceeded
- Always PROCEED, ignoring the output limit of the device

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o OUTPUT-LIMIT number

The "number" of the OUTPUT-LIMIT parameter refers to the:

- Number of cards for the CARD-PUNCH
- Number of feet for the PAPER-TAPE-PUNCH
- Number of minutes for the PLOTTER

These parameters (all set by GALGEN) default to the following if they are not included in the SYSTEM.CMD file at system startup:

- 500 cards for the CARD-PUNCH
- 500 feet for the PAPER-TAPE-PUNCH
- 30 minutes for the PLOTTER

o PRIORITY-LIMITS range

The "range" of the PRIORITY-LIMITS parameter refers to a range of request priority numbers the output device accepts. The priority range is 1:63. For example, if an output request is queued with a priority of 19 and there are no devices for the request that have been set to accept a priority of 19, the request will not be output until you change the priority range for the device, or the priority of the request. You can change the priority number of the request with the MODIFY command (refer to Section 13.12.6).

When you set an output device to change the FORMS-TYPE, LIMIT-EXCEEDED-ACTION, OUTPUT-LIMIT, or PRIORITY-LIMITS, the change remains in effect until you change it with the same command, or until the GALAXY system is reloaded.

----- Examples -----

1. Set the priority limits for the paper tape punch to be a range of 20:63. This prevents processing of paper tape punch requests with priority limits under 20 feet.

```
OPR>SET PAPER-TAPE-PUNCH 0 PRIORITY-LIMITS -<RET>
```

```
20:63 <RET>
```

```
OPR>
```

```
11:34:09          Papertape 0  -- Set Accepted --
```

```
OPR>
```

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2. Set the limit exceeded action for the card punch to ignore the output limit. This allows any card punch request, regardless of its limit, to be completed on CDP0.

```
OPR>SET CARD-PUNCH 0 LIMIT-EXCEEDED-ACTION --<RET>
```

```
PROCEED <RET>
```

```
OPR>  
12:23:18          Card-punch 0  -- Set Accepted --
```

```
OPR>
```

13.9.2 Using the SPFORM.INI File

The SPFORM.INI file allows you to automatically set forms parameters for the card punch, paper tape punch, and plotter on the basis of device type and form names. To accomplish this, you or your system manager must set up a file on SYS: called SPFORM.INI which contains a list of form names and switch settings for those forms.

Each line in the SPFORM.INI file is written in the following format:

```
devtyp formname:locator/switch1/switch2/switch3...
```

where:

devtyp	the device type for which this line applies. The device types are as follows:
	CDP for the card punch
	PTP for the paper tape punch
	PLT for the plotter
formname	a 1- to 6-character form name. You or your system manager should specify unique form names that are descriptive of the types of forms used at your installation.
:locator	an optional locator field containing one of the following:
	ALL all devices (the default)
	REMOTE all devices at remote stations
/switch1...	one or more switches available to you to describe how the forms are to be used. Refer to Tables 13-3 and 13-4 for a description of switches. Table 13-3 describes the switches that can be used for all the output device types. Table 13-4 describes the switches that can be used only for the plotter (PLT).

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Table 13-3: SPFORM.INI Switches For All Device Types

Switch	Meaning
/BANNER	specifies whether banner units will be output at the beginning of the request.
/HEADER	specifies whether header units will be output at the beginning of each file.
/NOTE:xxx	The xxx represents text (up to 50 characters) that is printed on the OPR terminal when the forms are scheduled. There is no default.
/TRAILER	specifies whether trailer units will be output at the end of each file.

Table 13-4: SPFORM.INI Switches For Plotter Devices Only

Switch	Meaning
/MAXIMUM:xx:yy	specifies the maximum form size in the horizontal (xx) and vertical (yy) axis. The values of xx and yy are measured in units; the unit size is defined by the /SPU switch. The plotter, when mounted with the specified type of form, will accept plots no larger than the values of xx and yy indicate.
/MINIMUM:xx:yy	specifies the minimum form size in the horizontal (xx) and vertical (yy) axis. The values of xx and yy are measured in units; the unit size is defined by the /SPU switch. The plotter, when mounted with the specified type of form, will accept plots no smaller than the values of xx and yy indicate.
/SPU:nnn	specifies the Steps Per Unit. A step is a measurement length as defined in the hardware manual for the device at your installation. The value of nnn should be $\text{step-size} * \text{nnn} = \text{one unit}$. For example, to define an inch as the unit if the plotter step is .01 inches, use /SPU:100.
	NOTE
	Refer to the hardware owner's manual for the plotter device at your installation before entering a line in the SPFORM.INI file for the plotter because there are many different types of plotters.

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The form name in SPFORM.INI need not be the actual name of a physical form; however, it is usually close to the type of form (such as normal forms, narrow forms, and so forth). When an output request is made, SPROUT compares the form name associated with the request with the form name of the form currently mounted on the output device. If the first four characters of the name are not the same, then the system requests you to change the forms on the output device. If the first four characters are the same, the system checks the switches associated with the requested form name and uses those values when processing the output job. (The number of characters that the system uses to compare the form name can be changed by running GALGEN; the default is four characters.)

For example, note the following SPFORM.INI file:

```
CDP NORMAL/HEADER/BANNER/TRAILER
CDP NORMØ1/HEADER/BANNER/TRAILER
CDP NORMØ2/HEADER/BANNER/TRAILER/NOTE:SPECIAL
```

Suppose that NORMØ1 forms are currently mounted on the card punch and a user makes a card punch request that requires NORMØ2 forms. SPROUT compares the first four characters of the requested form name (NORMØ2) with the first four characters of the form name for the form that is currently mounted in the card punch (NORMØ1). Because they are the same, SPROUT takes the switch values associated with NORMØ1 and applies them to the user's punch request. Therefore, the SPFORM.INI file should have a unique name for each type of form.

Each line in SPFORM.INI can also contain a locator field that specifies the location of the output device. The locator ALL (the default) refers to all of the devices as specified by the device type. The REMOTE locator applies only if your installation has TOPS-1Ø ANF-1Ø network software.

| Occasionally, SPROUT may encounter errors while processing the
| SPFORM.INI file. For example, it may not be able to find a form type,
| or to make a match based on form type and device. If this happens,
| SPROUT displays an error message and gives you the option to proceed
| with the job, or to requeue it.

13.9.3 Starting Output Devices

Normally, the SYSTEM.CMD file starts a defined number of output devices at system startup. However, you might have to start an output device when a user requests output from the device. If you do not set any parameters for the device, the device uses the default parameters set by your system manager with GALGEN.

To start an output device, use the START command. You can start one output device at a time or a range of devices.

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----- Example -----

Issue the START CARD-PUNCH command to start up card punch 0.

```
OPR>START CARD-PUNCH 0 <RET>
```

```
OPR>
10:23:21      Card-punch 0  -- Startup Scheduled --
```

```
OPR>
10:23:25      Card-punch 0  -- Started --
```

```
OPR>
```

13.9.4 Stopping Output Devices

To stop one or more output devices, use the STOP command. This temporarily stops an output device from processing its current job. You must use the CONTINUE command to resume the output to the device.

The STQP command has three optional arguments. They are:

- o AFTER CURRENT-REQUEST
- o AFTER EVERY-REQUEST
- o IMMEDIATELY

The IMMEDIATELY argument is the default argument of the STOP command. See the TOPS-10 Operator's Command Language Reference Manual for a complete description of these arguments.

----- Example -----

Stop the current job on card punch 0 temporarily to load more card forms and empty its hopper.

```
OPR>STOP CARD-PUNCH 0 <RET>
```

```
OPR>
18:24:09      Card-punch 0  -- STOP command queued --
```

```
OPR>
```

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13.9.5 Continuing Output Devices

Use the CONTINUE command to continue processing a request that was temporarily stopped with the STOP command.

----- Example -----

After stopping the card punch to load more cards and empty the hopper, continue the output of the current punch job.

```
OPR>CONTINUE CARD-PUNCH 0 <RET>
```

```
OPR>  
18:35:41      Card-punch 0  -- Continued --
```

```
OPR>
```

13.9.6 Shutting Down Output Devices

To shut down the scheduling of output requests on an output device or a range of output devices, use the SHUTDOWN command. If an output request is currently being processed on the device, the request will be completed before the output device is shutdown.

To stop the scheduling of jobs on the output device, use the SHUTDOWN command.

----- Example -----

Shut down paper tape punch 0 while a request is still being output on it.

```
OPR>SHUTDOWN PAPER-TAPE-PUNCH 0 <RET>
```

```
OPR>  
19:21:03      Papertape 0  -- Shutdown Scheduled --
```

```
OPR>
```

When the request on the paper tape punch has completed being output, the following message appears:

```
OPR>  
19:23:55      Papertape 0  -- Shutdown --
```

```
OPR>
```

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13.9.7 Displaying Output Device Parameters

You can display the current output device parameters with the SHOW PARAMETERS command, where device can be:

- o CARD-PUNCH unit-number
- o PAPER-TAPE-PUNCH unit-number
- o PLOTTER unit-number

If you do not specify a unit number with the device name, the SHOW command defaults to all units of the device that you specified.

The output from the SHOW PARAMETERS device command displays the following for each of the three devices listed above:

- o The unit number for the output device
- o The output limits for the output device
- o The type of forms for the output device
- o The priority range for the output device
- o The limit-exceeded-action for the output device
- o The character device type for the output device

----- Example -----

Use the SHOW PARAMETERS PAPER-TAPE-PUNCH command to display the parameters of paper-tape punch 0 on the system.

```
OPR>SHOW PARAMETERS PAPER-TAPE-PUNCH <RET>
```

```
OPR>
13:09:42          -- System Device Parameters --
```

Papertape Parameters:

Unit	Min:Max	Unit	Form	Prio	Lim-Ex	Dev-Chars
0	1:500		NORMAL	1:63	Ask	

```
OPR>
```

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13.9.8 Displaying Output Device Status

You can display the status of an output device or a range of output devices with the SHOW STATUS device command. If you do not specify a unit number or a range of unit numbers, the command displays information for all the specified types of devices on the system.

The output from the SHOW STATUS device command displays the following for each device:

- o The unit number of the output device
- o The current status of the output device
- o The job name currently active on the output device
- o The request-id number of the job
- o The name and PPN of the user who made the output request

If the output device is not active, the word "Idle" appears in the Status column with no job name, request-id, or user name. If none of the devices are active, only the unit number and status appears in the display.

If an output device is active, the output also shows the time that the output request started and the number of units output so far. If you do not need this information with the display of the SHOW STATUS device command, specify the /SHORT switch.

----- Example -----

Use the SHOW STATUS CARD-PUNCH command to display the current status of card punch 0 on the system.

```
OPR>SHOW STATUS CARD-PUNCH 0 <RET>
```

```
OPR>
13:51:39          -- System Device Status --
Card-Punch Status:
  Unit      Status      Jobname  Req#      User
-----
  0 Active          PUNCH9   137    HEISER [2,175]
  Started at 13:35:23, punched 687 of 2000 cards
```

```
OPR>
```

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13.10 CONTROLLING JOBS ON OUTPUT DEVICES

You can control any spooled output request, including those generated by batch job processing. OPR commands enable you to do the following to control jobs on the card punch, paper tape punch, or plotter:

- o Examine the queues
- o Prevent output requests from processing
- o Release previously held requests
- o Cancel a job currently processing
- o Cancel a job currently processing, and requeue to process at another time
- o Change the priority of an output request
- o Delete output requests

13.10.1 Examining the Queues

When a user issues a request to an output device, the request is placed in a queue where it waits for selection by the system for processing. To examine the queues for output jobs, use the OPR command SHOW QUEUES.

The SHOW QUEUES command displays the following information:

- o The name of the output job
- o The request-id number of the output job
- o The output limit of the job
- o The name of the user who requested the output

These four columns of the display appear whether the job is active (currently being processed) or inactive (not being processed).

In addition to the above, if the output is active on the device, the display shows the device unit number on which the job is being processed, the time that the output job started, and the total number of cards or units processed so far.

The SHOW QUEUES has optional switches, /ALL and /SHORT. The /ALL switch causes a display of all output jobs in the queue with their appropriate column headers and any additional switches that were specified when the user requested the output. If the user did not specify switches, the /ALL switch displays the default values of those switches. In addition, the /ALL switch displays any special characteristics of the output job, such as HOLD. The /SHORT switch displays only the job name, the request number, the scheduled run time, and the user name. The /SHORT switch does not display column headers or switches.

NOTE

The asterisk (*) before the job name column (see examples) indicates that the job is currently being processed.

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----- Examples -----

1. Use the SHOW QUEUES PLOTTER-JOBS command with the /ALL switch to display the plotter jobs in the queue with all their switches.

OPR>SHOW QUEUES PLOTTER-JOBS /ALL <RET>

OPR>
10:49:07 -- System Queues Listing --

```
Plotter Queue:
Job Name  Req#  Limit  User
-----
* GRAPH   17   100  OPERATOR [1,2]   On Unit:0 /Seq:3320
  Started at 10:47, plotted 25 of 100 units
  MF20    19   200  P.TAYLOR [10,2715] /Unit:0
/Seq:3341
  MF21    27   590  P.TAYLOR [10,2715] /Unit:0
/Seq:3349
  MF22    31   300  P.TAYLOR [10,2715] /Unit:0
/Seq:3355
```

There are 4 jobs in the queue (1 in progress)

OPR>

2. Use the SHOW QUEUES PLOTTER-JOBS command with the /SHORT switch.

OPR>SHOW QUEUES PLOTTER-JOBS /SHORT <RET>

OPR>
10:49:07 -- System Queues Listing --

```
Plotter Queue:
* GRAPH   17   100  OPERATOR [1,2]
  MF20    19   200  P.TAYLOR [10,2715]
  MF21    27   590  P.TAYLOR [10,2715]
  MF22    31   300  P.TAYLOR [10,2715]
```

OPR>

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13.10.2 Holding Jobs

To prevent output requests from being processed, use the HOLD command. The HOLD command prevents current jobs in the queue from processing. Any output requests queued after the HOLD command has been issued are not held and are processed when the device becomes available. You must specify one of the following with this command:

- o The request-id number, to hold a single output job
- o The PPN for a particular user, to hold all output requests queued by that user
- o An asterisk (*), to hold all output requests queued by all users

Use the RELEASE command to allow a held job to start again.

NOTE

You cannot HOLD an output job that is currently active.

----- Example -----

Use the HOLD CARD-PUNCH-JOBS command to hold all card punch requests for user BROWN, whose PPN is [27,5107].

```
OPR>HOLD CARD-PUNCH-JOBS [27,5107] <RET>
```

```
OPR>  
09:01:54          -- 3 Jobs Held --
```

```
OPR>
```

13.10.3 Releasing Jobs

Use the RELEASE command to release an output job that has been previously held with the HOLD command. To specify the request you want to release, supply one of the following:

- o A single request-id number to release one request
- o A user name to release all requests for that user
- o An asterisk (*) to release all requests for the same device type

The RELEASE command reschedules the requests to be processed.

NOTE

You must have one or more output devices started or in the Idle state to get an output request processed.

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----- Example -----

Use the RELEASE command to reschedule all output requests that were previously held on the card punch.

```
OPR>RELEASE CARD-PUNCH-JOBS * <RET>
```

```
OPR>  
10:38:09          -- 3 Jobs Released --
```

```
OPR>
```

13.10.4 Canceling Jobs

Occasionally, you may have to cancel an output job while it is processing on a device. To cancel an output job that is processing, use the ABORT command. Supply the device unit number and one of the following switches:

- o /PURGE
- o /REASON

The /PURGE switch flushes the entire request from the system when it is canceled. There are no trailer units processed when the job is purged.

The /REASON switch allows you to enter one or more lines of text to explain why the output request was canceled.

----- Example -----

Use the ABORT command to cancel an output job because a user had requested that you do so.

```
OPR>ABORT PLOTTER 0/REASON:USER-REQUEST<RET>
```

```
OPR>  
11:40:09          Plotter 0  -- ABORT command queued --
```

```
OPR>  
11:40:21          Plotter 0  -- End --
```

```
OPR>
```

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13.10.5 Requeuing Jobs

Occasionally, you may want to cancel an output job that is currently being processed, and reschedule the same job to be processed later. Use the REQUEUE command to hold the output request and abort its current output.

For example, you might want to REQUEUE an output request that requires more forms (cards, paper tape, or plotter paper) than are currently available at your site. Thus, you REQUEUE the request to be processed when the forms become available.

----- Example -----

Use the REQUEUE command to hold and cancel an output request that requires four hours to punch.

```
OPR>REQUEUE CARD-PUNCH 0 /REASON: <RET>
Enter text and terminate with ^Z
JOB REQUIRES FOUR HOURS TO PUNCH. <RET>
JOB WILL BE RELEASED FOR PUNCH ON 2ND SHIFT. ^Z
```

```
OPR>
13:21:03          Card-punch 0  -- REQUEUE command queued --
```

```
OPR>
13:21:25          Card-punch 0  -- End- -
```

```
OPR>
```

13.10.6 Modifying Requests

To change the priority of an output request in the queue, use the MODIFY device-REQUEST command, where device can be CARD-PUNCH, PAPER-TAPE-PUNCH, or PLOTTER. To specify the request you want to MODIFY, supply one of the following:

- o A single request-id number to modify one request
- o A user name to modify all requests for that user
- o An asterisk (*) to modify all requests in the queue

You must specify a new PRIORITY number from 1 to 63. The higher the number, the greater the priority.

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----- Example -----

Use the MODIFY command to change the priority of PAPER-TAPE-PUNCH-REQUEST number from 135 to 63. This causes the request to be the next one processed.

```
OPR>MODIFY PAPER-TAPE-PUNCH-REQUEST 135 PRIORITY 63 <RET>
```

```
OPR>  
08:51:21      -- 1 Job Modified --
```

```
OPR>
```

13.10.7 Deleting Requests

To delete an output request from the queue, use the CANCEL device-REQUEST command, where device can be CARD-PUNCH, PAPER-TAPE-PUNCH, or PLOTTER. To specify the request you want to delete, supply one of the following:

- o A single request-id number to delete one request
- o A user name to delete all requests for that user
- o An asterisk (*) to delete all requests for the specified device type

If you CANCEL an output request that is active, the output is immediately terminated.

----- Example -----

Use the CANCEL command to CANCEL output request 186 from the card punch output queue.

```
OPR>CANCEL CARD-PUNCH-REQUEST 186 <RET>
```

```
OPR>  
10:25:11      -- 1 Job Canceled --
```

```
OPR>
```

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13.10.8 Specifying the NEXT Job

You can force an output queue to schedule a particular request to be processed immediately by using the NEXT command with CARD-PUNCH, PAPER-TAPE-PUNCH, or PLOTTER as the keyword. This command starts processing the request immediately after the current request is finished. The NEXT command does not alter the sequence of other requests in the queue.

----- Example -----

A user (MORRILL) requests that his plotter job be moved to the top of the queue to be processed when a plotter is available. You must examine the plotter queue to obtain the request-identification number for his request. Then you use the NEXT command to place his request next in the queue.

```
OPR>SHOW QUEUES PLOTTER<RET>
```

```
OPR>
```

```
11:35:43
```

```
-- System Queues Listing --
```

```
Plotter Queue:
```

Job Name	Req	Limit	User
* GRAPH	14	200	KOVALCIN, D [10,4635] On Unit:0
Started at 11:30:44, plotted 20 of 100 units			
MF10	145	35	MAROTTA, M [27,5555]
SNOOPY	10	65	MORRILL, E [442,2520]
/After:29-MAY-82 12:00			

```
There are 3 jobs in the queue (1 in progress)
```

```
OPR>NEXT PLOTTER 0 REQUEST-ID 10<RET>
```

```
OPR>
```

```
11:36:17
```

```
Plotter 0 -- NEXT request #10 scheduled --
```

```
OPR>
```

13.11 GALAXY CRASH RECOVERY PROCEDURES

GALAXY programs may stop performing useful work for one of the reasons listed below. When a program stops performing, it is said to have "crashed." This section describes how you can recover from a GALAXY program crash.

Reasons for program crashes are:

- o A monitor call (UUO) takes the error return and a stopcode occurs.
- o An error is detected by the built-in consistency checks within the various components of GALAXY and a stopcode occurs.

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- o An undetected error eventually causes an illegal memory reference or an address check and a stopcode occurs.
- o A hung device condition causes the monitor to halt the program or, if the program is detached, to put the program into 'TO' (Terminal Output) state. The hung condition usually indicates that a device has hardware problems, the device controller is not functioning, or the CPU failed and the failure was trapped by PULSAR.
- o A component goes into Event-Wait (EW) state for an extended length of time waiting for an event that is not likely to occur. In this case, the program hangs in the UWO.

You should take one of the following steps if a GALAXY component (program) crashes. Step 1 applies to a stopcode error. Step 2 applies to a hardware error, and Step 3 applies to a software error.

1. Attach to the crashed job, and save the crash in DSK:[3,3] as xxxyyy.zzz, where:

xxx - indicates an abbreviated name of the component, such as BAT for BATCON, or QSR for QUASAR

yyy - indicates the 3-character stopcode name

.zzz - indicates a 3-digit number (file extension) to distinguish this file from others.

You must assign the entire six-character file name and three-character file extension. Your installation should maintain some form of crash recording method to establish the naming convention.

After you have saved the crash, restart the component that stopped, and detach the job.

2. Determine which device caused the monitor to terminate the program. This can usually be found by checking on the CTY for a ?HUNG DEVICE xxxx message. The xxxx should contain the device. If the CPU is hung, the CTY message is ?CPU FAILED FOR DEVICE xxxx. Next, run OPR and shut the device down (SHUTDOWN command). A hung device error usually indicates a hardware problem. Then restart the component, and detach the job.
3. Check to make sure that ACTDAE is running. If not, perform the ACTDAE crash recovery procedure described in Table 13-5 below, before continuing. Attach to the component, press <CTRL/C>, restart the component, and detach the job.

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Table 13-5: GALAXY Component Crash Recovery Procedures

Component	Recovery
ACTDAE	If ACTDAE crashes, it can be restarted. However, the restart may leave some users' jobs hung in Event-Wait (EW) state. This happens because messages queued up for ACTDAE will be lost during the restart. Users will not be able to log in and log out while ACTDAE is down. LPTSPL, SPROUT, SPRINT, and QUEUE will hang in Event-Wait state. Restarting ACTDAE may necessitate restarting other GALAXY programs to restore full operational capability. After restarting GALAXY programs, process ACTDAE crashes using Recovery Step 1 described previously. (ACTDAE tasks are described in Chapters 14 and 15.)
BATCON	If BATCON crashes, first display the batch stream status from OPR. For all active batch streams, attach to the job that is running in that stream and log it out. Logging the jobs out will not delete the queue request. The batch job will be restarted when BATCON is restarted. When all active batch jobs have been logged out, attach to BATCON and follow Step 1 described previously.
CDRIVE	If CDRIVE crashes, all jobs currently being read into card readers will be lost and will have to be restarted. Restart CDRIVE and detach the job.
LPTSPL	If LPTSPL crashes, it will automatically restart the jobs that were being processed at the time of the crash, from the page number recorded in the last checkpoint. Follow one of the recovery steps described previously, restart LPTSPL, and detach the job.
OPR	If OPR crashes, follow Step 1 of the recovery procedures listed previously and restart OPR (.R OPR). Be sure to start OPR in the same job slot (that is, the same job number), if you are restarting OPR without restarting ORION. Do not log out the job that OPR was running in. Merely attach to the job, halt it (press <CTRL/C> twice) then type the monitor command START.
ORION	If ORION crashes, it should be restarted in the same job slot (that is, it must have the same job number). All OPR programs that were running at the time will automatically reset the OPR/ORION link with the first command typed to OPR. The first command that reestablishes the OPR/ORION link will be lost. Any DN60 Termination remote stations should be shut down and restarted. (Refer to the <u>TOPS-10 IBM Emulation/Termination Manual</u> for more information.) Then follow recovery Step 1 described previously.

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Table 13-5: GALAXY Component Crash Recovery Procedures (Cont.)

Component	Recovery
PULSAR	<p>If PULSAR crashes, users accessing MDA-controlled tape drives and structures (devices that were INITIALIZED and AVAILABLE, see Chapter 15) find that their jobs have entered Event-Wait (EW) state. This happens because messages queued up for PULSAR are lost. These user jobs remain in this state after you restart PULSAR because the restarted PULSAR does not recognize any requests made before the crash. Users will have to press <CTRL/C> to the MOUNT command, DEALLOCATE the tape drive or structure, and MOUNT it again, if appropriate. You should then follow Recovery Step 1 described previously.</p>
QUASAR	<p>If QUASAR crashes, user requests for queue services are lost. This is because the master queue file is rebuilt when QUASAR is restarted. But user requests for mounts/dismounts involving devices AVAILABLE to the mountable-device allocation system will not be lost. In addition, programs using the QUEUE.UUO to interface with QUASAR will hang in Event-Wait (EW) state.</p> <p>To restart QUASAR, first determine which batch jobs were running at the time of the crash, attach to them, and log them out. Then restart QUASAR in the same job slot (that is, the same job number). Next, attach to LPTSPL, BATCON, CDRIVE, SPRINT, and SPROUT, press <CTRL/C> to each of them, and restart them. From OPR use the TAKE command and specify the SYSTEM.CMD file and any other command files used for system start-up. QUASAR crashes should be processed using Recovery Step 1 described previously.</p>
SPRINT	<p>If SPRINT crashes, it can be restarted without loss of data. Follow one of the recovery steps described previously, restart SPRINT, and detach the job.</p>
SPROUT	<p>If SPROUT crashes, all jobs currently being processed are restarted from the beginning of the current file. Follow one of the recovery steps described previously, restart SPROUT, and detach the job.</p>

CHAPTER 14

SCHEDULED SOFTWARE TASKS

This chapter describes the operating tasks that most installations consider standard (or scheduled). You may be expected to perform some of these tasks daily or weekly.

14.1 UPDATING THE MESSAGE OF THE DAY

The file SYS:NOTICE.TXT contains messages that are transmitted to users as they log in. These messages, normally preceded by the date on which they first appear, are usually brief and contain important system information. For example, a message may specify the hours that the system will be operating, the date when the disks will be refreshed, or mention new system programs.

You can change NOTICE.TXT during the day to warn users of problems on the system, to notify them of your intention to stop timesharing, or to direct users to a more lengthy file for additional information. However, you must be familiar with a text editor to do this.

To change, add, or delete a message in the file NOTICE.TXT, you can log in under [1,2] and run a text editing program such as TECO. (Refer to Introduction to TECO and the TECO Reference Manual.)

----- Example -----

In the following example, the operator wants to add a message on April 12th and delete a 3-line message dated March 18th. Remember, this is only an example. You type everything that is in UPPERCASE BOLD PRINT in the following example:

```
.R TECO <RET>  
*EBSYS:NOTICE.TXT$$
```

Run TECO and specify that file SYS:NOTICE.TXT is to be updated. ESCape prints as \$.

```
*IAPR !@ THIS IS AN EXAMPLE <RET>  
OF A 2-LINE MESSAGE. <RET>
```

The I command inserts into the file everything following it up to the first ESCape. If the I command is your first command to TECO, then TECO makes the insertion at the beginning of the file. You should always insert new messages at the beginning of NOTICE.TXT.

```
$$
```

Press the ESCape key twice to end the insertion.

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*SMAR 18\$ØL3K\$\$

The S command searches for the text "MAR 18", which uniquely identifies the old message, and deletes that line plus the next two lines.

*EX\$\$

This command string causes a new NOTICE.TXT to be filed and the old version to be saved as NOTICE.BAK, and causes you to exit from TECO and return to monitor level.

14.2 UPDATING THE ACCOUNTING FILE WITH REACT

The REACT program maintains the system authorization file (SYS:ACTDAE.ACT). It enables you to add, delete, and change user's LOGIN accounts.

CAUTION

Do not attempt to update the accounting file unless you are completely familiar with the REACT program. This program has no safeguards; therefore, a mistake can have serious consequences.

Please see the TOPS-1Ø Software Installation Guide, for complete information about REACT.

14.3 CONTROLLING USAGE ACCOUNTING

Usage accounting provides a method for collecting accounting information such as CPU time, spooled requests, and disk space used, by storing this information in the ACT:USAGE.OUT file. Usage accounting is enabled when you bring your system up and remains enabled. You cannot turn the usage accounting facility off. Refer to the TOPS-1Ø/2Ø USAGE File Specification for more complete information.

The OPR command, SET USAGE, allows you to write usage accounting information to the ACT:USAGE.OUT file from a temporary file. There are two methods that can be used to do this with the SET USAGE command.

1. Specify the BILLING-CLOSURE keyword with a time argument (hh:mm).
2. Specify the FILE-CLOSURE keyword with one of the following arguments:
 - o hh:mm (hours and minutes)
 - o DAILY hh:mm
 - o EVERY day hh:mm (where day is the name of a day in the week)
 - o NOW

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- o mm-dd-yy hh:mm (where mm is the numeric month, dd is the numeric day, and yy is the numeric year)
- o /NO-SESSION-ENTRIES

Refer to the TOPS-10 Operator's Command Language Reference Manual for a complete description of the above keywords, arguments, and switch.

Normally, the SET USAGE command is contained in your SYS:SYSTEM.CMD file. Your system manager may have set up an accounting billing rate for prime time users (for example, from 08:00 to 18:00) and for off-prime time users (for example, from 19:00 to 07:00). There may also be another accounting billing rate for weekend users.

WARNING

Consult with your system manager before you use the SET USAGE command because this command changes time parameters within the accounting database.

When you use the SET USAGE command, either through the SYSTEM.CMD file or through the OPR terminal, the command remains in effect indefinitely. You cannot cancel or clear the SET USAGE command after it has executed.

----- Example -----

On January 20, 1986, you use the SET USAGE command to cause file closure every Friday at 4:00 P.M. (16:00 hours).

```
OPR>SET USAGE FILE-CLOSURE EVERY FRIDAY 16:00 <RET>
```

```
OPR>
14:47:25          -- Will close usage file at 24-Jan-86 16:00:00 --
```

```
OPR>
```

On 24-Jan-86 and every Friday thereafter, the following message appears at 4:00 P.M.:

```
OPR>
16:00:01          -- Message from the Accounting System --
                  ACT.USAGE.OUT closed and renamed to yymmdd.hhx
```

```
OPR>
```

The "yymmdd.hhx" in the above message specifies a numeric filename and file extension in the format of year, month, day, hour, and sequence.

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14.4 MAINTAINING SYSTEM CATALOG FILES

The CATALOG application in OPR enables you to maintain the system catalogs and the information contained in those files. CATALOG's functions include:

- o Creating, changing, and deleting catalog entries
- o Enabling and disabling automatic catalog updates
- o Listing all volume-sets in a catalog file

The system catalog files contain information that is necessary for GALAXY to avoid deadlocks when multiple jobs request the same mountable device (disk or magnetic tape).

To enter CATALOG command level use the OPR command, ENTER, as follows:

```
OPR>ENTER CATALOG<RET>
CATALOG>
```

After you enter the CATALOG command subset, you can type a question mark (?) to display a list of the CATALOG commands. See the TOPS-10 Operator's Command Language Reference Manual for more information about CATALOG commands.

14.5 SAVING ACCOUNTING FILES

On a regular basis, you should save the system accounting files, which contain all the data necessary to compute user charges. To save the accounting files, all other system jobs must be logged off with only one [1,2] job left. Save the accounting files on both a magnetic tape and a private disk pack. These files are used by billing programs to produce computer usage bills. To save accounting files, type everything that is in **BOLD PRINT** in the following dialog:

```
.RENAME mmddy.FCT[1,2]=FACT.*[1,4] <RET>      Rename the accounting files from SYS:
                                                to [1,2].
.MOUNT xxx <RET>                                Mount the private pack xxx.
.R PIP <RET>
*xxx:[PPN]/X/B=mmddy.FCT[1,2] <RET>           Run the PIP program to transfer the
                                                accounting files to the area [PPN] on
                                                the private pack, xxx.
.ASSIGN MTxn: <RET>                             Assign a tape drive MTxn: (where x is
                                                the tape controller identification and n
                                                is the tape drive number),
                                                And mount a scratch tape on it.
.MOUNT MTxn:<RET>                               And mount a scratch tape on it.
.R BACKUP <RET>                                 Run the BACKUP program.
/TAPE MTxn: <RET>                              Use the magnetic tape on MTxn:.
/REWIND <RET>                                  Rewind to the beginning of the tape.
/SAVE [1,2]*.FCT <RET>                         Save all the files with the extension
                                                .FCT in the [1,2] area.
!1,2 DSKB                                       BACKUP prints the UFD as it begins to
                                                save files from that area.
.
.
.
"Done                                           The SAVE is complete.
```

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14.6 SAVING GRIPE FILES

During timesharing, the user can run the GRIPE program. This program allows the user to enter suggestions, complaints, or other comments, which are then stored in disk files named CMPnnn.CMP on area [3,3]. These text files may be copied to another disk area, or printed on the line printer.

14.7 RIDDING THE SYSTEM OF DETACHED JOBS

The following procedure eliminates detached jobs that have been inactive for a long period of time. Such inactive jobs may be using up job slots needed by users, however, this action should not be taken without the instruction of your system manager.

1. Run SYSTAT at different times, to determine the inactive jobs that must be eliminated.
2. Attach to the inactive jobs from a TTY at which you are logged in under [1,2], and attempt to log them off. To do this, type everything that is in **UPPERCASE BOLD PRINT** in the following dialog:

```
.ATTACH 5[40,111] <RET>
                                Attach to job 5, user [4,111].
From Job 2                       Monitor response.
.<CTRL/C>                         Type <CTRL/C> to return to the monitor.
.K/F <RET>                       Log out the job.
```

3. Make a note on the SYSTAT output concerning the action taken and file the SYSTAT in the System Logbook.

If the user is over quota or if his job has eternal ENQ. locks set, you will be unable to log out the job. In that case, perform the following steps:

1. Type everything that is in **UPPERCASE BOLD PRINT** in the following dialog:

```
.<CTRL/C>                         Type <CTRL/C> to return to the monitor.
.DETACH <RET>                     Detach the job.
From Job 5                       Monitor response.
```

2. Make a note on the SYSTAT that the job could not be logged off and file the SYSTAT in the System Logbook.

The ATTACH command detaches your current job and attaches your terminal to a detached job. To reattach your terminal to your original job, make note of your job number before you use the ATTACH command. After logging out or detaching the user's job, attach to your original job by typing:

```
.ATTACH jobn [1,2]
```

```
Password: <RET>
```

Refer to the TOPS-10 Operating System Commands Manual for more information about the monitor commands ATTACH and DETACH.

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14.8 BACKING UP THE SYSTEM (DAILY)

At a scheduled time each day, you should run the BACKUP program to save on magnetic tape all files that have been created or modified since the same time the day before. This is called an incremental save. (Refer to Appendix E for a complete discussion of BACKUP.)

You should file the log output of all BACKUP procedures in the System Logbook. If files are lost during a system crash, you can refer to the BACKUP logs to determine which magnetic tapes contain the files to be restored. This assumes that you have set up some system of externally labeling the magnetic tapes and that you enter corresponding tape identification in the logs.

To save all the files that have been created or modified since 6 PM yesterday, type everything that is in BOLD PRINT in the following dialog:

.ASSIGN MTxn: <RET>	Assign MTxn: (where x is the tape controller identification and n is the tape drive number).
.MOUNT MTxn:<RET>	Mount a tape for the BACKUP program.
.R BACKUP <RET>	Run the BACKUP program.
/TAPE MTxn: <RET>	Use magnetic tape on drive MTxn:.
/REWIND <RET>	Rewind to the beginning of the tape.
/MSINCE:YESTERDAY:18:00 <RET>	Limit the SAVE to all files created or modified since 6 PM yesterday.
/SAVE <RET>	Save the files.
!1,2 DSKB	BACKUP prints each UFD as it begins to save files from that area.
.	
.	
.	
"Done	The SAVE is complete.

14.9 BACKING UP THE SYSTEM (WEEKLY)

Once a week, you should use the BACKUP program to save the entire contents of the system disk structures on magnetic tape. This is called a full save. Once you have saved the files, you can refresh the disk structures. (Refer to the following section for information on refreshing disk structures.) Then you can restore the files from the tapes.

The following is an example of one way to save the contents of the system disks. Perform the following steps:

1. Run OPR and use the SET KSYS command to stop timesharing.

```
| .R OPR<RET>  
| OPR>SET KSYS +0:05<RET>  
| OPR>EXIT<RET>  
| .
```

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2. Type everything that is in **BOLD PRINT** in the following dialog:

```
.ASSIGN MTxn: <RET> Assign MTxn: (where x is the tape
                    controller identification and n is the
                    tape drive number).
.MOUNT MTxn:<RET> Mount a tape for the BACKUP program.
.R BACKUP <RET> Run the BACKUP program.
/TAPE MTxn: <RET> Use the tape on drive MTxn:.
/REWIND <RET> Rewind to the beginning of the tape.
/LIST DSK: <RET> Request a directory listing of disk.
/SAVE DSKB: <RET> Save system disk.
!1,2 DSKB BACKUP prints each UFD as it begins to
save files from that area.
.
.
.
"Done The SAVE is complete.
```

3. Repeat Step 2 to save other system disks.

If the data overflows a reel of tape, you will receive the following message:

```
[BKPAMD Asking MDA for next volume]
```

Replace the full tape with a new tape and type GO.

14.10 REFRESHING FILE STRUCTURES

Two reasons that you may want to refresh file structures are:

1. To free up lost disk space.

Lost disk space is space that was allocated to a user who was unable to use it before the system crashed. When the system came back up again, the space was still allocated. However, because the owner did not close the file before the crash, no one owns it. Therefore, it is lost.

2. To reorganize the disk.

Over time, the system files become fragmented as they are used. Each of these fragments contain retrieval pointers. Retrieval pointers not only take up space on the disk, but the CPU wastes overhead time finding them.

When you save all files, refresh the disk, and restore the files to the disk. The system consolidates the fragments and removes the extra retrieval pointers. Therefore, the disk contains the same files as before, but the files are better organized.

To refresh file structures, you can reload the monitor following the procedures in Chapter 12 with two important differences. First, you must copy the BACKUP.EXE file onto magnetic tape. To do this, type:

```
.COPY MTxn:=SYS:BACKUP.EXE <RET>
```

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Second, when the system prompts you for the **STARTUP OPTION**, you should answer **REFRESH**. However, remember that **REFRESH** deletes the entire file structure. If you have any doubts about answering **REFRESH**, see your system administrator. During the ensuing dialog, the system will prompt you as follows:

TYPE STR NAME TO BE REFRESHED (CR IF NONE, ALL IF ALL)

Type in a system structure. For example:

DSKB: <RET>

The system repeats this prompt so that you can enter all the structures that you want to refresh. To terminate this set of prompts, press **RETURN** with no structure name. The system will then repeat the **STARTUP OPTION** prompt. If there are no other changes to be made to the file structure parameters, answer with **QUICK** or **GO**. You will then receive the message:

TO AUTOMATICALLY LOG-IN UNDER [1,2] TYPE "LOGIN"

Now, type everything that is in **BOLD PRINT** in the following dialog:

.LOGIN <RET>	Automatically log in under [1,2].
.SET SCHED 1 <RET>	Set a schedule bit pattern of 1 to prohibit users from logging in.
.ASSIGN MTxn: <RET>	Assign MTxn: (where x is the tape controller identification and n is the tape drive number), and mount a tape containing the BACKUP.EXE program.
.RUN MTxn:BACKUP <RET>	Run the BACKUP program from magnetic tape because the disk is empty at this point.
/TAPE MTxn: <RET>	Mount the magnetic tape containing the full save described in the previous section. Specify the tape drive containing tape number 1 of the full save.
/ASINCE:-30D <RET>	This entry is optional and allows you to restore only those files that have been recently accessed (in this case, within the past 30 days).
/RESTORE <RET>	Restore all files, except those specifically excluded by prior conditions.
!1,2 DSKB	BACKUP types out each UFD as it begins to restore files into that area.
1,3	
.	
.	
.	
"Done	The RESTORE is complete.

If you are restoring a multireel **SAVE**, the end of each full tape will result in the message:

[BKPAMD Asking MDA for next volume]

Mount the next sequentially numbered tape and type **GO**.

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If you want additional information to be printed on the CTY, for example, tape sequence numbers, saveset names, dates, and times, type the following before the /RESTORE entry:

/LIST CTY: <RET> Direct the printing of the BACKUP.LOG file to the CTY.

When the RESTORE is complete, type everything that is in UPPERCASE BOLD PRINT in the following dialog:

/<CTRL/C> Type CTRL/C to return to the monitor.
.SET SCHED 0 <RET> Set the schedule bit pattern to 0 to allow users to log in.
.K/F <RET> Log out.
.LOG 1,2 <RET> Log in again under [1,2] to ensure a correct search list. Also, this ensures that the system has been at least partially restored.

You can now start your system jobs by reloading the monitor using the steps listed in Chapter 11.

Private disk structures can be refreshed without reloading the system, by using the TWICE program. For information about TWICE, see the TOPS-10 Software Installation Guide.

14.11 ANALYZING SYSTEM FILE STRUCTURES WITH DSKLST

The DSKLST program compiles and prints an analysis of the contents and the current status of the system file structures. It provides the information with which you and the system administrator can do the following:

- o Analyze the efficiency of disk space usage.
- o Detect and diagnose problem areas on disk.
- o Determine when to refresh the various disk areas.
- o Determine optimum cluster sizes for assigning and releasing file storage space.

To run DSKLST while logged in under [1,2], type everything that is in UPPERCASE BOLD PRINT in the following dialog:

.ASSIGN DSK LPT <RET> Assign the disk to receive the DSKLST output rather than the printer.
.R DSKLST <RET> Run the DSKLST program, which will prompt with an asterisk.
FOR HELP TYPE /H
* <RET> Press RETURN to print all DSKLST output for all structures.
*<CTRL/C> Type CTRL/C to return to the monitor.
.PRINT DSKLST.LST <RET> Queue the report to be printed.

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If you include the above steps in a batch control file such as DSKLST.CTL, you can submit the job to run under batch with the command:

```
.SUBMIT DSKLST <RET>
```

Refer to the DSKLST Specification in the TOPS-10 Software Notebook Set for more information on DSKLST.

14.12 OBTAINING DISK ERROR INFORMATION WITH DSKRAT

The DSKRAT program compiles and prints damage-assessment information for disk file structures. It can also free up lost disk space. Lost disk space is space that was allocated to a user who was unable to use it before the system crashed. When the system came back up again, the space was still allocated. However, because the owner did not close the file before the crash, no one owns it. Therefore, it is lost.

To recover lost disk space, you must run DSKRAT standalone with the SCHED bit set to 1. If no other jobs are running, DSKRAT will then create a file called LSTBLK.nnn in the [1,2] area. After DSKRAT exists to return all lost disk space to the free usage pool, you may delete LSTBLK.nnn.

To run DSKRAT while logged in under [1,2], type everything that is in UPPERCASE BOLD PRINT in the following dialog:

```
.ASSIGN DSK LPT <RET>          Assign printer output to the disk.
.ASSIGN str STR <RET>         Assign the logical device name STR to
                              the file structure "str" that you are
                              analyzing.
.R DSKRAT <RET>              Run the DSKRAT program.
.PRINT RAT.LST <RET>         Queue the report to be printed.
```

If more than one structure is to be analyzed, repeat the last three lines of this dialog using different "str"s.

To run this procedure under batch, include the above command sequence in a file DSKRAT.CTL and submit it to batch with:

```
.SUBMIT DSKRAT.CTL <RET>
```

Refer to the DSKRAT Specification in the TOPS-10 Software Notebook Set for more information on DSKRAT.

14.13 SHUTTING DOWN THE SYSTEM

To shut down the system and terminate timesharing, perform the following steps:

1. Type everything in UPPERCASE BOLD PRINT in the following dialog:

```
.RUN OPR<RET>
OPR>SET KSYS +30:00  This OPR command stops timesharing in 30
                    minutes and causes periodic warning
                    messages to be automatically sent to the
                    users.
```

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2. Stop the system.
3. Make a log entry that says that you shut down the system, and why.

CHAPTER 15

UNSCHEDULED SOFTWARE TASKS

The tasks in this chapter are considered unscheduled software tasks because they are performed as needed. If any of these tasks should be scheduled at your installation, decide upon a schedule for them with your system manager.

15.1 CONTROLLING THE ORION LOG FILE

ORION maintains a log of all messages sent through it. ORION timestamps and identifies the type of message and provides any additional information available. This function of ORION is referred to as a Centralized Logging Facility.

The ORION log file contains all OPR-to-ORION commands and transactions performed at the operator's console. The following OPR commands control this logging facility:

- o ENABLE LOGGING
- o DISABLE LOGGING
- o CLOSE LOG

If your installation has ANF-10 network software, only an operator with HOST or SYSTEM privileges can issue any of the above OPR commands.

The Centralized Logging Facility is on by default at system start-up, but can be disabled by placing the DISABLE LOGGING command in the SYSTEM.CMD file, or by using this command at OPR command level.

To enable the Centralized Logging Facility again, use the ENABLE LOGGING command at OPR command level, or place this command in the SYSTEM.CMD file.

The CLOSE LOG command closes the current log file and automatically creates a new one. When the CLOSE LOG command is issued, the log file is closed and renamed to OPERAT.nnn. The file extension of closed log files is numbered sequentially starting from 001. You can then print the log file on the line printer to obtain a hard copy of all the ORION messages for a given time period.

| The CLOSE LOG command also enables you to include date and arguments
| that specify a future time to close the log file. Use the SHOW QUEUES
| EVENTS command to display pending ORION log file closure times.

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The name of the log file is determined when your system manager runs GALGEN. (Refer to the TOPS-10 Software Installation Guide for the GALGEN procedures.) The default file name is OPERAT.nnn.

----- Examples -----

1. Disable the logging facility for a period of time while the system is operating stand-alone.

```
OPR>DISABLE LOGGING <RET>
```

```
OPR>
08:52:12          -- ORION Logging Disabled by JOB 6 OPERATOR
                  [1,2] at terminal 14 --
```

```
OPR>
```

2. Close the current log file and automatically create a new log file.

```
OPR>CLOSE LOG <RET>
```

```
OPR>
```

15.2 DUAL PATH ACCESS TO MAGTAPE

It is possible to share a string of TU70, 71, 72, or TU78 tape drives between two systems. In the case of the TU70, 71, 72, a TX03 switch is installed in the TX01/02 controller. In the case of the TU78s, the TM78 controller can be dual-ported between RH20s on two separate systems, and A/B switch position is employed on the drives similar to that used on Massbus disk drives. In both cases, it is essential that the drives remain under the control of MDA (Mountable Device Allocator), PULSAR and QUASAR, and the operator. That is, the tape drives have to be initialized. If a drive shared in the manner described above is set unavailable, and therefore directly assignable to the users, then the possibility of simultaneous access arises. The operator must also exercise care to insure that mount requests issued on the two systems are not identified (using the IDENTIFY command) with the same drive.

15.3 INITIALIZING TAPES

Occasionally you may be asked to initialize and/or reinitialize a magnetic tape. When you initialize a tape, the system writes specific information on the tape pertaining to the identification of the tape. When you initialize a tape specifying an ANSI or EBCDIC standard label, the system writes the following information on the tape:

- o A standard volume label that contains the volume identification (volid) of the tape
- o Standard header and trailer labels. Later, when a file is written on the tape, these labels contain specific information pertaining to the file.

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To initialize one or more tapes, use the following OPR command:

```
OPR>SET TAPE-DRIVE MTxn: INITIALIZE /switch1,/switch2,...RET>
```

where x is the tape controller identification and n is the tape drive number.

Table 15-1 describes the valid switches for the SET TAPE-DRIVE INITIALIZE command:

Table 15-1: SET TAPE-DRIVE INITIALIZE Switches

Switch	Meaning
/ABORT	allows the operator to abort a tape initialization in progress. This resets the tape drive to a "normal" state, making it available for user mount requests.
/COUNT:nn	specifies the number (nn) of tapes to be initialized. The /COUNT switch, when specified, provides a mechanism for initialization of multiple tapes with the same attributes. After initialization, the tape is automatically unloaded and the tape drive is ready to accept the next tape to initialize. When the number of tapes specified by nn has been initialized, the tape drive returns to the available state.
/DENSITY:nn	specifies the density of the tapes to be initialized. The number (nn) can be 200, 556, 800, 1600, or 6250 BPI (Bits-Per-Inch). If you do not specify the /DENSITY switch, the density defaults to the default density for that drive.
/INCREMENT:nn	specifies the numeric value (nn) by which to increment the tape volumes. This switch is valid only when specified with the /COUNT and /VOLUME-ID switches. If you do not include this switch, the default numeric value is 1. For example, to initialize a set of 10 tapes with volids from 442000 through 442900, use the switches /COUNT:10, /INCREMENT:100, and /VOLUME-ID:442000. Every tape mounted on the tape drive is initialized with the next sequence number as specified by the /INCREMENT switch.

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Table 15-1: SET TAPE-DRIVE INITIALIZE Switches (Cont.)

Switch	Meaning
/LABEL-TYPE:type	specifies the type of label to be written on the tape. The type can be ANSI, EBCDIC, or UNLABELED. The default label is ANSI when you specify this switch. If you do not specify the /LABEL-TYPE switch, the default is that specified in the GALGEN dialog by the system manager.
/OVERRIDE-EXPIRATION:YES or NO	specifies whether to check for expiration date of the data on the tape. If you specify NO and attempt to reinitialize a labeled tape whose first file is not expired, the system issues an error message and does not reinitialize the tape. If you specify YES, each tape is reinitialized unconditionally. If you are initializing virgin tapes, you should specify YES to prevent the tape drive from "running away" when PULSAR tries to read a label from the tape. If you do not specify this switch, the default is YES.
/OWNER:[PPN]	specifies the project-programmer number of the user who owns the tape(s) to be initialized. If you do not specify the /OWNER switch, the tape is initialized with no owner and a protection of 000.
/PROTECTION:nnn	specifies a 3-digit octal number as the protection number of the tape. The number ranges from 000 (where anyone can use the tape) through 777 (where no one can use the tape). If you do not specify the /PROTECTION switch, the default is the standard file protection (usually 057). However, if you omit the /OWNER switch, then the protection is set to 0. The protection code is described in the <u>TOPS-10 Operating System Commands Manual</u> .

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Table 15-1: SET TAPE-DRIVE INITIALIZE Switches (Cont.)

Switch	Meaning
/TAPE-DISPOSITION:condition	specifies what is to be done to the tape after it is initialized. The condition can be either HOLD or UNLOAD. If you specify HOLD, the tape is initialized and is not unloaded. If you specify UNLOAD, the tape is initialized and is unloaded from the tape drive. The default is UNLOAD. If a value greater than 1 is specified by the /COUNT switch, the /TAPE-DISPOSITION switch applies to the last tape initialized.
/VOLUME-ID:valid	specifies a volume identification for the tape. The valid must be from 1 to 6 characters. The valid must be made up of alphanumeric characters only. This switch is not necessary if the tape is being initialized as an unlabeled tape.

When you use a tape drive for initializing tapes, the tape drive is not available for user mount requests. When the initialization process is complete, the tape drive automatically becomes available for user mount requests. To force a tape drive out of initialize mode prematurely, use /ABORT.

----- Examples -----

1. A user (JONES.J) has requested a tape mount of an ANSI labeled tape with a valid of TAPE01 and has requested that you initialize the tape first. The volume is initialized with ANSI labels and a valid of TAPE01. The drive default for density (in this example, 1600 BPI) and protection (057) are used. When the tape is mounted on the drive, the tape is initialized and the drive then becomes available to the user (/TAPE-DISPOSITION:HOLD). Volume recognition takes over and satisfies the mount request for TAPE01.

OPR>
12:11:34

```
-- Magtape mount request #31 --
User: JONES.J [31,5723] Job# 39
Volume-set-name: MTA-DJ6YIH
```

Volume-ID	Write	Labels	Track	Density
TAPE01	Enabled	ANSI	9	1600

OPR>

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Mount and ready the tape supplied by the user.

OPR>
 9:04:38 Device MTA263 -- Unlabeled volume mounted --
 Density 1600 BPI, write-Enabled

OPR>SET TAPE-DRIVE MTA3: INITIALIZE /LABEL-TYPE:ANSI- <RET>
 /OWNER:[31,5723]/TAPE-DISPOSITION:HOLD/VOLUME-ID:TAPE01 <RET>

OPR>
 9:05:12 Device MTA263 -- Volume initialized --
 Volume Id:TAPE01, Label type:ANSI, Density:1600
 Owner:[31,5723], Protection:057

OPR>
 9:05:14 Device MTA263 -- Volume Initialization Complete --
 Drive is available for use

OPR>
 9:05:20 Device MTA263 -- Volume TAPE01 Reassigned --
 User: JONES.J [31,5723] Job# 39

OPR>

2. You initialize two tapes with ANSI-standard labels.

OPR>REC MTA3:

OPR>
 6:17:58 Device MTA263 -- Unlabeled volume mounted --
 Density 1600 BPI, Write-Enabled

OPR>SET TAPE MTA3:INITIALIZE /COUNT:2 /DENSITY:1600 /INCREMENT:1 -
 /LABEL-TYPE:ANSI /OVERRIDE-EXPIRATION:YES /OWNER:[10,56] -
 /PROTECTION:057 /TAPE-DISPOSITION:UNLOAD /VOLUME-ID:TEST00<RET>

OPR>
 6:18:43 Device MTA263 -- Volume initialized --
 Volume Id:TEST00, Label type:ANSI, Density:1600
 Owner:[10,56], Protection:057

6:18:44 <6> Device MTA263 -- Please load next tape to be initialized --
 Its volume identifier will be TEST01
 Type 'RESPOND <number> ABORT' to terminate this operation
 Type 'RESPOND <number> PROCEED' after completing requested operation

Mount and ready the next tape.

OPR>
 6:19:20 --Message 6 canceled by user [1,2] job 8--

6:19:22 Device MTA263 -- Volume initialized --
 Volume Id:TEST01, Label type:ANSI, Density:1600
 Owner:[10,56], Protection:057

6:19:23 Device MTA263 -- Volume initialization complete --
 Drive is available for use

6:19:23 Device MTA263 -- Offline --

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15.4 HANDLING MAGTAPE MOUNT REQUESTS

There are two types of tapes you may be requested to mount: labeled tapes and unlabeled tapes. The differences in handling the two types of tape requests are explained in the following sections. The user must issue a MOUNT command to request that a tape be mounted. When the system receives this request, OPR prints the following message:

```
hh:mm:ss      -- Magtape mount request #nn --
               User: username [PPN] Job# nn
               Volume-set-name: name

               Volume-id  Write  Labels  Track  Density
               -----  -
               (tape conditions)
```

where:

hh:mm:ss	specifies the time the operator received the message.
request #nn	specifies the request-id number assigned to the mount request.
username	specifies the name of the user who issued the MOUNT command.
[PPN]	specifies the user's project-programmer number.
Job# nn	specifies the job number assigned to the user upon logging onto the system.
Volume-set-name: name	specifies the volume set name the user assigned in his MOUNT command.
Volume-id	specifies the valid of the tape. The user assigns this valid with the /REELID switch in the MOUNT command.
Write	specifies whether the tape is Enabled (write-enabled) or Locked (write-locked).
Labels	specifies the type of label, either ANSI, EBCDIC, NO (for no labels), or BYPASS (to bypass label processing).
Track	specifies the tape tracks, either 7 or 9.
Density	specifies the tape density in Bits-Per-Inch (BPI). The densities can be either 200, 556, 800, 1600, or 6250.

If the user includes a remark with the /REMARK switch in the MOUNT command, you can display the remark when you use the SHOW QUEUES MOUNT-REQUESTS command with the /ALL switch.

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15.4.1 Displaying Tape Drive Status

If you need to find out the status of one or all of the tape drives on your system, use the following OPR command:

```
OPR>SHOW STATUS TAPE-DRIVE MTxn: /switch <RET>
```

where MTxn is optional, and identifies the tape controller and the tape drive.

Instead of specifying a magnetic tape unit number you can use one of the following switches:

Switch	Meaning
/ALL	displays the status of all the tape drives on the system. This switch causes the system to print the following information: <ul style="list-style-type: none">o The unit number of the tape drive (MTxnnn:)o The number of tracks (7 or 9) that the drive is set to read and write.o The current status of the tape drive (Free, Online, or Unavailable)o The status of AVR (Automatic Volume Recognition) on the tape drive (Yes = Enabled or No = Disabled)o The write mode of the tape (Enabled or Locked)o The volume identification of the tape on the driveo The job number of the user who has the tape assigned to his job.o The name and PPN of the user who has the tape assigned to his job.
/FREE	displays the tape drives that are available (Free) to you for mounting tapes. With this switch, the display shows the drive unit number, the status, and whether AVR is enabled or not.

If you do not give a physical device or one of the above switches, the display defaults to the /ALL switch.

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----- Examples -----

1. Use the SHOW STATUS TAPE-DRIVE command.

```
OPR>SHOW STATUS TAPE-DRIVE<RET>
```

```
OPR>
```

```
10:14:28
```

```
-- Tape Drive Status --
```

Drive	Trk	Status	AVR	Write	Volume	Job	User
MTA260	9	Free	Yes				
MTA261	9	Free	Yes				
MTA262	9	Online	Yes	Enabled	TEST01	185	BROWN.E [27,5107]
MTA263	9	Unavailable	No				
MTA264	9	Online	Yes	Locked	PIPTAP	235	RON LUSK [30,5524]
MTA265	7	Free	Yes				

```
OPR>
```

2. Use the SHOW STATUS TAPE-DRIVE command with the /FREE switch.

```
OPR>SHOW STATUS TAPE-DRIVE /FREE <RET>
```

```
OPR>
```

```
10:18:45
```

```
-- Tape Drive Status --
```

Drive	Trk	Status	AVR
MTA260	9	Free	Yes
MTA261	9	Free	Yes
MTA265	7	Free	Yes

```
OPR>
```

15.4.2 Controlling Tape Drive Volume Recognition (AVR)

Volume recognition allows you to mount a labeled tape without telling the system the volume identification of the tape. When you mount a labeled tape on a drive that has volume recognition enabled, PULSAR automatically reads the volume identifier from the volume label.

If your system is using labeled tapes, then it is likely that volume recognition has been enabled. Volume recognition is enabled by default. If you need to disable volume recognition for one or all tape drives, use the following OPR command:

```
OPR>DISABLE VOLUME-RECOGNITION argument <RET>
```

where the argument can be:

MTxn: (for a specific tape drive)

or

TAPE-DRIVES (for all tape drives)

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One reason for disabling volume recognition on a tape drive is to avoid runaway tapes when you are initializing tapes. When you disable volume recognition, OPR prints the following message confirming that volume recognition has been disabled:

```
hh:mm:ss          Device MTxnnn  -- Volume Recognition is Disabled --
```

In addition, you can check the status of the tape drive with the OPR command SHOW STATUS TAPE-DRIVE /ALL.

You can enable volume recognition for one or more of the tape drives on your system by using the following OPR command:

```
OPR>ENABLE VOLUME-RECOGNITION argument <RET>
```

----- Example -----

Disable volume recognition for tape drive 0 (MTA0:).

```
OPR>DISABLE VOLUME-RECOGNITION MTA0: <RET>
```

```
OPR>
12:23:45          Device MTA260  -- Volume Recognition is Disabled --
OPR>
```

15.4.3 Handling Labeled Tapes with AVR Enabled

When a user issues a MOUNT command for a labeled tape, you receive a message similar to the following:

```
OPR>
10:15:43          -- Magtape mount request #12 --
                  User: BROWN.E [27,5107] Job# 59
                  Volume-set-name: MTA-GY31OL

                  Volume-ID   Write   Labels  Track  Density
                  -----
                  100200      Locked  ANSI    9      1600
```

```
OPR>
```

If the user has not already given you the tape, you must mount the tape on a drive that has volume recognition enabled. When the tape is brought on line, PULSAR automatically reads the label and prints a message similar to the following on your terminal:

```
OPR>
10:15:43          Device MTA260  -- Labeled Volume Mounted --
                  Density 1600 BPI, Write-Locked ANSI Label

OPR>
10:15:45          Device MTA260  -- Volume 100200 Reassigned --
                  User: BROWN.E [27,5107] Job# 59

OPR>
```

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When finished using the tape drive, the user issues a DISMOUNT command to release the tape drive. When this command is given, the system prints a message similar to the following on your terminal:

```
OPR>
11:20:33      Device MTA260  -- Released --
                User: BROWN.E [27,5107] Job# 59
```

OPR>

15.4.4 Handling Labeled Tapes with AVR Disabled

When a user issues a MOUNT command, you see the same mount request as explained in Section 15.4.3. However, because volume recognition is disabled, PULSAR does not automatically read the label. Therefore, you must use the OPR command RECOGNIZE to inform QUASAR of the label information.

For example, a user requests a labeled tape whose valid is 112233 to be mounted on a tape drive. You mount the tape on a tape drive that has volume recognition disabled, for example, MTA0:. After you bring the tape on line, use the following command:

```
OPR>RECOGNIZE MTA0: <RET>
```

This command causes the labels on the tape to be read, and the tape to be reassigned to the user request.

15.4.5 Handling Unlabeled Tapes

When a user requests that an unlabeled tape be mounted on a tape drive, the mount request you see is the same as the ones in the previous sections with the exception that the "label-type" is shown as "No Labels." To assign the tape to a user, or to associate a valid with the tape, use the OPR command IDENTIFY.

After you have mounted the tape on a free tape drive, use the IDENTIFY command to associate the tape with the mount request. In addition, you can use the IDENTIFY command to assign a volume identification (valid) to the unlabeled tape.

For example, a user requests that an unlabeled tape be mounted with a valid of TEST01. When the mount request is processed, the system prints the following message on your terminal:

```
OPR>
10:20:10      -- Magtape mount request #12 --
                User: SMITH [10,5353] Job# 21
                Volume-set-name: MTA-Y57HAB
```

Volume-ID	Write	Labels	Track	Density
TEST01	Locked	No	9	1600

OPR>

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When you receive this request, locate and mount the tape on an available tape drive and then use the IDENTIFY command in the following formats.

```
OPR>IDENTIFY MTxn: VOLUME-ID TEST01 <RET>
```

```
OPR>IDENTIFY MTxn: REQUEST-ID 12 <RET>
```

where MTxn is the tape unit.

This procedure assumes that volume recognition is enabled. If volume recognition is disabled on the tape drive, you must use the RECOGNIZE command before either of the IDENTIFY commands shown above. This permits QUASAR to know the tape is mounted on the tape drive, before you identify it. For example,

```
OPR>RECOGNIZE MTxn: <RET>
```

where MTxn is the tape unit.

----- Example -----

A user requests that you mount an unlabeled tape and you comply.

```
OPR>
12:25:09          -- Magtape mount request #57 --
                  User: PACELLI [2,134] Job 43
                  Volume-set-name: MTA-JM05KL
```

Volume-ID	Write	Labels	Track	Density
SCR123	Locked	No	9	1600

```
OPR>
```

Mount and ready an unlabeled tape on tape drive MTA2:.

```
12:27:32          Device MTA262 -- Unlabeled Volume Mounted --
                  Density 1600 BPI, Write-Locked
```

```
OPR>
```

Then reply to OPR with:

```
OPR>IDENTIFY MTA2: REQUEST-ID 57 <RET>
```

```
OPR>
12:28:33          Device MTA262 --Volume SCR123 Reassigned--
                  User: PACELLI [2,134] Job# 43
```

```
OPR>
```

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15.4.6 Dismounting Tapes

When a user has completed the desired tasks with the mounted tape, the user should use the monitor command DISMOUNT (or DEASSIGN) to rewind and unload the tape from the tape drive. You can then remove the tape from the tape drive.

NOTE

If the user does not use the DISMOUNT command, but instead logs off the system, any mounted tapes are automatically rewound and unloaded.

If a tape is mounted on a tape drive and it is not assigned to any one user, you can use the OPR command DISMOUNT in the following format to remove the tape from the tape drive:

```
OPR>DISMOUNT TAPE-DRIVE MTxn: <RET>
```

To check the status of the tape drives use the SHOW STATUS command. If a tape is mounted, but is not assigned to any user, the display shows the tape online without a request number, user name, or [PPN].

Do not press the UNLOAD button to rewind and unload the tape drive. Always use the DISMOUNT TAPE-DRIVE command to remove tapes from tape drives.

If, however, you do press the UNLOAD button to remove a tape and then you mount another labeled tape on the same drive, you must use the RECOGNIZE command to force the system to recognize the tape.

----- Examples -----

1. Use the DISMOUNT command to rewind and unload a tape that is mounted, but not assigned to any user.

```
OPR>DISMOUNT TAPE-DRIVE MTA3: <RET>
```

```
OPR>  
10:36:54          Device MTA263  -- Unloading --
```

```
OPR>
```

2. If you previously pressed the UNLOAD button on a tape drive and then mounted a labeled tape, you must use the RECOGNIZE command to force the system to recognize the labeled tape.

```
OPR>RECOGNIZE MTA2: <RET>
```

```
OPR>  
10:07:02          Device MTA262  --Volume 100100 Mounted--  
ANSI·Labels, 1600 BPI, Write-Enabled
```

```
OPR>
```

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15.4.7 Canceling Tape Mount Requests

If you are unable to satisfy a user's mount request, you can cancel the mount request by using the OPR command CANCEL MOUNT-REQUEST nn. You should also notify the user why you could not satisfy the request by giving the /REASON switch with the command.

For example, you cancel a mount request because you could not find the requested tape. To do this, use the following command:

```
OPR>CANCEL MOUNT-REQUEST nn /REASON:I CANNOT FIND THE TAPE <RET>
```

where "nn" is the request number assigned to the mount request.

----- Example -----

Cancel mount request 204.

```
OPR>CANCEL MOUNT-REQUEST 204 /REASON:I CANNOT FIND THE TAPE <RET>
```

```
OPR>
```

```
11:49:19          -- Mount Request 204 Canceled --
```

```
OPR>
```

15.4.8 Setting Tape Drives Available or Unavailable

When you start the system, all tape drives are under control of the mountable device allocation system. However, there may be times when you want to gain control of the tape drive. To do this, use the following command:

```
OPR>SET TAPE-DRIVE MTxn: UNAVAILABLE <RET>
```

OPR prints:

Enter text and terminate with ^Z

This allows you to enter a comment explaining why you are setting the tape drive unavailable.

When you use this command, MDA releases control of the tape drive and users can assign the drive to their jobs by using the TOPS-10 command ASSIGN. To return control of the tape drive to MDA, use the following command:

```
OPR>SET TAPE-DRIVE MTxn: AVAILABLE <RET>
```

----- Example -----

Set MTA0: unavailable because of a hardware problem.

```
OPR>SET TAPE-DRIVE MTA0: UNAVAILABLE<RET>
```

Enter text and terminate with ^Z

```
TAPE DRIVE MTA0: IS LOSING VACUUM ^Z
```

```
OPR>
```

```
12:23:00          Device MTA260  -- Set Unavailable --
```

```
OPR>
```

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15.5 HANDLING FILE STRUCTURE AND DISK-DRIVE TASKS

OPR commands help you to control structures and disk-drives. With OPR commands, you can do the following:

- o Enable volume recognition
- o Force the system to recognize a structure or disk-drive
- o Dismount or remove a structure
- o Lock structures to prevent users from mounting them, and unlock structures
- o Cancel mount requests that you cannot satisfy
- o Display the status of structures
- o Display the status of disk-drives
- o Control structure-recognition
- o Control volume-recognition
- o Examine the mount requests queue

The following sections describe each of the above commands to assist you in the control of file structures and disk drives.

15.5.1 Answering Structure Mount Requests

When a user issues a request to mount a structure with the MOUNT command, one or both of the following conditions must be present:

- o The structure must be defined in the system catalog file. See Section 14.4 for more information about the system catalog file.
- o All packs in the structure must be mounted and ready.

When either of these conditions are present, the following message appears on your OPR terminal to inform you of the user request. A list appears immediately following the message, displaying the structure request and where the structure is mounted.

```
OPR>
hh:mm:ss      Device str  -- Structure Mount Request #nn  --
               From User: username [PPN] Job# nn

               Unit   Volume  Type   Drive
               -----
(List showing where structure may be mounted)
```

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where:

hh:mm:ss specifies the time the operator received the message.

Request #nn specifies the request number assigned to the mount request.

username [PPN] specifies the name and project-programmer number of the user who issued the MOUNT request.

Job# nn specifies the job number the user was assigned when the user logged onto the system.

The display provides the following information:

- o The unit identification
- o The volume identification
- o The type of drive (RP04, RP06, or RM03)
- o The disk drive identification

If the requested structure consists of more than one volume disk pack, all volumes are displayed in this list.

If the structure is defined in the system catalog file, but not mounted and in the ready state, this list displays available disk drives, along with the type, volume, and unit.

You must answer a MOUNT request by doing one of the following:

- o If the structure is not mounted and ready, you must mount and prepare the structure on an available disk drive.

If volume recognition is enabled for both structures and disk drives, the system automatically recognizes the structure and satisfies the mount request.
- o If volume recognition is disabled for either structures or disk drives, you must use the RECOGNIZE command to OPR to force the system to recognize the structure mount.

Once the structure is known by the system, OPR prints a message similar to:

```
OPR>  
hh:mm:ss          -- Structure str Mounted --
```

```
OPR>
```

OPR prints the preceding message only after you have physically mounted all the packs in the structure. For example, if a structure mount request exists for structure DSKR:, and DSKR: consists of two packs, both packs must be mounted to satisfy the mount request.

NOTE

MDA continues to process requests from other users if you do not respond to a MOUNT request with some action. For example, if five separate users request five different structure MOUNTs at the same time, you can respond individually to each request in any order.

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----- Examples -----

1. In this example, a user wants to MOUNT a structure that is not defined in the system catalog file and volume recognition is disabled. In this case you must know in advance of the structure mount so that the user does not receive an error message for his mount request. Before the request is given, you must mount and prepare the structure. Then you must use the RECOGNIZE command to have the system recognize the structure mount and satisfy the mount request.

OPR>

13:12:10 Device ECB1 -- Structure Mount Request #221 --
From User: BROWN,A [27,5107] Job# 68

Unit	Volume	Type	Drive
ECB10	ECB10	RP04	RPA0

OPR>RECOGNIZE RPA0: <RET>

OPR>

13:13:13 Device RPA0 -- Volume ECB10 for Structure ECB1 Mounted --

OPR>

13:13:15 -- Structure ECB1 Mounted --

OPR>

2. In this example, a user requests that structure DSKN: be mounted. DSKN: is defined in the catalog list but is not currently mounted and ready.

OPR>

12:40:15 Device DSKN -- Structure Mount Request #37 --
From User: PACELLI,V [2,134] Job# 27

Unit	Volume	Type	Drive
DSKN	DSKN0	RP06	RPB1

OPR>

You can now physically mount DSKN: and make the system recognize the structure as being on line. Request 37 is satisfied automatically, and the user is notified.

OPR>

12:43:33 Device RPB1 -- Volume DSKN0 for Structure DSKN Mounted --

OPR>

12:43:35 -- Structure DSKN Mounted --

OPR>

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15.5.2 Mounting a Structure with MOUNT

If structure recognition is disabled, or you need to mount a structure with an alias, you can use the OPR command MOUNT. For example, to mount a structure called DSKX: with structure recognition disabled, use the command:

```
OPR>MOUNT STRUCTURE DSKX: <RET>
```

```
OPR>  
12:17:20          -- Structure DSKX Mounted --
```

```
OPR>
```

NOTE

If volume and structure recognition are enabled and the structure is defined in the system catalog file, you need not use the MOUNT command, because the system recognizes the structure when it becomes ready (mounted and spinning).

If volume and structure recognition are disabled, you must use the RECOGNIZE command and then the MOUNT command.

If you want to mount a structure with an alias, and the structure is the first structure by that name, you must disable volume and structure recognition before giving the MOUNT command and mounting the structure. After you have mounted and readied the structure, you should re-ENABLE structure and volume recognition.

In addition, the MOUNT command allows you to specify an alias name for the structure when two file structures of the same name are to be mounted. For example, if DSKA: is already mounted and you must now mount another structure of the same name, you can use the following command:

```
OPR>MOUNT STRUCTURE DSKA: ADSK: <RET>
```

```
OPR>  
 2:32:09          -- Structure ADSK Mounted --
```

```
OPR>
```

When you assign an alias name to a structure, the physical name of the structure (which is written in the HOM blocks of the structure) is not changed.

WARNING

MDA strictly enforces unique volids on both disks and tapes. Therefore, you cannot mount two identical DSKAs. You can mount two DSKAs if the volids in the HOM blocks are not identical.

To examine the mounted structures and their alias names, use the OPR command SHOW STATUS STRUCTURES (refer to Section 15.5.5).

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15.5.3 Controlling Structure Dismount Requests

When you use a valid DISMOUNT command, OPR prints:

```
hh:mm:ss          --Structure str Dismounted--  
                  From Unit: xxxn
```

where:

str specifies the file structure name.

xxn specifies the disk drive name.

When a user dismounts a structure, you are not notified unless the user specified the /REMOVE switch in his DISMOUNT command. (Refer to the TOPS-10 Operating System Commands Manual for additional information on the DISMOUNT command.)

When you issue the OPR command DISMOUNT to dismount a file structure, there are two additional considerations you must acknowledge. They are:

1. You can lock the structure before you dismount it to prevent other users from accessing the structure.
2. If more than one user is currently using the structure, you receive a message to which you must respond.

The next section explains the tasks involved in dismounting file structures.

15.5.3.1 Locking and Unlocking Structures -

When your system is brought up, all mounted structures are unlocked so that users can access files on the structures.

However, if you must remove a structure during normal operation and you want to prevent users from accessing the structure, you can "lock-out" further jobs from access before dismounting the structure. You can use the OPR command LOCK to accomplish this task.

All jobs and programs currently accessing the structure will continue. When the jobs and programs complete, you can dismount the structure.

In addition, you can specify a date and time and an optional switch /NOUNLOAD with the LOCK command. The date and time specifies when the structure will be locked so that users cannot access it after the date and time you specify. The /NOUNLOAD switch specifies that the structure will not be removed, but will be locked from user access.

To reverse the effects of a LOCKed structure, you can use the OPR command UNLOCK.

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----- Examples -----

1. You want DSKZ: to be locked at 16:00 to change your operation over to the evening production schedule.

```
OPR>LOCK DSKZ: 16:00 <RET>
```

```
OPR>
14:10:13          -- Structure DSKZ: --
                   LOCK set for 21-Feb-80 16:00
```

```
OPR>
```

2. To reverse the effects of DSKZ: being locked at 16:00:00, you can unlock the structure.

```
OPR>UNLOCK DSKZ: <RET>
```

```
OPR>
16:01:07          -- Structure DSKZ: pending LOCK canceled --
```

```
OPR>
```

15.5.3.2 Removing a Structure with DISMOUNT -

To dismount and/or remove a structure from the system (perhaps to have maintenance done on a drive, to run TWICE on a structure, or to mount another structure), use the OPR command DISMOUNT.

In addition, you can specify the /REMOVE switch with the DISMOUNT command to automatically stop the structure for removal.

If users currently have the structure mounted, the following message appears at your OPR terminal:

```
OPR>
hh:mm:ss      <n> Device str:      -- Problem removing structure --
                Mount count = nn
                RESPOND with ABORT (CANCEL) or PROCEED
```

```
OPR>
```

where:

hh:mm:ss	specifies the time the message was sent to you
<n>	specifies the message number that you must respond to
str:	specifies the structure name that other users are accessing
nn	specifies the number of users who have the structure volume mounted

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You must do one of the following:

- o If you must dismount the structure immediately, you can send a message to all other users that the structure is being dismounted and then respond with PROCEED.
- o If time allows, you can use the LOCK command to prevent other users from accessing the structure and then, at the appropriate time, dismount the structure.
- o If you cannot dismount the structure or if you specified the wrong structure in the DISMOUNT command, you can respond to the message number with ABORT to cancel the dismount request.

When you respond with ABORT, OPR displays the following message:

```
hh:mm:ss          -- Can't Dismount Structure str:  --
```

If you respond with PROCEED, the structure is dismounted and OPR displays following message:

```
hh:mm:ss          -- Structure str: Dismounted --  
                  From Unit: disk-unit-name
```

----- Examples -----

1. You want to dismount a structure from system access so that you can run TWICE on the structure. First, send a message to all users that the structure is being dismounted by operations.

```
OPR>SEND ALL DSKX: WILL BE DISMOUNTED IN 10 MIN. <RET>
```

```
OPR>  
15:50:19  
;;SYSTEM: - DSKX: WILL BE DISMOUNTED IN 10 MIN.
```

```
OPR>
```

In 10 minutes, use the DISMOUNT command to dismount DSKX: from system use.

```
OPR>DISMOUNT STRUCTURE DSKX: <RET>
```

```
OPR>  
16:00:13 <16> Device DSKX:      -- Problem removing structure --  
                Mount count = 9  
                RESPOND with ABORT (CANCEL) or PROCEED
```

```
OPR>
```

Now use the RESPOND command to proceed with the dismount.

```
OPR>RESPOND 16 PROCEED <RET>
```

```
OPR>  
16:01:18          -- Structure DSKX Dismounted --  
                  From Unit: RPD4
```

```
OPR>
```

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2. You need to dismount TEST: at 16:00 to change over to the production shift. First, LOCK the structure to prevent additional users from mounting it.

```
OPR>LOCK TEST: <RET>
```

```
OPR>  
15:15:30          -- Structure TEST: Locked --
```

```
OPR>
```

```
At 16:00, dismount and remove structure TEST: from disk unit  
RPD1.
```

```
OPR>DISMOUNT STRUCTURE TEST: /REMOVE <RET>
```

```
OPR>  
16:01:39          -- Structure TEST Dismounted --  
From Unit: RPD1
```

```
OPR>
```

15.5.4 Canceling Structure Mount Requests

If you are unable to satisfy a user's structure mount request, you can delete the mount request by giving the OPR command CANCEL MOUNT-REQUEST nn. You should give a reason why you are canceling the mount request. You can do this by giving the /REASON switch with the CANCEL command.

----- Example -----

Cancel structure mount request 204.

```
OPR>CANCEL MOUNT-REQUEST 204 /REASON: NO AVAILABLE DISK DRIVES <RET>
```

```
OPR>  
10:23:17          -- Mount Request 204 Canceled --
```

```
OPR>
```

15.5.5 Displaying Structure Status

You can display the status of the file structures with the SHOW STATUS STRUCTURE command. With this command, you can specify one of the following:

- o The structure name, to display the status of an individual disk file structure currently known to the system
- o The /USERS switch, to display the status of each file structure, along with the users currently accessing the structure

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If you do not specify either the file structure name or the /USERS switch, the SHOW STATUS STRUCTURE command displays all structures mounted and known to the system.

The output from this command displays:

- o The name of the file structure
- o The PPN of the owner, if the structure is private
- o The time (in hour and minutes) that the file structure was mounted
- o The number of free blocks on the file structure
- o The mount count (the number of users currently accessing the file structure) and the request count (the number of jobs that have allocated the structure)
- o The volume name of the disk file structure and its unit number
- o The disk drive type
- o The disk drive name

With the /USERS switch specified, the output display includes the user's name, [PPN], and job number.

----- Examples -----

1. Use the SHOW STATUS STRUCTURE command to display all disk file structures.

```
OPR>SHOW STATUS STRUCTURE <RET>
```

```
OPR>
```

```
8:50:55
```

```
-- Disk File Structures --
```

Name	Time	Free	Mount	#Req	Volume	Type	Drive	Owner	PPN
BLKX	6:53	15580	0	8	BLKX0	1/1	RP04	RPA2	31,5063
DSKA	6:53	26152	24	12	DSKA0	1/1	RP06	RPD0	
DSKB	6:53	56460	12	0	DSKB0	1/2	RP06	RPD1	
				3	DSKB1	2/2	RP06	RPD2	
DSKC	7:34	34960	24	0	DSKC0	1/2	RP06	RPB3	
				0	DSKC1	2/2	RP06	RPB4	
DSKZ	8:41	721740	1	0	DSKZ0	1/1	RP06	RPE0	20,404

```
TEST --Waiting to be mounted--
```

```
Total of 6 file structures
```

```
(5 mounted, Total of 854892 free blocks)
```

```
OPR>
```

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2. Use the SHOW STATUS STRUCTURE command with the /USERS switch for DSKB:.

```
OPR>SHOW STATUS STRUCTURE DSKB: /USERS <RET>
```

```
OPR>
```

```
8:58:14
```

```
-- Disk File Structures --
```

Name	Time	Free	Mount	#Req	Volume	Type	Drive	Owner	PPN
DSKB	6:53	56460	12	0	DSKB0	1/2	RP06	RPD1	
				3	DSKB1	2/2	RP06	RPD2	

```
Users: Job 10 User OPERATOR [1,2]
        Job 20 User TONY WACHS [10,10]
        Job 25 User YOUNG-KP [30,5221]
        Job 21 User BROWN.E [27,5107]
        Job 22 User QHALLYBURTON [10,5324]
        Job 27 User RON LUSK [30,5524]
        Job 28 User OPERATOR [1,2]
        Job 31 User MAROTTA [27,5434]
        Job 33 User CUSTER,L [27,2345]
        Job 37 User TUCKER,B [27,5342]
        Job 40 User CARLSON,A [10,3331]
        Job 41 User GODSELL,S [10,334]
```

```
OPR>
```

15.5.6 Displaying Disk Drive Status

You can display the status of the disk drives with the SHOW STATUS DISK-DRIVES command. With this command, you can specify one of the following:

- o /ALL to display FREE, MOUNTED, and unavailable disk drives and their current status

```
OPR>SHOW STATUS DISK-DRIVES /ALL
```

- o /FREE to display all disk drives that are available for file structure mounts

```
OPR>SHOW STATUS DISK-DRIVES /FREE
```

- o /MOUNTED to display those disk drives that are currently mounted and known to the system

```
OPR>SHOW STATUS DISK-DRIVES /MOUNTED
```

If you do not specify a switch, the SHOW STATUS DISK-DRIVES command defaults to /ALL.

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The SHOW STATUS DISK-DRIVES command with /FREE displays:

- o The disk drive name
- o The auxiliary port name
- o The disk drive type
- o The status of the disk drive
- o The AVR (automatic volume recognition) status (YES when AVR is enabled, NO when AVR is disabled.)

The SHOW STATUS DISK-DRIVES command with /MOUNTED displays the same information as the /FREE switch with the following additional columns. Note that the status column shows the word "Mounted".

- o The file structure name
- o The volume name of the file structure
- o The file structure unit number

The output display with /ALL show FREE, MOUNTED, and unavailable disk drives.

----- Examples -----

1. Use the SHOW STATUS DISK-DRIVES command with the /FREE switch.

```
OPR>SHOW STATUS DISK-DRIVES /FREE <RET>
```

```
OPR>
```

```
10:12:03
```

```
-- Disk Drive Status --
```

Drive	Type	Status	AVR
RP01	RP04	Free	Yes
RP05	RP06	Free	Yes
RP05	RP06	Free	Yes
RP01	RP04	Free	Yes

```
OPR>
```

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2. Use the SHOW STATUS DISK-DRIVES command with the /MOUNTED switch.

```
OPR>SHOW STATUS DISK-DRIVES /MOUNTED <RET>
```

```
OPR>
 9:23:45                -- Disk Drive Status --

Drive  Type   Status   AVR   STR   Volume  Unit#
-----
RPA2   RP04   Mounted  Yes   BADP  BADP0   0
RPA3   RP20   Mounted  Yes   BLKX  BLKX0   0
RPB0   RP04   Mounted  Yes   SIRS  SIRS0   0
RPB1   RP06   Mounted  Yes   BLKK  BLKK0   0
RPB6   RP04   Mounted  Yes   GAL0  GAL00   0
RPD0   RP06   Mounted  Yes   DSKC  DSKC0   0
RPB2   RP06   Mounted  Yes   DSKC1 DSKC1   1
RPE0   RP20   Mounted  Yes   BLKY  BLKY0   0
```

```
OPR>
```

15.5.7 Controlling Structure Recognition

Structure recognition allows QUASAR to recognize all the mounted packs of a structure. When you mount a structure on a disk drive that has structure recognition enabled, QUASAR automatically mounts the structure.

To disable structure recognition, use the following OPR command:

```
OPR>DISABLE STRUCTURE-RECOGNITION <RET>
```

```
hh:mm:ss                -- Structure Recognition is Disabled --
```

In addition, you can check the status of the structures with the OPR command SHOW STATUS STRUCTURE.

If structure recognition is not already enabled, use the following OPR command to enable structure recognition:

```
OPR>ENABLE STRUCTURE-RECOGNITION <RET>
```

15.5.8 Controlling Disk Drive Volume Recognition

Disk drive volume recognition allows you to mount disks without telling the system the volume identification of the structure. When you mount a disk pack on a disk drive that has volume recognition enabled, the system automatically reads the volume identifier from the HOM blocks when the disk drive is brought on line.

If your system is using volume recognition for disk drives, then it is likely that volume recognition has been enabled. Both structure and volume recognition are enabled by default. If, for some reason, you need to disable volume recognition for one or all disk drives, use the following OPR command:

```
OPR>DISABLE VOLUME-RECOGNITION argument <RET>
```

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where the argument can be:

xxxn: (specifies the physical unit number of a specific drive, such as RPA0:.)

or

DISK-DRIVES (for all disk drives)

One reason for disabling volume recognition on a disk drive is to run TWICE on a structure. When you disable volume recognition, OPR prints the following message confirming that volume recognition has been disabled:

```
hh:mm:ss          Device xxxn -- Volume Recognition is Disabled --
```

In addition, you can check the status of the disk drive with the OPR command SHOW STATUS DISK-DRIVE.

You can enable volume recognition for one or more of the disk drives on your system by giving the following OPR command:

```
OPR>ENABLE VOLUME-RECOGNITION argument <RET>
```

----- Example -----

Disable volume recognition for disk drive 0 (RPA0:).

```
OPR>DISABLE VOLUME-RECOGNITION RPA0: <RET>
```

```
OPR>
12:25:47          Device RPA0 -- Volume Recognition is Disabled --
```

```
OPR>
```

15.6 EXAMINING TAPE/DISK MOUNT REQUESTS IN THE QUEUE

When a user submits a mount request, the request is placed in a queue, where it waits for you to mount the tape or disk, or to delete the request. To examine the mount queue, use the OPR command SHOW QUEUES MOUNT-REQUESTS.

The SHOW QUEUES MOUNT-REQUESTS command displays:

- o The tape/disk volume name of the request
- o The status of the request
- o The type of request (tape or disk)
- o Whether the request is write-enabled or write-locked
(The Write column for disk mount requests is blank. For tape mount requests the Write column contains Enabled for write-enabled or Locked for write-locked.)

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- o The request number
- o The job number
- o The user name and PPN

The status column displays the following:

- o Waiting, if a tape/disk request is waiting to be satisfied
- o A tape/disk drive name, if the request has been satisfied
- o Dismount, if a tape or disk is being dismounted

In addition, the SHOW QUEUES MOUNT-REQUESTS command has optional switches. With the /ALL switch specified, all the available information for each request is printed. With the /SHORT switch specified, only those requests that have not been satisfied are displayed. The default is /SHORT if you do not specify a switch.

----- Example -----

Use the SHOW QUEUES MOUNT-REQUESTS command to display the current mount requests in the queue.

```
OPR>SHOW QUEUES MOUNT-REQUESTS <RET>
```

```
OPR>
```

```
9:34:51
```

```
-- System Queues Listing --
```

```
Tape/Disk Mount Queue:
```

Volume	Status	Type	Write	Req#	Job#	User
BKLX	Waiting	Disk		7	25	YOUNG-KP [30,5221]
TEST01	Waiting	Tape	Enabled	30	41	BROWN.E [27,5107]

```
Volume-set: MTA
```

```
Label-Type: No, Tracks: 9, Density: Default BPI
```

```
There are 2 Requests in the Queue
```

```
OPR>
```

15.7 CONTROLLING SYSTEM LISTS

At various times (possibly between shift or production changes) you may be requested to change one or all of the system lists. These lists consist of:

- o The active swapping list (ASL)
- o The crash dump list (also called the system dump list, or SDL)
- o The system search list (SSL)

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| To change any of these lists, use the OPR command MODIFY. To display
| the system lists, use the OPR command SHOW SYSTEM LISTS. The
| following sections explain these procedures.

NOTE

Consult your system manager before changing system lists. The performance of your system can be greatly affected if you remove or add a structure or disk unit to any of the system lists.

15.7.1 Displaying System Lists

| To display the current system lists, use the SHOW SYSTEM LISTS
| command. This command displays the following information:

- o The structures in the crash-dump list
- o The disk units in the active-swapping list
- o The structures in the system-search list

----- Example -----

| Use the SHOW SYSTEM LIST command to display the current system lists.

OPR>SHOW SYSTEM LISTS <RET>

OPR>

```
11:21:45          -- System Lists --  
Crash Dump List:   BLKL:, BLKM:, BLKN:  
Active Swapping List: RPD1:, RPD2:, RPD0:  
System Search List: BLKN:, BLKL:, TEST:
```

OPR>

15.7.2 Modifying System Lists

To change any of the system lists, use the MODIFY command. With this command, you must specify the specific system list and whether you want to EXCLUDE (remove) or INCLUDE (add) a structure or disk unit. Note that the following changes occur when you modify the lists specified below:

- o Modifying the active-swapping list changes the disk unit names that the system uses to swap pages of memory.
- o Modifying the crash-dump list changes the structures that the system uses to dump (or copy) memory during a system crash.

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- o Modifying the system-search list changes the structures that the system uses to search for file structures and file names when the users specifies SYS:.

----- Example -----

Use the MODIFY command to add structure DSKZ: to the crash dump list.

```
OPR>MODIFY CRASH-DUMP-LIST INCLUDE DSKZ: <RET>
```

```
OPR>
```

```
14:32:02          Device DSKZ  -- Added to Crash Dump List --
```

```
OPR>
```

15.8 RESTORING DISK FILES WITH BACKUP

If a user requests that you restore some files from a magnetic tape, be sure to find out:

- o Which magnetic tape(s) to use. You might have to use a tape containing a complete SAVE and some tapes from incremental SAVES. You should look through the terminal output kept for each save operation and determine which tapes to use.
- o Which files to restore and what directory they are in.
- o Which directory to put them into.
- o Which special BACKUP status commands to use, if any. Refer to Appendix F for more information about BACKUP.

Then do the following:

1. On a terminal, logged-in as [1,2], type MOUNT MTx: with an optional logical-name and the /VOLID:volid switch. The default mode is Write-Locked. The x in MTx: represents the tape controller identification. If the tape is a labeled tape, you must specify the /LABEL switch. Otherwise, the labels are ignored.

OPR prints:

```
hh:mm:ss          Device MTxnnn  -- Labeled Volume Mounted --  
                  Density nnnn BPI, Write-Locked
```

If volume recognition is disabled, use the IDENTIFY command to OPR to identify the tape drive to the mount request.

2. If the desired structure is not mounted, type MOUNT structure-name: at TOPS-l0 monitor command level, and physically mount and prepare the structure.

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3. Type R BACKUP and give the following BACKUP commands:

.R BACKUP<RET>
/TAPE MTxn: <RET>
/REWIND <RET>
/RESTORE str:filespec[PPN] <RET>

"Done

(See argument types for filespecs below.)

4. When BACKUP replies with "Done, type:

/REWIND <RET>
/EXIT <RET>
.DISMOUNT MTxn: <RET>

5. When the OPR terminal replies with:

hh:mm:ss Device MTxnnn -- Released --
 User: OPERATOR [1,2] Job# 2

remove the magnetic tape from the tape drive.

Argument types for RESTORE:

- o To restore an entire user area; for example, to copy all the files of directory DSKA:[10,4733] on tape to directory DSKA:[10,4733]:

RESTORE DSKA:[10,4733]

- o To restore certain files of directory DSKA:[10,4733] on tape to directory DSKA:[10,4733] on disk:

RESTORE DSKA:filespec1[10,4733],DSKA:filespec2[10,4733],...

- o To restore DSKA:A.MAC[27,5107] to DSKB:A.MAS[10,4733]:

RESTORE DSKB:A.MAS[10,4733]=DSKA:A.MAC[27,5107]

- o To copy all files from DSKB:[1,4] on tape to SAVE:[1,4] on disk:

RESTORE SAVE:[1,4]=DSKB:[1,4]

----- Example -----

| A user has requested you to restore all of his files on structure MISC:.

.MOUNT MTA: /REELID:001234 <RET>

The OPR terminal replies:

18:14:23 -- Magtape mount request #146 --
 User: OPERATOR [1,2] Job# 2
 Volume-set-name: MTA-CJ7ZXY

Volume-ID	Write	Labels	Track	Density
001234	Locked	No	9	1600

OPR>

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Mount and ready tape volume 001234 and OPR replies:

```
18:15:01      Device MTA260  -- Unlabeled Volume Mounted --  
              Density 1600 BPI, Write-Locked
```

OPR>

Use the IDENTIFY command at the OPR terminal.

```
OPR>IDENTIFY MTA0: REQUEST-ID 146 <RET>
```

```
OPR>  
18:16:56      Device MTA260  -- Volume 001234 Reassigned --  
              User: OPERATOR [1,2] Job# 2
```

OPR>

Run BACKUP from the monitor terminal.

```
.R BACKUP <RET>
```

```
/TAPE MTA0: <RET>  
/REWIND <RET>  
/RESTORE MISC:[21,3307] <RET>  
121,3307 MISC
```

```
"Done  
/REWIND <RET>  
/EXIT <RET>
```

```
.DISMOUNT MTA0: <RET>  
MTA0: Dismounted  
.
```

OPR replies with:

```
18:26:12      Device MTA260  -- Released --  
              User: OPERATOR [1,2] Job# 2
```

OPR>

15.9 COMMUNICATING WITH THE USERS

Timesharing and batch users often need to communicate with you to perform various tasks, obtain help, or send and receive messages. This section describes how to answer PLEASE requests with the OPR command RESPOND, and how to send messages to a user with the OPR command SEND.

NOTE

The SEND command that is discussed here is the OPR command SEND. If you are at monitor command level, you can use the monitor SEND command. These commands are slightly different. Refer to the TOPS-10 Operating System Commands Manual for a discussion of the SEND monitor command.

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15.9.1 Answering PLEASE Messages with OPR

The PLEASE command provides two-way communication between you and the user. It is initiated by the user typing at monitor level:

```
.PLEASE <RET>
```

Enter text, terminate with Altmode or ^Z

When a user sends a message with PLEASE, you receive a message at the OPR terminal that is time stamped and has a message number enclosed in angle brackets. You should answer the message with the RESPOND command from OPR.

Whenever you receive a message by means of the PLEASE command, the user issuing the command is identified by job number, PPN, user name, and terminal number. For example:

User SMITH,J [40,64] at terminal 100 types the following line:

```
.PLEASE <RET>
```

Enter text, terminate with Altmode or ^Z
WHEN WILL MTA2 BE FREE ^Z

```
[PLSOPN Operator at KL1026(26) has been notified at 9:08:22]
```

The message is transmitted to the CTY and appears at OPR command level as follows:

```
OPR>  
10:06:33 <3>      -- Message from Timesharing User --  
                  From User SMITH,J [40,64] at terminal 100  
                  WHEN WILL MTA2 BE FREE
```

```
OPR>
```

If you know a batch job using MTA2: will be finished soon, you can answer:

```
OPR>RESPOND 3 MTA2 WILL BE FREE IN 10 MIN <RET>
```

```
OPR>
```

Your response will appear on the user's terminal.

Respond to the PLEASE commands as soon as possible, because in some cases the user cannot proceed to other tasks until you respond to the message.

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15.9.2 Talking to a User with SEND

If you need to send a message to a user, you can use the OPR command SEND. Use any of the following commands at the OPR terminal.

```
OPR>SEND JOB n message <RET>
```

or

```
OPR>SEND TERMINAL m message <RET>
```

or

```
OPR>SEND ALL message <RET>
```

where n is the number of the timesharing or batch job in the first command format above, and m is the number of the user's terminal line in the second command format above.

To send a message to all the users on the system, use ALL instead of the job number or terminal number.

The SEND command also allows you to include the message with the SEND command string or as multiple lines terminated by a <CTRL/Z>.

The SEND command does not affect the user's job. If the user is waiting for input to a program, the message sent will appear on the user's terminal, but it will not affect the program input.

Refer to the TOPS-10 Operator's Command Language Reference Manual for a complete description of the OPR SEND command.

----- Examples -----

1. Tell a user that a requested task is now complete.

```
OPR>SEND JOB 27 <RET>
Enter text and terminate with ^Z
THE UPDATED FORTRAN SOURCE LIBRARY IS NOW UP <RET>
YOU MUST CONNECT TO TEST: <RET>
^Z
```

```
OPR>
13:57:19          -- SEND Command Completed --
```

```
OPR>
```

2. Send a message to terminal 15 to notify the user that batch requests are being held.

```
OPR>SEND TERMINAL 15 YOUR BATCH REQUESTS ARE BEING HELD <RET>
```

```
OPR>
17:23:09          -- SEND Command Completed --
```

```
OPR>
```

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15.10 REPORTING ERRORS WITH OPR

You can report problems or errors that occur during normal operations with the OPR command REPORT. This command allows you to enter one or more lines of text into the SYS:ERROR.SYS file. This file can be printed when you run your system error program, such as SPEAR.

In addition, the REPORT command optionally allows you to enter the following:

- o A user name of 1 to 6 characters in length. You may supply your last name here. Your PPN is always automatically entered into the system error report file.
- o A device name of 1 to 6 characters in length. The device name may be used when a device is causing errors.

----- Example -----

Report an error with tape drive MTA2:.

```
OPR>REPORT SMITH MTA2: <RET>
Enter text and terminate with ^Z
TAPE DRIVE MTA2 HAS STOPPED FOR NO APPARENT REASON. <RET>
FIELD SERVICE HAS BEEN CALLED. <RET>
OPERATIONS ^Z
OPR>
11:35:09      -- ERROR.SYS entry made by the REPORT Command --
OPR>
```

15.11 DOWN-LINE LOADING ANF-10 REMOTE STATIONS

To load an ANF-10 remote station (DN80-series or DN92) from the TOPS-10 system, you must use the NETLDR program. This program should be available on SYS. You can only run NETLDR if the remote node that needs to be loaded is running its bootstrap and has issued a load request. The load request is issued when the remote node is turned on and its bootstrap ROM is activated. After the load request comes up the line to the TOPS-10 host, NETLDR can be run to down-line load the appropriate software into the remote node.

NETLDR runs automatically when the monitor receives a load request, unless either SCHED 1000 (down-line node loading disabled) is set, or the monitor was brought up in debugging mode (Bit 0 of DEBUGF is set). (Refer to the NETLDR Specification in the TOPS-10 Software Notebook Set.)

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15.11.1 Running NETLDR Automatically

Normally, NETLDR runs automatically. For this to occur, the NETLDR program must be on SYS:. When the node is started up, its bootstrap program sends a load request to a TOPS-10 host through intermediate node(s). As long as SCHED 1000 has not been set, the host processor will create a job and run NETLDR automatically. If SCHED 1000 has been set, NETLDR will be neither loaded nor run.

When NETLDR starts automatically in response to a load request from a remote station, it prints the following message on the CTY:

```
%LOAD req on Node nodename (nn) Line:syn# for DNtyp Ser:ser
```

This message indicates that a station of type DNtyp has sent a load request to the host. Nodename is the name and nn is the number of the host system from which the remote DNtyp station must be loaded. Line:syn# is the number of the synchronous line from the node that first received the load request to the remote station, and Ser:ser is the serial number of the remote station's processor (ser can be zero).

If the load request includes a file specification, NETLDR loads the specified file directly into the node. If the load request does not contain all the necessary information, NETLDR searches SYS:NETLDR.INI for the appropriate entry. If there is no corresponding entry in SYS:NETLDR.INI, the node cannot be loaded and an error message of the following form appears at the CTY:

```
?NETNMI - Cannot find match in SYS:NETLDR.INI
```

The SET SCHED command and the NETLDR switch /IGNORE can be used to control the load requests. If a host is to disregard all load requests, the system operator can prevent the automatic running of NETLDR by typing the operator-privileged command:

```
.SET SCHED 1000 <RET>
```

However, if requests from certain nodes are to be disregarded, the NETLDR switch /IGNORE can be placed in the NETLDR.INI file.

15.11.2 Running NETLDR Manually

To run NETLDR manually, you must start by issuing a command to SET SCHED 1000. This prevents NETLDR from running automatically while you are running it manually. Issue the following commands:

```
.SET SCHED 1000 <RET>  
.R NETLDR <RET>
```

NETLDR responds with the prompt:

FILE:

You must enter a command string of the form:

```
filespec/CPU-type/NODE:nodeid /LINE:syn# /switch/switch...  
/SELF
```

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where entries are:

Entry	Form/Use
filespec	Form: dev:filename.ext[PPN] In a load operation, filename is required; other arguments default to your disk area, file extension .BIN, and your [PPN]. In a dump operation, an omitted filespec defaults to DSK:nodename.LSD. If the node to be dumped is running, nodename is the name of the node itself. If the node is not running, nodename must be the name of an adjacent node.
/CPU-type	Form: /PDP11, /11, /PDP8, or /8 This entry must appear. It specifies the processor type of the remote node (use /11 for DN8x-series stations, /8 for DN92-series).
/NODE:nodeid	Form: 6-character nodename or three-digit octal node number This entry must appear. If the remote node is running, nodeid specifies the node itself; if the remote node is not running (as in a load operation), nodeid specifies an adjacent running node.
/LINE:syn# /SELF	One of these entries must appear. If the remote node is running (as when NETLDR is requesting a dump), the /SELF switch is used. If the remote node (to be loaded) is not running, syn# specifies the synchronous line at the adjacent node over which loading is to occur.

Optional NETLDR switches are:

Switch	Action
/DUMP:c-d	Dumps all or a specified portion of the remote node's memory, in octal. /DUMP with no arguments gives a full memory dump; /DUMP:c-d dumps from location c to location d, inclusive; /DUMP:c-* dumps from location c to location 17777 (PDP-8) or 137776 (PDP-11).
/IMAGE	Specifies that the file to be read is in image mode. This is the default for a PDP-8 node.
/LOAD	Loads the file into the remote node; does not start the program.
/PACKED	Specifies that the file to be read is in PDP-11 packed image mode. This is the default for a PDP-11 node.
/START:addr	Starts the program at address addr. If no filespec is given in the command, the program currently in memory is started. This switch is not needed if a filespec is given and the program is to be started at its default start address.

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15.12 CONTROLLING ANF-10 REMOTE STATIONS

If your installation has DN60-series (IBMCOM), DN80-series, DN92, or DN20 network software, you can perform the following tasks for remote stations using OPR commands:

- o Start a node
- o Shutdown a node
- o Display the status of a network node
- o Route output from one node to another node
- o Display the route table

This section describes the tasks associated with the above commands. The TOPS-10 Remote Station Guide provides more information about the ANF-10 remote stations and operating them. The DECnet front end (DN20 running MCB) and the DECnet network tables must be built by the system manager and maintained by the operator using DECnet programs described in the DECnet-10 Operator's and System Manager's Guide.

NOTE

If your installation has 2780/3780 network software, you can perform additional tasks with the OPR commands DEFINE and SET NODE. These commands are described in the TOPS-10 Operator's Command Language Reference Manual and in the TOPS-10 IBM Emulation/Termination.

If you are a remote station operator, the OPR running at your station can control only the devices at your remote station. All commands you specify default to your node when those commands are passed to ORION for processing. In addition, you have complete control over all jobs located at or queued up at your node.

To specify a remote node, use the /NODE switch. This switch is available with many of the OPR commands described in previous sections of this manual. The /NODE switch allows you to identify any node in the network. The format of the /NODE switch is:

/NODE:node-id::

where the node-id is either the number or the name of the node.

Because a remote station operator has control only of the devices and jobs at his remote station, his commands always default to a job or device at his station when the command is processed by ORION. Therefore /NODE is not necessary to refer to devices at the remote station. However, if the operator would like to refer to another node in the system, the /NODE switch must be included in the OPR command.

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15.12.1 Starting and Shutting Down a Node

To start a node, use the OPR command `START NODE`. This also schedules start-up for the printer and/or card reader at that node.

----- Example -----

Start node CTCH22(22).

```
OPR>START NODE CTCH22:: <RET>
```

```
OPR>
```

```
9:08:21      Printer 0 [CTCH22(22)]  -- Startup Scheduled --
```

```
OPR>
```

```
9:08:21      Reader 0 [CTCH22(22)]  -- Startup Scheduled --
```

```
OPR>
```

To shut down a node, use the OPR command `SHUTDOWN NODE`. This also schedules shutdown for the printer and/or card reader at that node.

----- Example -----

You shut down node CTCH22(22).

```
OPR>SHUTDOWN NODE CTCH22:: <RET>
```

```
OPR>
```

```
14:34:21     Printer [CTCH22(22)]  -- Shutdown --
```

```
OPR>
```

```
14:34:21     Reader [CTCH22(22)]  -- Shutdown --
```

```
OPR>
```

15.12.2 Displaying Node Status

To display the status of one or all nodes in your network use the OPR command `SHOW STATUS NETWORK-NODE`. If you do not specify a specific node, this command displays all nodes in the network.

The `SHOW` command displays the following information:

- o The node name and node number
- o The status of the node (either On-line or Off-line)

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----- Example -----

Display the status of all nodes in your network.

```
OPR>SHOW STATUS NETWORK-NODE <RET>
```

```
OPR>
```

```
9:08:35          -- System Network Status --
```

Node	Status
KL1026 (26)	Online
COMET (70)	Online
NOVA (31)	Online
TITAN (61)	Online
WIZARD (75)	Online
KS4101 (76)	Online
CTCH22 (22)	Offline
JINX (134)	Offline

There are 8 nodes in the network

```
OPR>
```

15.12.3 Routing Device Output between Nodes

To route the output for one device or all devices from one or more nodes to another node, use the OPR command ROUTE. The ROUTE command can route the output for the following devices:

- o ALL-DEVICES
- o CARD-PUNCH
- o PAPER-TAPE-PUNCH
- o PLOTTER
- o PRINTER

The ROUTE command is useful when there are hardware problems on a device whose output is very important. If you are the operator at a host system, you can route output to any node. If you are a remote station operator, you cannot route output; you must request that routing be done for you by the host operator.

----- Examples -----

1. To route the output of all printers on node COMET to printer number 1 on node KL1026, you use the following command:

```
OPR>ROUTE PRINTER ALL-UNITS /NODE:COMET::1/NODE:KL1026:: <RET>
```

```
COMET:: 1 /NODE:KL1026:: <RET>
```

```
OPR>
```

```
13:05:19          -- All Printers [COMET] Routed to [KL1026(26)]
```

```
--
```

```
OPR>
```

When this command has been executed, an entry is entered into QUASAR's Route Table (refer to the next section).

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2. In addition, the ROUTE command allows you to delete entries in the system route table. To end device routing on a node, omit the destination node-id.

To delete the entry made above, use the following command:

```
OPR>ROUTE PRINTER ALL-UNITS /NODE:COMET:: <RET>
```

```
OPR>  
17:34:19          -- Routing for All Printers [COMET] Deleted --
```

```
OPR>
```

15.12.4 Displaying the Routing Table

To display the route table, use the OPR command SHOW ROUTE-TABLE. The routing entries are listed from specific device entries (such as Printer 0) to more general entries (such as All printers). For example, the output of printer 0 on node NOVA:: routed to node ALPHA:: is listed first; while the output of all printers on node CTCH22:: routed to KL1026:: is listed second.

----- Example -----

Use the SHOW ROUTE-TABLE command to display the current device output that has been routed.

```
OPR>SHOW ROUTE-TABLE <RET>
```

```
OPR>  
12:34:09          -- System Device Routing Table --  
  
Printer 0 [NOVA(33)] Routed to Printer 0 [ALPHA(45)]  
All Printers [CTCH22(22)] Routed to [KL1026(26)]
```

```
OPR>
```

15.13 STOPPING AND RESTARTING KS10 COMMUNICATIONS

The ANF-10 network runs on the KS10 processor. The TOPS-10/KS10 host communicates on the network with TOPS-10 remote nodes and other TOPS-10/KS10 hosts.

The TOPS-10/KS10 network consists of a KMC-11, two DUP-11s, the ANF-10 network software, and a KMC-11 loader program, KDPLDR. KDPLDR runs automatically at system start-up. The KDPLDR program initializes the KMC-11 hardware and both of the TOPS-10 network communications lines.

You can stop and restart either or both communication lines by running KDPLDR on the KS10 processor.

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To stop communications, use the following KDPLDR command sequence:

```
.R KDPLDR <RET>
```

```
*/STOP:n/KMC:0 <RET>
```

Where n is 0 or 1 for a DUP-11 line number, or ALL for both lines.

To restart communications, use the following KDPLDR command sequence:

```
.R KDPLDR <RET>
```

```
*/START:n/KMC:0 <RET>
```

Where n is 0 or 1 for a DUP-11 line number or ALL for both lines.

NOTE

To restart communications on both lines of the KS10 processor, you can use the following command sequence:

```
.R KDPLDR <RET>
```

```
*/AUTO <RET>
```

The /AUTO switch is the same as using the switch sequence of:

```
/MCLEAR:0/LOAD:0/VERIFY:0/USTART:0/START:ALL/KMC:0
```

For more information on KDPLDR, refer to the KDPLDR Specification in the TOPS-10 Software Notebook Set.

----- Examples -----

1. Stop all TOPS-10 network communications on the KS10 processor.

```
.R KDPLDR <RET>
```

```
*/STOP:ALL/KMC:0 <RET>
```

2. Restart communications on line 2 of the KS10 processor.

```
.R KDPLDR <RET>
```

```
*/START:1/KMC:0 <RET>
```

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15.14 RECONFIGURING SYSTEM HARDWARE

The CONFIG application has a command subset that enables you to reconfigure system hardware without halting the system. With CONFIG commands you can do the following:

- o Add disk controllers, CPUs, and memory to the system
- o Automatically configure disks and tapes into the system
- o Remove disk controllers, CPUs, and memory from the system
- o Enable and disable automatic reloads of the monitor and DX20 microcode
- o Specify the BOOT-TEXT command string
- o Shut down and reload the system
- o Suspend the system
- o Stop the system, dump the memory image, and continue the system automatically

To enter CONFIG command level use the OPR command, ENTER, as shown below.

```
OPR>ENTER CONFIG<RET>
CONFIG>
```

After you enter the CONFIG command subset, you can type a question mark (?) to display all of the CONFIG commands. See the TOPS-10 Operator's Command Language Reference Manual for a complete description of the CONFIG commands.

----- Example -----

```
.R OPR
OPR>ENTER CONFIG
CONFIG>? one of the following:
ENTER  EXIT  PUSH  RETURN  TAKE  WAIT
  or one of the following:
ADD    AUTO-CONFIGURE  HELP    LOAD    REMOVE
SET    SHOW           SHUTDOWN  SNAPSHOT  SUSPEND
CONFIG>
```


INSERT TAB 2 "ERROR-RECOVERY PROCEDURES" HERE

CHAPTER 16

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

This chapter describes various types of errors that may occur on a KS system. KL error recovery is described in Chapter 17.

When the system is running, unexpected errors may occur, resulting in a crash. A crash can be caused by one or more of the following:

- o Software problems
- o Hardware problems
- o Environmental problems

The system usually uses BOOT as the bootstrap program. When booting from magnetic tape, the BOOTM program boots the system. Use BOOT when you first power up your system. If the system crashes after it has been running for more than five minutes, BOOT automatically dumps and reloads the system.

Excluding crashes, after five minutes you will only have to use BOOT or BOOTM if you power down the system and load from a cold start; or if the system does not recover from an error, preventing BOOT from performing an automatic reload. The monitor calls BOOT, which can dump any amount of memory, from one page to all of it. The bootstrap program is highly tolerant of errors such as memory parity errors. When an error occurs, BOOT prints an error message before it takes corrective action. (For further information on BOOT messages, see Appendix A.)

It is very important to record all system problems accurately. If software problems cause a crash, you must fill out a Software Error Report (SER) form and make an entry in the logbook. Similarly, if hardware problems cause a crash, you must fill out a hardware error form and make a log entry. This chapter discusses some of the errors you may encounter and how you can correct them. To correct errors not discussed in this chapter, contact either the system programmer or your software specialist.

Common problems (and references to the sections that address them) are:

- o Nothing prints on CTY when you type CTRL/backslash (Section 16.1).
- o System does not respond to you or to users (Sections 16.1, 16.4).
- o Two crashes occur within 5 minutes (Section 16.2.2).

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- o System does not automatically reload (Sections 16.1, 16.2.2).
- o System overwrites crash file (Section 16.5).
- o Stopcode prints on CTY (Section 16.6).
- o Message that begins "?Non-recoverable memory" or "?Non-existent memory" prints on CTY (Section 16.7).
- o "*****" prints on CTY above and below a series of messages (Section 16.7).
- o No characters print on CTY (Section 16.8).
- o "?J" prints on CTY (Section 16.9).
- o "%File not found..." prints on CTY (Section 16.9).
- o "%HLTD" prints on CTY (Section 16.11).
- o "?" followed by two or more capital letters prints on CTY (Section 16.12).
- o Power fails or fluctuates (Section 16.13).

16.1 RECOVERING FROM A MICROPROCESSOR CRASH

If the system does not automatically reload after a crash, it may mean that the microprocessor has crashed. If the following are all true, the microprocessor has crashed.

- o The KS10> prompt does not print on the CTY.
- o The CTY is plugged in and has paper.
- o The LOC-LINE switch is set so the terminal is on-line.
- o After you insert the key in the REMOTE DIAGNOSIS switch and set the switch to ENABLE, the REMOTE indicator light is on.
- o The STATE indicator light is blinking.

If the above conditions are not met, refer to Section 16.2. If the above conditions are met, perform the following steps:

1. Go to another terminal. If the system is still up, log in under [1,2].
2. Halt timesharing by typing SET KSYS +hh:mm to OPR. (See Section 16.3 for detailed information on halting timesharing.)

If neither of the above steps is effective, call your Field Service representative.

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16.2 RECOVERING FROM A MONITOR CRASH

To recover from a monitor crash, BOOT must perform the following steps:

1. Record (dump) the memory image as it appeared when the monitor crashed.

BOOT dumps the memory image to the default file DSKB:CRASH.EXE[1,4], which is called the crash file. BOOT always writes the crash file to the [1,4] directory area. However, if the system crashes again, BOOT will not overwrite one crash file with another. Instead, it prints the following dialog on the CTY:

[Dumping on DSKB:CRASH.EXE[1,4]]

BOOT tries to dump the memory image to the default file DSKB:CRASH.EXE[1,4], where DSKB: is the system dump list.

%Unprocessed dump on DSKB:CRASH.EXE[1,4]
Do you want to overwrite it? No<RET>

Type no, which is the default, or yes, and then press RETURN.

Structure on which to dump: DSKB:<RET>

Type the name of the structure on which you want BOOT to dump the crash file, and then press RETURN. BOOT defaults to the system dump list.

[Dumping on DSKB:CRASH.EXE[1,4]]

Approximately 20 seconds elapse while BOOT dumps the memory image to the file DSKB:CRASH.EXE[1,4].

2. Reload the last monitor that was loaded.

When the monitor has been loaded into memory, the monitor startup questions begin. (See Section 10.5.) There is a 60-second time-out after the first monitor startup question. If you do not answer the first question during the 60-second time-out, the system assumes (and prints on the CTY) the default answers to the ONCE dialog. (Refer to the TOPS-10 Software Installation Guide for complete information on the ONCE dialog.)

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Normally, if the monitor crashes, BOOT automatically performs the above steps for you. However, if the monitor crashes twice within 5 minutes, you must direct BOOT to manually perform them. (See Section 16.2.2.)

When your system administrator or Field Service representative reports a crash to DIGITAL, you must provide the logbook information and a magnetic tape containing both the crash file and a copy of the monitor as it appeared before it was run. (Be sure to include operating system and software version numbers.)

After you answer the monitor startup questions, INITIA may print a few lines on the CTY. Whether or not your system runs INITIA at system startup is determined when the monitor is generated. (Refer to the TOPS-10 Software Installation Guide for more information on INITIA.)

16.2.1 Automatically Dumping and Reloading the Monitor

Usually, if the system has not crashed in the last 5 minutes, BOOT automatically dumps and reloads the system. In this case, the following message prints on the CTY:

```
?CPU0 monitor error. Stopcode name is UIL
File TTY6:
Job 2 on TTY6 running FD User [1,2]
```

```
CPU Status Block on dd-mmm-yy hh:mm:ss
```

```
CONI APR, = 001060,,004072
CONI PI, = 000000,,000377
CONI PAG, = 000000,,020000
DATAI PAG, = 500100,,000117
```

```
Reload monitor
```

```
[Dumping on DSKB:CRASH.EXE[1,4]]
```

Approximately 20 seconds elapse while BOOT dumps the memory image to the file DSKB:CRASH.EXE[1,4].

```
[Loading from DSKB:SYSTEM.EXE[1,4]]
```

BOOT is now reloading the monitor.

When the first monitor startup question prints on your CTY, the system has already used the /D switch to BOOT to dump the memory image to the crash file DSKB:CRASH.EXE[1,4] and has loaded the default monitor from the file DSKB:SYSTEM.EXE[1,4].

There is a 60-second time-out after the first monitor startup question. If you do not answer the first question during the 60-second time-out, the system assumes (and prints on the CTY) the default answers to the ONCE dialog. (Refer to the TOPS-10 Software Installation Guide for complete information on the ONCE dialog.)

After you answer the monitor startup questions, INITIA may print a few lines on the CTY. Whether or not your system runs INITIA at system startup is determined when the monitor is generated. (Refer to the TOPS-10 Software Installation Guide for more information on INITIA.)

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

16.2.2 Manually Dumping and Reloading the Monitor

To manually dump and reload the monitor, perform the following steps:

1. Type everything that is in UPPERCASE BOLD PRINT in the following sample dialog:

^ \ENABLED	Type CTRL/backslash, which does not echo. The microprocessor then prints the word ENABLED.
KS10>SHUT<RET>	Type SHUT at the KS10> prompt, then press RETURN to shut down the system.
KS10>USR MOD	Enter user mode.
BOOT>/D<RET>	Type /D and press RETURN to dump the memory image to the default file specification, DSKB:CRASH.EXE[1,4]. (The prompt prints here only if the system has not been up for 5 minutes.)
[Dumping on DSKB:CRASH.EXE[1,4]]	Approximately 20 seconds elapse while BOOT dumps the memory image to the file DSKB:CRASH.EXE[1,4].
BOOT><RET>	Press RETURN to load the default monitor from the file DSKB:SYSTEM.EXE[1,4].
[Loading from DSKB:SYSTEM.EXE[1,4]]	BOOT is now reloading the monitor.

When the monitor has been loaded into memory, the monitor startup questions begin.

2. Answer the monitor startup questions discussed in Section 10.5.

After you answer the monitor startup questions, INITIA may print a few lines on the CTY. Whether or not your system runs INITIA at system startup is determined when the monitor is generated. (Refer to the TOPS-10 Monitor Installation Guide for more information on INITIA.)

16.3 PERFORMING A SCHEDULED DUMP AND RELOAD

To perform a scheduled dump and reload, you must first halt timesharing and then dump and reload the system. See Section 10.3.2 for information on how to perform a scheduled dump and reload.

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

16.4 RECOVERING FROM A HUNG OR LOOPING SYSTEM

Sometimes the central processor does not respond to you or to users. In this case, if the scheduler cannot run any job other than the null job, then the central processor is probably hung or looping.

To recover from a hung or looping system, make certain the processor LOCK switch is off. Then follow the procedure discussed in Section 16.2.2.

If this procedure does not solve the problem, you can perform the following steps:

NOTE

The following procedure will destroy useful information in the dump. Use this procedure only if the procedure described in Section 16.2.2 does not work.

1. Make sure the processor LOCK switch is off.
2. Type everything that is in UPPERCASE BOLD PRINT in the following sample dialog:

^ \ENABLED	Type CTRL/backslash, which does not echo. The microprocessor then prints ENABLED.
KS10>MR<RET>	Type MR and press RETURN to reset memory.
KS10>SM<RET>	Type SM and press RETURN.
%HLTD/000000 PC/000000,,000000	
KS10>ST 407<RET>	Type ST 407 and press RETURN.
KS10>USR MOD	Enter user mode.
BOOT>/D<RET>	Type /D and press RETURN to dump the memory image to the default file DSKB:CRASH.EXE[1,4]. (If the system has been up for five minutes, the prompt does not print.)
[Dumping on DSKB:CRASH.EXE[1,4]]	Approximately 20 seconds elapse while BOOT dumps the memory image to the file DSKB:CRASH.EXE[1,4].

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BOOT><RET>

Press RETURN to load the default monitor from the file DSKB:SYSTEM.EXE[1,4].

[Loading from DSKB:SYSTEM.EXE[1,4]]

BOOT is now reloading the monitor.

When the monitor has been loaded into memory, the monitor startup questions begin.

3. Answer the monitor startup questions discussed in Section 10.5.

16.5 COPYING CRASH DATA

CRSCPY is the default program that automatically copies system dumps and then clears the unprocessed-dump bit. CRSCPY runs at system startup and when a continuable stopcode occurs. (Refer to Appendix A and the files CRSCPY.DOC and CRSCPY.HLP for complete information on CRSCPY.)

| If you want to use your installation's own program to copy system
| dumps, you must redefine the symbol CPYNAM in the SIXBIT hardware
| definitions in MONGEN to be equivalent to the name of your
| installation's program. (Refer to the TOPS-10 Software Installation
| Guide for complete information on MONGEN.)

16.6 RECOVERING FROM STOPCODES (MONITOR ERROR STOPS)

When the monitor detects an internal error, it executes its stopcode macro. This macro prints the following message on the CTY:

?CPU0 monitor error. Stopcode name is xxx

where:

xxx is a mnemonic identifying the error. (See the STOPCD specification in the Software Notebooks for a complete list of stopcodes.)

| The following types of stopcodes, may occur:

- o DEBUG (See Section 16.6.1)
- o JOB (See Section 16.6.2)
- o STOP (See Section 16.6.3)
- o CPU (See Section 16.6.4)
- o HALT (See Section 16.6.5)
- o INFO (See Section 16.6.6)
- o EVENT (See Section 16.6.6)

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

In general, there are two types of stopcodes: continuable stopcodes that allow most user jobs to continue without interruption, and noncontinuable stopcodes that cause the system to halt and reload. HALT stopcodes do not initiate automatic recovery procedures. Also, HALT stopcodes do not cause the '?CPU0 monitor error. Stopcode name is xxx' error message to print. The following is an example of what you will see on the CTY when the monitor detects a continuable stopcode.

?CPU0 monitor error. Stopcode name is ICN

CPU Status Block on dd-mmm-yy hh:mm:ss

```
CONI APR, = 001060,,004102
CONI PI, = 000000,,000777
CONI PAG, = 000000,,020000
DATAI PAG, = 500100,,000002
[Dumping on DSK:CRASH.EXE[1,4]]
[Continuing system]
```

In this case, the monitor executed its stopcode macro, dumped the memory image, and continued the system.

For more information on stopcodes, refer to the TOPS-10 Stopcodes Specification.

16.6.1 Identifying DEBUG Stopcodes

A DEBUG stopcode is not immediately harmful to any job or to the system. The monitor prints the following message on the CTY:

```
?CPU0 monitor error. Stopcode name xxx
[Continuing system]
```

Processing then continues. Fill out a Software Error Report form.

16.6.2 Identifying JOB Stopcodes

A JOB stopcode indicates an internal error that endangers the integrity of the job that is currently running. The monitor prints the following message on the CTY:

```
?CPU0 monitor error. Stopcode name xxx
[Aborting job]
```

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

Also, the following message prints on the user's terminal:

```
?Monitor error; UUO at address
```

where address is one of the following virtual memory locations:

- o User loc n
- o Exec loc n; Exec called from exec location m
- o Exec loc n; Exec called from user location m

where m and n are memory addresses.

The monitor then aborts the current job and continues normal operation. Fill out a Software Error Report form.

16.6.3 Identifying STOP Stopcodes

A STOP stopcode indicates an internal error that endangers the integrity of the entire system. The monitor prints the following message on the CTY:

```
?CPUØ monitor error. Stopcode name xxx  
Reload monitor
```

This means that all jobs are aborted and the system begins to automatically dump and reload the monitor.

If the monitor can obtain the necessary information, it prints a supplementary message on the CTY of the form:

```
JOB jobno on TTYnnn running xxxxxx  
UUO is octal at user PC address  
File filespec
```

where:

jobno	is the number of the job causing the error.
nnn	is the number of the controlling TTY.
xxxxxx	is the name of the program running for that job.
octal	is the octal representation of the monitor call that failed for that job.
address	is the value of the program counter for that job.
filespec	is the file specification for the file being accessed.

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

16.6.4 Identifying CPU Stopcodes

A CPU stopcode has the same effect as a STOP stopcode. In other words, a CPU stopcode indicates an error that endangers the integrity of the entire system. The monitor prints the following message on the CTY:

```
?CPU0 monitor error. Stopcode name xxx
Reload monitor
```

This means that all jobs are aborted and the system begins to automatically dump and reload the monitor.

If the monitor can obtain the necessary information, it prints a supplementary message on the CTY of the form:

```
Job jobno on TTYnnn Running xxxxxx
UUO is octal at user PC address
File filespec
```

where:

jobno	is the number of the job causing the error.
nnn	is the number of the controlling TTY.
xxxxxx	is the name of the program running for that job.
octal	is the octal representation of the monitor call that failed for that job.
address	is the value of the program counter for that job.
filespec	is the file specification for the file being accessed.

16.6.5 Identifying HALT Stopcodes

A HALT stopcode affects the entire system. Also, the monitor cannot automatically reload. In this case, the system halts, and you must manually dump and reload the monitor. (See Section 16.2.2.)

16.6.6 Identifying INFO and EVENT Stopcodes

INFO and EVENT stopcodes report on system events that may be of interest in debugging crashes. These stopcodes are for informational purposes only, and do not interrupt system or job execution. EVENT stopcodes are the same as INFO, but do not ring the terminal bell, and the CTY message is in a different format.

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

16.7 RECOVERING FROM PARITY AND NXM ERRORS

Memory-system errors are hardware errors. The types of memory-system errors are:

1. Parity errors
2. NXM (nonexistent memory) errors

When the system detects a parity or NXM error, it performs the following steps:

1. Prints a series of informational messages that describe the error.

Include these informational messages in the system logbook. They are important because they provide the system programmers and your Field Service representative with information that will help them troubleshoot the problem. To make the informational messages easy to identify, 15 asterisks (that is, *****) print on the CTY above and below each message series. (See Examples 1 and 2.)

2. Tries to automatically recover in the way that causes the least amount of damage.
3. Prints one of the following error messages if it cannot recover:

?Non-recoverable memory parity error in monitor.
[CPU Halt]

?Non-existent memory detected in monitor.
[CPU Halt]

If either of the above error messages prints on the CTY, perform the following steps:

- a. Include the error messages that are printed on the CTY in the system logbook.
- b. Manually dump and reload the monitor. (See Section 16.2.2.)
- c. If you cannot dump and reload the monitor, call your Field Service representative.

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

Examples 1 and 2 are similar to what you see on the CTY when the monitor detects a memory error.

Example 1: (CPU Parity Trap)

```
*****
CPU0 parity trap at user PC 007017 on dd-mmm-yy hh:mm:ss
Job 42[WRTBAD] was running
Page fail word = 760000,013271
Mapped page fail address = 543001,,306271
Incorrect contents = 000000,,000000
CONI PI, = 000000,,000377
Retry unsuccessful. Offending location zeroed.
*****
```

Example 2: (Memory Parity Scan)

```
*****
Memory parity scan initiated by channel 0 on CPU0 on dd-mmm-yy
hh:mm:ss
Parity errors detected:
  at 253271 (phys.), Contents = 000000,,000000
*****
```

16.8 RESTARTING A HUNG CONSOLE TERMINAL (LA36)

If you try to type commands on a CTY and no characters are printed, check to see if the following conditions are met:

- o The CTY should be plugged in.
- o There should be paper in the CTY. (If you replenish the supply, and characters still do not print, switch the CTY to LOCAL and then back to ON-LINE.)
- o The fuse on the vertical panel under the keyboard is not burned out.
- o The CTY should work when it is set to LOCAL.
- o The CTY should be on-line.
- o The CTY should be set to the correct speed.
- o No other terminals should work.

If the above conditions are met, reload the system from disk or magnetic tape. If these conditions are not met, or if the problem persists, call your Field Service representative.

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

16.9 FINDING A MISSING MONITOR FILE

Sometimes, when you load the system from a cold start with BOOT, ?J prints on the CTY. This means that when BOOT tried to read the monitor from disk, it could not find the file that you specified. If you pressed RETURN after the BOOT> prompt, then the file that you specified was DSKB:SYSTEM.EXE[1,4]. The following message prints on the CTY:

```
%File not found dev:file.ext[p,pn]
```

This means that when BOOT tried to reload the monitor from disk, it could not find the file that you specified.

To solve either of these problems, check that you have done the following:

- o Correctly specified a nondefault monitor name if your installation uses a nondefault monitor.
- o Loaded BOOT, and not BOOTM which loads the monitor from magnetic tape.
- o Mounted the correct disk packs.
- o Set the mounted disk packs on-line.

16.10 ALLOWING SYSTEM DIAGNOSIS WITH KLINIK

The KLINIK link allows a DIGITAL Field Service representative or software specialist to diagnose a problem in your system from a remote location. By using the KLINIK link, DIGITAL's Field Service product support group and software specialists can collect and analyze performance data without traveling to your installation.

The KLINIK link can be in one of four states, depending on the position of the REMOTE DIAGNOSIS switch on the front panel, the commands you type, and the commands the KLINIK user types. The four states are:

1. State 1 - Unavailable
2. State 2 - Awaiting Password
3. State 3 - Timesharing User
4. State 4 - Remote CTY

The link must be in State 4 to use the KLINIK facility.

In State 1, the REMOTE DIAGNOSIS switch is in the DISABLE position. The KLINIK link is also in State 1 if the REMOTE DIAGNOSIS switch is in the PROTECT position, and you (the operator) have not typed a password into memory using the PW command. In State 1, the user at the remote site receives the message ?NA, which means not available.

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

In State 2, the REMOTE DIAGNOSIS switch is in the PROTECT position, and you have typed a password using the PW command. The console program waits for the KLINIK user to type a password for verification. In this state, the KLINIK user receives the message PW: in response to the first character typed on the remote terminal.

The message ?IL followed by PW: prints on the remote terminal if the KLINIK user types an incorrect password. The KLINIK user has three chances to type the correct password. After three failures, the console program hangs up the line. However, if the user enters the correct password, the message OK prints on the remote terminal, and the KLINIK link enters State 3.

In State 3, each character that the KLINIK user types is sent directly to the running monitor, which causes the KLINIK link to behave as if it were a normal timesharing line. State 3 helps Field Service personnel examine system error files and crash dumps.

In State 4, the KLINIK link is considered a remote CTY. The KLINIK user can type any command that you (the operator) can type on the CTY. Input is taken from both the CTY and the remote CTY as if it were typed from one terminal. For example, a SYSTAT can be done by typing S at the CTY and Y followed by a carriage return at the remote CTY. Therefore, be careful not to type on the CTY while the KLINIK user types on the remote CTY.

To enter State 4, the KLINIK link must first be in State 3, and the KL command must be on (you must have typed the KL 1 command). Then the KLINIK user must type the correct password, followed by a CTRL/backslash. The KLINIK link is now in State 4.

Another way to enter State 4 is to turn the REMOTE DIAGNOSIS switch to the ENABLE position and turn the KL command on by typing KL 1. To enter State 4, the KLINIK user types CTRL/backslash. No password is necessary. This method gives less security to the KLINIK link than the first method. However, it is a useful option when there is no operator coverage.

The various states of the KLINIK link are:

Switch Position	Operator Commands	KLINIK User Response	State
DISABLE	none	none	1
PROTECT	none	none	1
PROTECT	PW password	none	2
ENABLE	none	none	3
PROTECT	PW password KL 1	password CTRL/backslash	4
ENABLE	KL 1	CTRL/backslash	4

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

If you turn the REMOTE DIAGNOSIS switch to DISABLE while in any state, you switch the KLINIK link to State 1, unavailable.

You need not enter a password into memory with the PW command nor type the KL 1 command every time you need to enable the KLINIK link. They are retained in memory until one of the following occurs:

- o The power is turned off and then turned on again.
- o The RESET switch is pressed.
- o PW followed by a carriage return is typed. This removes the password from memory. If this happens during States 2 or 4, the KLINIK link returns to State 1. Type KL 0. Typing the KL 0 command changes the KLINIK link from State 4 to State 2.

The following commands to the console program allow you to enable or disable the KLINIK facility:

Command	Function
KL 1	Turns on the KL command so that State 3 can be entered.
KL 0	Turns off the KL command so that State 3 is disabled.
KL	Gives the status of the KL command.
PW password	Allows you to enter a one- to six-character password into memory. The password remains in the memory until you type PW and press RETURN, or until you turn the power off and back on again, or until you press the RESET switch.

16.11 RECOVERING FROM KS10 HALT-STATUS CODES

When the KS10 processor halts, the microprocessor prints a 6-digit binary code on the CTY. This code, called a halt-status code, tells you why the KS10 processor halted. A halt-status code prints in the following form:

```
%HLTD/nnnnnn PC/000000,,xxxxxx
```

where:

nnnnnn is the halt-status code.

xxxxxx are the contents of the program counter when the KS10 is halted.

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

The halt status codes are:

Halt Code	Explanation
000001	A halt instruction, such as a HALT stopcode, has been executed.
000002	The console program, which runs in the microprocessor, halted the CPU. That is, an HA command was typed at the CTY.
000100	An I/O page failure occurred. Call your Field Service representative.
000101	An illegal instruction interrupt occurred. Call your Field Service representative.
000102	The pointer to the UNIBUS vector is zero. Call your Field Service representative.
001000 001004	An illegal microcode dispatch occurred. Call your Field Service representative.
001005	The microcode startup check failed. Call your Field Service representative.

16.12 MICROPROCESSOR ERROR MESSAGES

If the microprocessor detects an error, it prints one of the following error messages. Unless otherwise noted, these errors occur when the monitor is not running.

?BFO

Problem: Buffer overflow. You typed more than 80 characters on a single line while in console mode. This message prints during timesharing.

Solution: Try again with 80 or fewer characters on a single line.

?BN

Problem: Bad number. The number you typed was not octal. The console program accepts only octal numbers. This message prints during timesharing.

Solution: Retype the number in octal.

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

?BT xxxyyy

Problem: Boot error where xxxyyy is an octal code that represents the error. You may have tried to boot from a nonexistent device, from a device that is not in the proper format, or from a device that does not have the KS10 microcode on it. xxxyyy represents the following octal codes when the microprocessor is trying to access either a disk or a magnetic tape:

xxx	Explanation
-----	-------------

001	Accessing Disk - The microprocessor encountered an error while it was trying to read the HOME blocks. This error can be caused by selecting the wrong unit, by having no disk pack in the drive, by specifying the wrong RHBASE, by selecting the wrong UNIBUS adapter, or by using a bad disk drive. This error can also occur if the microprocessor can read both the HOME block and the alternate HOME blocks, but neither has the HOME-block identifier (HOM) in SIXBIT.
-----	--

Accessing Magnetic Tape - The microprocessor encountered an error while it was trying to read the first page of the microcode from magnetic tape. This error can be caused by selecting the wrong unit, by specifying the wrong RHBASE address, by selecting the wrong UNIBUS adapter, by selecting the wrong slave, by specifying the wrong density, by using a bad tape drive, by using a bad magnetic tape, or by using an improperly formatted magnetic tape.

Any microprocessor command or process that accesses a disk or magnetic tape can cause you to receive this message.

002	The microprocessor encountered an error while it was trying to read the page of pointers that makes up the microprocessor file system. This error can be caused by using an improperly formatted disk pack, by trying to read HOME blocks that contain errors, by using a bad disk drive, or by using a bad disk pack.
-----	--

Any microprocessor command or process that accesses a disk or magnetic tape can cause you to receive this message.

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

xxx	Explanation
003	The microprocessor encountered an error while it was trying to read a page of microcode. This error can be caused by using an improperly formatted disk pack or by using a bad disk drive or pack.
004	The microcode did not start running successfully after a BT or an MT command. The microprocessor encountered an error while it was trying to read the preboot program. This error can be caused by using an improperly formatted disk pack or magnetic tape, or by using a bad disk drive or pack.
yyy	This represents the lower eight bits of the microprocessor address of the channel-command-list operation that failed.

Solution: Try again with a select command for the desired boot device (MS or DS) and then repeat the boot command that failed.

?BUS

Problem: Bad KS10 bus. This error may occur on power up.

Solution: Call your Field Service representative.

?CHK n

Problem: Microprocessor checksum error; n is the error number. This error may occur on power up.

Solution: Call your Field Service representative.

?DNC

Problem: Did not complete. This message usually occurs if you have bad KS10 microcode, no KS10 microcode, or the KS10 microcode has not been loaded. If the message occurs in response to an HA command, the KS10 microcode may not be running (for example, when you have pressed RESET).

Solution: Try reloading the microcode. If the error persists, call your software specialist.

?DNF

Problem: Did not finish. This message may occur during a CO, ST, or EX command. Usually, this error occurs if you have bad KS10 microcode, no KS10 microcode, or the KS10 microcode has not been started.

Solution: Call your software specialist.

ERROR RECOVERY ON THE KSIØ CENTRAL PROCESSOR

?FRC

Problem: Forced reload. This message means that an automatic reload is in progress. When it is complete, the first monitor startup question prints on the CTY (occurs during timesharing).

Solution: Answer the monitor startup questions.

?IA

Problem: Illegal address. The address you typed was out of range.

Solution: Repeat the command with a legal address.

?IL

Problem: Illegal command. The console program did not recognize the sequence of characters you typed as a legal command.

Solution: Try again.

?KA

Problem: Keep-alive error. This error occurs only during timesharing. The monitor has not updated the keep-alive count for 15 seconds. The monitor will resume operation and print a Keep-Alive Fail (KAF) stopcode.

Solution: Wait. If no KAF stopcode occurs, follow the steps listed in Section 16.2.2. If the KAF occurs, follow instructions for recovery in Section 16.1.

?MRE

Problem: Memory refresh error (occurs during timesharing).

Solution: Follow the steps in Section 16.7.

?NDA

Problem: No data acknowledged.

Solution: Call your software specialist.

?NR-SCE

Problem: Nonrecoverable soft CRAM error.

Solution: Call your Field Service representative.

ERROR RECOVERY ON THE KS10 CENTRAL PROCESSOR

?NXM

Problem: Nonexistent memory. This message can occur during an EM or DM command. The command referenced a nonexistent memory location.

Solution: This can mean that you examined a memory location that exceeds the memory capacity of your system. In this case, ?NXM does not mean that there is an error. Sometimes, when you load the system, ?NXM prints on the CTY. In this case, ignore it. If you use the EM or DM command to specify a memory location that is clearly within the capacity of your system, but ?NXM prints on the CTY, call your software specialist.

?PAR ERR xxx yyy zzz

Problem: Memory parity error. The KS10 CPU clock has been frozen. xxx yyy zzz represents the contents of microprocessor registers 100, 103, and 303 (occurs during timesharing). (For more information on the contents of microprocessor registers, refer to the KSCOM specification in the Software Notebooks.)

Solution: Follow the steps in Section 16.7.

?RA

Problem: The command requires an argument. The command that you typed must be followed by an argument.

Solution: Repeat the command and provide an argument.

?RUNNING

Problem: Clock running. The CPU clock must be stopped to execute the command that you typed.

Solution: Stop the CPU clock and then retype the command.

%SCE xxxxxx

Problem: Soft CRAM error. xxxxxx represents the address at which the microprocessor encountered the error.

Solution: Call your Field Service representative.

?UI

Problem: Unknown interrupt. The console program received an internal interrupt and found no character on either the CTY input line or the KLINIK input line (occurs during timesharing).

Solution: Call your Field Service representative.

ERROR RECOVERY ON THE KSIØ CENTRAL PROCESSOR

16.13 RECOVERING FROM ENVIRONMENTAL ERRORS

The causes of environmental crashes are varied. They include power fluctuations, power outages, temperature extremes, water leaks, accidental spills, mechanical shocks, and so forth. Some of these environmental problems are easy to detect before they cause the system to crash. For example, if the air-conditioning system fails, the rise in temperature could cause a system crash. Other environmental problems, however, will occur without warning.

Whenever possible, you should perform an orderly shutdown if any of these conditions are imminent. When the problem is solved, you can power up and reload the system.

When either a power fluctuation or outage occurs, a power-failure detection circuit senses it, and initiates a power-failure interrupt. This interrupt triggers the operation of a program that saves the PC, flags, mode information, and fast memory registers; then it halts the processor. The system will try to recover automatically when power is restored.

If the temperature rises above an acceptable level, it is sensed by temperature sensors, which cause the power to shut down and initiate the power-failure interrupt sequence.

A power fluctuation is a variation in line voltage that occurs over a short time. Although the power is not lost completely, the system will probably go through an automatic restart procedure.

A power outage is a complete loss of power. If the power goes off and then comes back on suddenly, the surge of power can damage the equipment. Therefore, when the power goes off, turn the START/STOP switch on all disk drives to STOP. When the power has been restored, the system will go through an automatic restart procedure.

If the automatic restart procedure after a power outage or fluctuation is unsuccessful, perform the following steps:

1. Check all equipment to make sure that there is power. If there is power, try to power up. (See Sections 1Ø.2 and 1Ø.3.) If this fails, call your Field Service representative.
2. If necessary, reload the monitor. If the monitor will not load, check the various controllers; clear them if necessary (refer to the TOPS-1Ø Hardware Reference Manual), and try to reload the monitor. If this still fails, call your Field Service representative.

CHAPTER 17

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

This chapter describes errors and recovery procedures for KL processors. For KS error recovery, refer to Chapter 16.

When the system is running, unexpected errors may occur, resulting in a crash. A crash can be caused by one or more of the following:

- o Software problems
- o Hardware problems
- o Environmental problems

The system usually uses BOOT as the bootstrap program. When booting from magnetic tape, the BOOTM program boots the system. Use BOOT when you first power up your system. If the system crashes after it has been running for more than five minutes, BOOT automatically dumps and reloads the system.

Excluding crashes, after five minutes you will only have to use BOOT or BOOTM if you power down the system and load from a cold start, or if the system does not recover from an error. These situations prevent BOOT from performing an automatic reload.

The monitor calls BOOT, which can dump any amount of memory, from one page to all of it. The bootstrap program is highly tolerant of errors such as memory parity errors. When an error occurs, BOOT prints an error message before it takes corrective action. (For further information on BOOT messages, see Appendix A.

It is very important to record all system problems accurately. If software problems cause a crash, you must fill out a Software Error Report (SER) form and make an entry in the logbook. Similarly, if hardware problems cause a crash, you must fill out a hardware error form and make a log entry. This chapter discusses some of the errors you may encounter and how you can correct them. To correct errors not discussed in this chapter, contact either the system programmers or your software specialist.

Sections 17.1 through 17.17 apply to both single-processor and Symmetric Multiprocessing (SMP) systems. Section 17.18, however, applies only to SMP systems. If you have an SMP system, you must perform the CPU-specific procedures on the CTY for the appropriate CPU.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

Common problems and references to the sections that address them are:

- o Nothing prints on CTY when you type CTRL/backslash (Section 17.2).
- o System does not respond to you or to users (Sections 17.1, 17.2, 17.4).
- o Two crashes occur within 5 minutes (Section 17.2.2).
- o System does not automatically reload (Section 17.2.2).
- o System overwrites crash file (Section 17.5).
- o Stopcode prints on CTY (Section 17.6).
- o "KLI --" followed by a message prints on CTY (Section 17.8).
- o Message that begins "?Non-recoverable memory" or "?Non-existent memory" prints on CTY (Section 17.9).
- o "*****" prints on CTY above and below a series of messages (Section 17.9).
- o Memory module is unusable (Section 17.10).
- o No characters print on CTY (Section 17.11).
- o "?J" prints on CTY (Section 17.12).
- o "%File not found..." prints on CTY (Section 17.12).
- o "%PDP-11" followed by a message prints on CTY (Section 17.13).
- o "%Tape" followed by a message prints on CTY (Section 17.14).
- o Power fails or fluctuates (Section 17.17).

17.1 RECOVERING FROM A KL10 CRASH

On an SMP system, each KL has a console front end that runs RSX-20F. If the KL10 crashes, RSX-20F detects the error and performs the following steps for the CPU to which it is attached:

1. Prints an error message
2. Dumps the system
3. Reloads the system

RSX-20F performs these steps by calling KLERR, which analyzes the error and prints system information that will help the system programmers debug the software. (For more information on KLERR, and a complete list of RSX-20F error messages, refer to the TOPS-10/TOPS-20 RSX-20F System Reference Manual and to the TOPS-10 SPEAR Manual.) Then, RSX-20F calls KLINIT, which passes control to the crash restart routine. In turn, the crash restart routine automatically dumps and reloads the system.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

If the crash restart routine fails, you must manually dump and reload the system. (See Section 17.2.2.)

----- KLERR Error Messages -----

Argument Out of Range

The number to be loaded into the burst-count register is greater than the maximum number allowed.

Can't Clear KL Clock

An attempt to clear the KL clock failed.

Can't Clear KL Run Flop

An attempt to clear the Run Flop failed.

Can't Find KL Halt Loop

The microcode did not go into its halt loop even when told to do so.

Can't Sync KL Clock

A function executed to synchronize the KL clock failed.

Can't Set KL Run Flop

KLERR cannot set the Run Flop.

Directory File Not Found

KLERR cannot find the directory file into which the error file is to be placed.

DTE-20 Not Privileged, No KL Operations are Legal

This DTE is not the privileged DTE, which is allowed complete access to the KL.

DTE-20 Status Failure

An attempt to read or write the DTE status register failed.

EBOX Clock Timeout

The EBOX clock timed out during an attempt to simulate the EBOX clock from MBOX clocks.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

EBUS Parity Error

There are parity errors on the EBUS.

Examine Deposit Mode Illegal

The arguments for a KL Deposit or Examine are not set up correctly.

Function Execute Failed

A Function Execute failed.

Function Read Failed

A Function Read failed.

Function Write Failed

A Function Write failed.

Illegal Function Code

The code in the argument of the Function Read, Function Write, or Function Execute command does not match existing values.

Internal Programming Error

There is a problem in the system software.

KL Clock Error Stop

A check of diagnostic register 1 reveals that there is an error in the KL clock.

KL CRAM Address Error

The CRAM address to be read is not a valid CRAM address.

KL in Halt Loop

The PDP-11 put the KL into the halt loop.

KL not in Halt Loop

The PDP-11 could not put the KL into the halt loop.

KLERR0.SNP File Creation Failed

Creation of the error file failed.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

Odd Function Code

The number of the Function Read, Function Write, or Function Execute does not match existing values.

Run and Halt Loop Both On

The KL thinks that the microcode is at the same time in the halt loop and running normally.

Unable to Enter KLERRO.SNP into Directory

There was an error when the file name was inserted into the directory file.

Unable to Extend KLERRO.SNP File

KLERR was denied access when it tried to append to KLERRO.SNP.

Unable to write KLERRO.SNP file

An error occurred when KLERR was writing the KLERRO.SNP file.

Unmatched Error Code

The error code reported does not match any on the list of known errors.

17.2 RECOVERING FROM A MONITOR CRASH

To recover from a monitor crash, BOOT runs automatically and performs the following steps:

1. Records (dumps) the memory image as it appeared when the monitor crashed.

BOOT dumps the memory image to the default file DSKB:CRASH.EXE[1,4], which is called the crash file. This crash file is always written to the same directory area, [1,4]. However, if the system crashes again, it will not overwrite one crash file with another. Instead, the following dialog prints on the affected CTY to allow you to process the previous crash file with CRSCP:

[Dumping on DSKB:CRASH.EXE[1,4]]

BOOT tries to dump the memory image to the default file specification DSKB:CRASH.EXE[1,4], where DSKB: is the system dump list.

%Unprocessed dump on DSKB:CRASH.EXE[1,4]]

Do you want to overwrite it?No<RET>

Type No, which is the default, or Yes and then press RETURN.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

Structure on which to dump:DSKB:<RET> Type the name of the structure on which you want the monitor to dump the crash file and then press RETURN. BOOT defaults to the system dump list.

[Dumping on DSKB:CRASH.EXE[1,4]] Approximately 20 seconds elapse while BOOT dumps the memory image to the file DSKB:CRASH.EXE[1,4].

2. Reloads the last monitor that was loaded.

When the monitor has been loaded into memory, the monitor startup questions begin. There is a 60-second time-out after the first monitor startup question. If you do not answer the first question during the 60-second time-out, the system assumes (and prints on the CTY) the default answers to the ONCE dialog. (Refer to the TOPS-10 Software Installation Guide for complete information on the ONCE dialog.)

Normally, if the monitor crashes, BOOT automatically performs Steps 1 and 2 for you. (See Section 17.2.1.) However, if the monitor crashes twice within 5 minutes, you must direct BOOT to manually perform them. (See Section 17.2.2.) BOOT error messages are described in Appendix A.

When your system administrator or Field Service representative reports a crash to DIGITAL, you must provide the logbook information and a magnetic tape containing both the crash file and a copy of the monitor as it appeared before it was run. (Be sure to include operating system and software version numbers.)

After you answer the monitor startup questions described in Section 11.6, INITIA may print a few lines on the CTY. Whether or not your system runs INITIA at system startup is determined when the monitor is generated. (Refer to the TOPS-10 Software Installation Guide for more information on INITIA.)

17.2.1 Automatically Dumping and Reloading the Monitor

Usually, if the system has not crashed in the last 5 minutes, BOOT automatically dumps and reloads the monitor. In this case, the following prints on the CTY:

%DECSYSTEM-10 NOT RUNNING The monitor has stopped.

?CPU0 monitor error. Stopcode name is UIL
File TTY6:
Job 2 on TTY6 running FD User [1,2]

CPU Status Block on dd-mmm-yy hh:mm:ss

APRID = 000231,,364130
ERA = 602000,131427
CONI APR, = 007760,,000003
CONI PI, = 000000,,000777
CONI PAG, = 000000,620001
DATAI PAG, = 700100,,000131
AR ARX Data Word = 000000,,000000
IO Page Fail Word = 000000,,000000

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

SBUS Diags:

```
CNTRLR FNC 0          FNC 1
000000 006000,,000000 036100,,016012
000001 006000,,000000 036100,,016005
000011 007743,,166340 000500,,001000
```

Reload monitor

[Dumping on DSKB:CRASH.EXE[1,4]]

Approximately 20 seconds elapse while BOOT dumps the memory image to the file DSKB:CRASH.EXE[1,4].

[Loading from DSKB:SYSTEM.EXE[1,4]]

BOOT is now reloading the monitor.

When the monitor has been loaded into memory, the monitor startup questions begin. (See Section 11.6.)

There is a 60-second time-out after the first monitor startup question. If you do not answer the first question during the 60-second time-out, the system assumes (and prints on the CTY) the default answers to the ONCE dialog. (Refer to the TOPS-10 Software Installation Guide for complete information on the ONCE dialog.)

After you answer the monitor startup questions described in Section 11.6 INITIA may print a few lines on the CTY. Whether or not your system runs INITIA at system startup is determined when the monitor is generated. (Refer to the TOPS-10 Software Installation Guide for more information on INITIA.)

17.2.2 Manually Dumping and Reloading the Monitor

To manually dump and reload the monitor, perform the following steps:

1. Type everything that is in UPPERCASE BOLD PRINT in the following sample dialog:

^

Type CTRL/backslash, which does not print, to communicate with the PARSER.

PAR>SHUT<RET>

Type SHUT and press RETURN to shut down the system.

DECSYSTEM-10 NOT RUNNING

The monitor has stopped.

BOOT>/D<RET>

Type /D and press RETURN to dump the memory image to the default file, DSKB:CRASH.EXE[1,4]. (The prompt prints here only if the system has not been up for 5 minutes.)

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

OUTPUT DEVICES: TTY
PAR> EOF

End of LOOP.CMD
execution.

PAR>J 407

[Dumping on DSKB:CRASH.EXE[1,4]]

Start BOOT.

[Loading from DSKB:RL156A.EXE[1,4]]

You need to manually dump
and reload the system if
you do not see the prompt
or the reload message
within 10 seconds.

RL156A DEC10 Development mm-dd-yy
Why reload: HUNG
Date: dd-mmm-yy
Time:<RET>

Startup option: Q <RET>

17.5 COPYING CRASH DATA

CRSCPY is the default program that automatically copies system dumps and then clears the unprocessed-dump bit. CRSCPY runs at system startup and when a continuable stopcode occurs.

If you want to use your installation's own program to copy system dumps, you must redefine the symbol CPYNAM in the SIXBIT hardware definitions in MONGEN to be equivalent to the name of your installation's program. (Refer to the TOPS-10 Software Installation Guide for complete information on MONGEN.)

17.6 RECOVERING FROM STOPCODES (MONITOR ERROR STOPS)

When the monitor detects an internal error, it executes its stopcode macro. This macro prints the following message on the CTY of the affected CPU:

?CPU0 monitor error. Stopcode name is xxx

where:

xxx is a mnemonic identifying the error. (See the STOPCD specification in the Software Notebooks for a complete list of the stopcodes.)

The following types of stopcodes, may occur:

- o DEBUG (See Section 17.6.1.)
- o JOB (See Section 17.6.2.)
- o STOP (See Section 17.6.3.)
- o CPU (See Section 17.6.4.)

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

- o HALT (See Section 17.6.5.)
- o INFO (See Section 17.6.6)
- o EVENT (See Section 17.6.6)

HALT stopcodes do not initiate automatic recovery procedures.

The following is an example of what you will see on the CTY of the affected CPU when the monitor detects a continuable stopcode.

```
%DECSYSTEM-10 NOT RUNNING
```

```
?CPU1 monitor error. Stopcode name is EUE  
Job 5 on TTY1 running DDT User [1,2]  
UUO is 0 at user PC 002472
```

```
CPU Status Block at dd-mmm-yy hh:mm:ss
```

```
APRID = 000231,,342002  
ERA = 600000,,040513  
CONI APR, = 007760,,000003  
CONI PI, = 000000,,000377  
CONI PAG, = 000000,,620001  
DATAI PAG, = 700100,,002255  
AR ARX Data Word = 000000,,057000  
IO Page Fail Word = 000000,,000000
```

```
SBUS Diags:
```

```
CNTRLR FNC 0          FNC 1  
000004 007040,,040610 000200,,000000
```

```
[Dumping on DSKB:CRASH.EXE[1,4]]  
[Continuing system]
```

```
[DECsystem-10 Continued]
```

In this case, the monitor executed its stopcode macro, dumped the memory image, and continued the system.

17.6.1 Identifying DEBUG Stopcodes

A DEBUG stopcode is not immediately harmful to any job or to the system. The monitor prints a message on the affected CTY of the form:

```
?CPU1 monitor error. Stopcode name xxx  
[Continuing system]
```

Processing then continues. Fill out an SER form. Sometimes a DEBUG stopcode acts like a JOB stopcode. (See Section 17.6.2.)

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

17.6.2 Identifying JOB Stopcodes

A JOB stopcode indicates an error that endangers the integrity of the job that is currently running. The monitor prints a message on the CTY of the affected CPU, in the form:

```
?CPU monitor error. Stopcode name xxx  
[Aborting job]
```

Also, the following message prints on the user's terminal:

```
?Monitor error at address; UUU at address
```

where address is one of the following:

```
User loc n  
Exec loc n; Exec called from exec loc m  
Exec loc n; Exec called from user loc m
```

and where m and n are memory addresses.

Then the monitor aborts the current job and continues. Fill out an SER form.

17.6.3 Identifying STOP Stopcodes

A STOP stopcode endangers the integrity of the entire system. The monitor prints the following message on the affected CTY:

```
?CPU monitor error. Stopcode name xxx  
Reload monitor
```

This means that all jobs are aborted and the system begins to automatically dump and reload itself, provided the monitor uptime is greater than 5 minutes. If the monitor uptime is less than 5 minutes, then the operator will have to manually dump and reload. For more information on a manual dump and reload, refer to Section 17.2.2. The following example is that of a stopcode with less than 5 minutes of monitor uptime:

```
%DECsystem-10 not running  
  
?CPU0 monitor error. Stopcode name is KAF  
File CTY:  
Job 4 on CTY running FIT19 User [1,2]
```

CPU Status Block on dd-mmm-yy hh:mm:ss

```
APRID = 640324,,364113  
ERA = 224000,,011451  
CONI APR, = 007760,,000003  
CONI PI, = 000000,,010377  
CONI PAG, = 000000,,660001  
DATAI PAG, = 700100,,006745  
AR ARX Data Word = 000000,,000000  
IO Page Fail Word = 000000,,000000
```

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

SBUS Diags:

```
CNTRLR FNC 0          FNC 1
000004 001740,,045157 000200,,000000
000010 006160,,011603 000500,,001000
000011 006165,,777003 000500,,001000
000012 006126,,745507 000500,,001000
000013 007747,,470524 000500,,001000
```

Reload monitor

BOOT>/D

[Dumping on DSKB:CRASH.EXE[1,4]]

Operator types /D to manually
dump and reload the system.

BOOT><RET>

[Loading from DSKB:SYSTEM.EXE[1,4]]

(or filespec).

CSSE 2123 7.02 SYSTEM mm-dd-yy

Date: dd-mmm-yy

Time:hh:mm

Startup option: Q

If the monitor can obtain the necessary information, it prints a supplementary message on the affected CTY of the form:

```
JOB jobno on TTYnnn running xxxxxx
UUO is octal at user PC address
File filespec
```

where:

jobno	is the number of the job causing the error.
nnn	is the number of the controlling TTY.
xxxxxx	is the name of the program running for that job.
octal	is the octal representation of the monitor call that failed for that job.
address	is the value of the program counter for that job.
filespec	is the file specification for the file being accessed.

17.6.4 Identifying CPU Stopcodes

If a CPU stopcode is detected on a single-processor system or on the last processor that is still running in a multiprocessor system, it has the same effect as a STOP stopcode.

In all other cases, a CPU stopcode prints a message on the affected CTY of the form:

```
?CPU monitor error. Stopcode name xxx
[Stopping CPU]
```

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

If the monitor can obtain the necessary information, it prints a supplementary message on the CTY of the form:

```
Job jobno on TTYnnn running xxxxxx
UUO is octal at user PC address
File filespec
```

where:

jobno	is the number of the job causing the error.
nnn	is the number of the controlling TTY.
xxxxxx	is the name of the program running for that job.
octal	is the octal representation of the monitor call that failed for that job.
address	is the value of the program counter for that job.
filespec	is the file specification for the file being accessed.

The CPU will then run in its accumulators and will not restart until you manually restart it. On an SMP system, a CPU stopcode causes a role switch if the error occurred on the Policy CPU.

17.6.5 Identifying HALT Stopcodes

A HALT stopcode affects the entire system. Also, the monitor cannot automatically be reloaded. In this case, the system halts, and you must manually dump and reload the monitor. (See Section 17.2.2.)

ENABLE ON is the default condition set by the software. It is not to be changed unless specified by Field Service.

For single CPU systems:

RELOAD ENABLE ON

The RSX-20F front end will automatically respond by taking a snapshot of the system, and then dumping and reloading the system.

RELOAD ENABLE OFF

A manual snapshot must be taken, followed by a dump/reload, or valuable data will be lost. In most cases, the ENABLE will be ON, and the operator will not be required to take any action.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

For SMP systems:

RELOAD ENABLE ON

BOOT/POLICY CPU HALTS

Another CPU will take over as Policy CPU, as messages will indicate. The console front end of the HALTED CPU at this time will snapshot and restart the CPU.

NON BOOT CPU HALTS

The console front end of the HALTED CPU will snapshot and restart the CPU.

RELOAD ENABLE OFF

Same as above with the exception that no automatic snapshots or CPU restart will occur.

17.6.6 Identifying INFO and EVENT Stopcodes

INFO and EVENT stopcodes report on system events that may be of interest in debugging crashes. These stopcodes are for informational purposes only, and do not interrupt system or job execution.

17.7 RECOVERING FROM ERRORS DETECTED BY THE PARSER

When the front-end command language parser detects an error, it prints one of the error messages listed in this section. The format of these messages is:

PAR -- [command]message

where:

command is the name of the command that caused the error (or PARSER if the error is in the command parser rather than a command routine).

message is the error message.

----- PARSER Error Messages -----

AMB - AMBIGUOUS KEYWORD xxx

where xxx is the ambiguous keyword.

Problem: The PARSER found more than one keyword that matches the abbreviation you typed.

Solution: Type enough of the keyword to make it unique.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

APE - KL APR ERROR

Problem: There is a CPU error.
Solution: Call your Field Service representative.

BAE - BURST ARGUMENT ERROR

Problem: There is an internal programming error.
Solution: Call your software specialist.

CAE - KL CRAM ADDRESS ERROR

Problem: There is an internal programming error.
Solution: Call your software specialist.

CBO - COMMAND BUFFER OVERFLOW

Problem: You typed more than 280 characters on one line.
Solution: Retype the command on two lines.

CDI - CLEAR DATE ILLEGAL

Problem: You tried to clear the interval date while the KL was in primary protocol.
Solution: Clear the internal date when the KL is no longer in primary protocol.

CES - CLOCK ERROR STOP - code ERROR STOP

where code is CRAM, DRAM, FM, or FS-STOP.

Problem: There is a fatal internal hardware error.
Solution: Write down the code and try to reload the system. If this fails, call your Field Service representative and tell him the code.

CFH - CAN'T FIND KL HALT LOOP

Problem: The PARSER cannot halt the KL.
Solution: Call your Field Service representative.

CLE - CONSOLE LIMIT EXCEEDED

Problem: You tried to set a console mode that is higher than the console mode specified in the SET KLINIK dialog.
Solution: None. While the KLINIK line is active in remote mode, you cannot set a console mode higher than the console mode specified in the SET KLINIK dialog.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

CNR - COMMAND IS NOT REPEATABLE

Problem: You tried to repeat a command that cannot be repeated.

Solution: None.

DAV - DATE ALREADY VALID

Problem: You tried to set a new internal date when the date validity flag was on.

Solution: Turn off the validity flag. You can only set a new internal date when the date validity flag is off.

DBT - DATE BEFORE TODAY

Problem: You tried to set a KLINIK open or close date that is prior to the current date.

Solution: Set a KLINIK open or close date that is on or after the current date.

DCK - DIVIDE CHECK

Problem: There is an internal programming error.

Solution: Call your software specialist.

DMF - DEPOSIT KL MEMORY FAILED

Problem: There is an internal programming error. RSX-20F did not accept a deposit directive.

Solution: Call your software specialist.

DNP - DTE-20 IS NOT PRIVILEGED

Problem: There is a fatal error. The DTE-20 mode switch is in the wrong position.

Solution: Call either your software specialist or your Field Service representative.

DOR - DAY OUT OF RANGE

Problem: You specified a nonexistent date.

Solution: Correct the date you specified.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

DSF - DTE-20 STATUS FAILURE

Problem: A read or write to one of the DTE status registers failed.

Solution: Call your software specialist.

DTC - DTE-20 CONFUSED - RUN AND HALT LOOP

Problem: There is a fatal error. The run and halt loop flags were set at the same time.

Solution: Call your Field Service representative.

ECT - EBOX CLOCK TIMEOUT

Problem: While the PARSER was doing an execute function, the KL did not reenter the halt loop within the allotted time.

Solution: Call your software specialist.

EMF - EXAMINE KL MEMORY FAILED

Problem: There is an internal programming error. RSX-20F did not accept an examine directive.

Solution: Call your software specialist.

EOC - END OF COMMAND REQUIRED

Problem: You typed ? at the end of a command that requires no additional arguments.

Solution: Retype the command and press RETURN.

EPE - EBUS PARITY ERROR

Problem: There is a fatal error. The PARSER encountered a parity error on the EBUS.

Solution: Call your Field Service representative.

ESD - EBOX STOPPED - DEPOSIT

Problem: The PARSER executed a deposit directive and found that the KL clock is stopped.

Solution: Reload the system. If the problem persists, call your Field Service representative.

ESE - EBOX STOPPED - EXAMINE

Problem: The PARSER executed an examine directive and found that the KL clock is stopped.

Solution: Reload the system. If the problem persists, call your Field Service representative.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

FRF - FUNCTION READ nnn FAILED

Problem: There is a fatal error. A diagnostic Function Read with function code nnn failed. If the system crashed, try to reload it.

Solution: Call your software specialist and your Field Service representative.

FWF - FUNCTION WRITE nn FAILED

Problem: There is a fatal error. A diagnostic Function Write with function code nn failed. If the system crashed, try to reload it.

Solution: Call your software specialist and your Field Service representative.

FXF - FUNCTION XCT nn FAILED

Problem: There is a fatal error. A diagnostic Function Execute with function code nn failed. If the system crashed, try to reload it.

Solution: Call your software specialist and your Field Service representative.

IDF - ILLEGAL DATE FORMAT

Problem: You typed the date in the wrong format.

Solution: Retype the date as dd-mmm-yy or dd mmm yy. Day and year must be numeric and month must be alphabetic.

IFC - ILLEGAL FUNCTION CODE

Problem: There is either an internal programming error or you typed a diagnostic command with an invalid function code. The valid function codes are:

- o FREAD command - codes 100 through 177
- o FWRITE command - codes 40 through 77
- o FXCT command - codes 0 through 37

Solution: If this message did not result from entering a diagnostic command, call your software specialist.

ILC - ILLEGAL CHARACTER c

where c is the illegal character. Characters that do not print are converted to their printable equivalent and preceded by ^.

Problem: There is an illegal character in a command line.

Solution: Retype the command without the illegal character.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

ILS - ILLEGAL SEPARATOR CHARACTER s

where s is the illegal separator character. Characters that do not print are converted to their printable equivalent and preceded by ^. A tab is converted to one space.

Problem: There is an illegal separator character in a command line.

Solution: Retype the command line without the illegal separator character.

IOC - ILLEGAL KL OPCODE

Problem: Either you or the PARSER tried to execute a KL instruction with an illegal opcode.

Solution: If this message did not result from an XCT command, call your software specialist.

IPC - ILLEGAL PASSWORD CHARACTER c

where c is an illegal character.

Problem: You typed an illegal character in a password during the SET KLINIK dialog.

Solution: Retype the password using only numeric or uppercase alphabetic characters.

IRC - ILLEGAL REPEAT COUNT

Problem: You typed a zero or a negative argument to a REPEAT or a SET REPEAT command.

Solution: Retype the command with an argument that is greater than zero.

ITF - ILLEGAL TIME FORMAT

Problem: You typed a time in a format other than hh:mm or hhmm.

Solution: Retype the time in an acceptable format.

ITN - ILLEGAL TASK NAME

Problem: You typed the RUN or the MCR command with no task name.

Solution: Retype the command with the task name.

KCN - KL CLOCK IS OFF

Problem: You typed a command that requires that the KL clock be on; however, the KL clock is off.

Solution: Reload the system. If the problem persists, call your Field Service representative.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

KLA - KL ADDRESS ERROR

Problem: The KL address that you specified is over 22 bits, is negative, or is not in octal radix.

Solution: Specify a KL address that is a positive octal number made up of 22 or fewer bits.

KLR - ILLEGAL WHILE KL RUNNING

Problem: You tried to execute a command that is illegal while the KL is running.

Solution: Execute the command when the KL is not running.

KNC - KL IS NOT CONTINUABLE

Problem: You tried to resume processing with the CONTINUE command, but the KL is not in a continuable state. For example, you cannot CONTINUE after a RESET command.

Solution: Give the CONTINUE command when the KL is in a continuable state.

KWE - KLINIK WINDOW ERROR

Problem: During the SET KLINIK dialog, you specified a window close date and time that is prior to the window open date and time.

Solution: Specify a window close date and time that is after the window open date and time.

MRA - MISSING REQUIRED ARGUMENT

Problem: You did not specify all of the arguments required by the command.

Solution: Specify all of the arguments required by the command.

NDI - NULL DATE ILLEGAL

Problem: You pressed RETURN after the Date: prompt during the SET DATE dialog.

Solution: Type a date and then press RETURN after the Date: prompt.

NER - NUMERIC EXPRESSION REQUIRED

Problem: You typed a non-numeric expression as an argument to a command that must have a numeric expression as an argument.

Solution: Type a numeric expression as an argument to the command that you typed.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

NOR - INPUT NUMBER OUT OF RANGE

Problem: You typed a number that is either out of range or in the wrong radix.

Solution: Type the correct number.

NPI - NULL PASSWORD ILLEGAL

Problem: You pressed RETURN after the PASSWORD: prompt during the SET KLINIK dialog.

Solution: Type a password after the PASSWORD: prompt.

NSK - NO SUCH KEYWORD xxx

Problem: You typed a command that contained the invalid keyword xxx.

Solution: Retype the command with a valid keyword.

NST - NO SUCH TASK

Problem: You specified a nonexistent task in an MCR or a RUN command.

Solution: Specify a valid task.

NTI - NULL TIME ILLEGAL

Problem: You pressed RETURN after the Time: prompt during the SET DATE dialog.

Solution: Type a time and then press RETURN after the Time: prompt.

OAI - ODD ADDRESS ILLEGAL

Problem: You tried to examine an odd-numbered PDP-11 address. This is illegal.

Solution: You can examine only even-numbered PDP-11 addresses.

OFC - ODD FUNCTION CODE

Problem: There is an internal programming error.

Solution: Call your software specialist.

PTL - PASSWORD TOO LONG

Problem: You typed a password that is longer than thirty-nine characters.

Solution: Type a password that is thirty-nine characters or less.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

RPM - RIGHT PARENTHESIS MISSING

Problem: You omitted a right parenthesis in a numeric expression.

Solution: Type the command again, and put in the right parenthesis.

SCF - SET CLOCK FAILED

Problem: There is a hardware error. The PARSER cannot validate the clock enable parameters it has just set.

Solution: Call your Field Service representative.

SKI - SET KLINIK ILLEGAL WHILE KLINIK ACTIVE

Problem: You tried to set new KLINIK parameters while the KLINIK link is active.

Solution: To change the parameters, you must first disconnect the KLINIK link by typing DISCONNECT or CLEAR KLINIK.

SPF - SET PARITY FAILED

Problem: There is a hardware error. The PARSER cannot validate the parity stop parameters it has just set.

Solution: Call your Field Service representative.

SZI - START AT ZERO ILLEGAL

Problem: You tried to start the KL at location 0. This is illegal.

Solution: Start the KL at a different location.

TAA - TASK ALREADY ACTIVE

Problem: You issued an MCR or a RUN command for a task that is already active.

Solution: Stop the task before restarting it.

TOR - TIME OUT OR RANGE

Problem: You typed a time with more than 23 hours or more than 59 minutes.

Solution: Retype the time.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

UNL - KL MICROCODE NOT LOADED

Problem: The system tried to start the KL microcode and found that it has not been loaded or it is not functioning.

Solution: Reload the microcode and the system by using the DISK, DECTape, or FLOPPY switch or the switch register.

VFY - VERIFY FAILED

Problem: There is an internal programming error. The PARSER cannot verify the correct execution of a DEPOSIT command.

Solution: Call your software specialist.

WRM - COMMAND NOT AVAILABLE IN THIS CONSOLE MODE

Problem: You typed a command that is not available in the current console mode.

Solution: Change the console mode by using the SET CONSOLE command.

XTO - KL EXECUTE TIMED OUT

Problem: The KL failed to reenter the halt loop within the allotted time while performing a fast internal Execute Function.

Solution: Retype the command. If the problem persists, call your Field Service representative.

YOR - YEAR OUT OF RANGE

Problem: You typed the wrong year.

Solution: Retype the year correctly.

17.8 RECOVERING FROM ERRORS DETECTED BY KLINIT

When the KL initialization program (KLINIT) detects an error, it prints one of the following types of error messages.

1. KLINIT operator-dialog error message, which prints when your answer to a KLINIT question is unacceptable. (See Section 17.8.1.)
2. KLINIT warning messages, which print when an unusual (but not fatal) condition exists. (See Section 17.8.2.)
3. System error messages, which print when KLINIT detects an error from which it cannot recover. (See Section 17.8.3.)

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

17.8.1 KLINIT Operator-Dialog Error Message

The KLINIT operator-dialog error message indicates that your answer to a KLINIT question is unacceptable. KLINIT prints the error message, reprints the question, and then reprints the KLI> prompt.

Currently, the following is the only operator-dialog error message:

KLI -- COMMAND SYNTAX ERROR

Problem: You did not type one of the possible answers specified in the question.

Solution: Type one of the acceptable answers or press RETURN answer.

17.8.2 KLINIT Warning Messages

KLINIT prints one of the following warning messages when an unusual condition exists. After KLINIT prints a warning message, the KLINIT operator dialog continues.

KLI -- % EXTERNAL CORE MEMORY IS OFFLINE

Problem: A DMA20 external memory controller is off-line.

Solution: KLINIT tries to reconfigure the system without the controller in question.

KLI -- % NO FILE - ALL CACHE BEING CONFIGURED

Problem: The default to the RECONFIGURE CACHE question was taken and KLINIT could not find the KL.CFG file in the directory.

Solution: KLINIT enables all caches.

KLI -- % NO FILE - ALL MEMORY BEING CONFIGURED

Problem: The default to the CONFIGURE KL MEMORY question was taken and KLINIT could not find the KL.CFG file in the directory.

Solution: KLINIT configures all available memory and sets the interleaving at the highest level consistent with the setting of the interleave switches on the memory units.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

17.8.3 KLINIT System Error Messages

System error messages indicate conditions in which KLINIT cannot continue. These conditions can be caused by software, hardware, or environmental failures. Sometimes you can try again successfully; other times, you may have to call your Field Service representative or your software specialist. Save all of the console log data and every memory-dump listing to help your Field Service representative or software specialists solve the problem.

Unless otherwise noted, after KLINIT prints a system error message, the system restarts the KLINIT operator dialog and prints the KLI> prompt again. Files are specified in the message text in the following form:

dev:filename.ext;version

The following are the system error messages:

KLI -- ? BOOTSTRAP LOAD FAILED

Problem: A software or hardware error occurred while the KL bootstrap program was being loaded.

Solution: Reload the bootstrap program. To do this, type BOOT and press RETURN to answer the KLI> prompt. If the problem persists, call your Field Service representative.

KLI -- ? C-RAM DIFFERS AT xxxxxx

KLI -- BAD xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xx

KLI -- GOOD xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xx

KLI -- XOR xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xx

Problem: While KLINIT was trying to verify the microcode, the contents of octal location xxxxxx in the KL10 control RAM did not match the corresponding code in the appropriate microcode file. The actual contents of the location are printed, followed by the expected contents. The last line is the result of a bit-by-bit exclusive-OR (XOR) of the actual and expected values.

Solution: Reload the KL microcode and verify it with the KLINIT operator dialog. If the problem persists, call your Field Service representative.

KLI -- ? CACHE ENABLE FAILED

Problem: A hardware error may have occurred while KLINIT was trying to configure the cache memory.

Solution: Try the operation again. If the problem persists, call your Field Service representative. Also, you can temporarily reconfigure with no cache memory.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

CLI -- ? CANNOT FIND [5,5] DIRECTORY

Problem: KLINIT cannot locate the RSX-20F system file directory; a software error may have overlaid it. The system exits from KLINIT.

Solution: Reload the system. If the problem persists, call your software specialist.

CLI -- ? CANNOT FIND HALT LOOP

Problem: KLINIT tried to start the microcode, but it is not running properly.

Solution: Reload the microcode. If the problem persists, call your Field Service representative.

CLI -- ? CANNOT GET DEVICES

Problem: KLINIT cannot open a system device for communications. This is probably a software error in RSX-20F. The system exits from KLINIT.

Solution: Reload the system. If the problem persists, call your software specialist.

CLI -- ? CANNOT RUN KLINIT WHILE KL IS IN PRIMARY PROTOCOL

Problem: You tried to run KLINIT while the KL10 was running. This can occur only if you load KLINIT by typing RUN KLINIT to the PARSER and then press RETURN. The system exits to the monitor.

Solution: If you want to run KLINIT again, follow the steps to shut down the monitor. Then reload the system and enter KLINIT again. If the monitor does not shut down properly, set the console to PROGRAMMER mode and reload KLINIT.

CLI -- ? CANNOT START KL

Problem: A hardware or software failure occurred while KLINIT was trying to restart after a power failure or system crash during memory determination.

Solution: Reload the microcode and try the operation again. If the problem persists, call your Field Service representative.

CLI -- ? CLOCK ERROR STOP DURING KL RESTART

Problem: The KL processor clock stopped while KLINIT was monitoring a restart.

Solution: Try to load the KL bootstrap and monitor again. If the problem persists, call your software specialist.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

CLI -- ? CONFIGURATION FILE NOT CHANGED

Problem: The KL.CFG configuration file could not be updated because KLINIT could not read the old file, could not write the new file, or some other error occurred.

Solution: Delete the old configuration file and try the operation again. If the problem persists, call your software specialist.

CLI -- ? D-RAM DIFFERS AT xxxxxx

CLI -- BAD A:x B:x P:x J:xxxx A:x B:x P:x J:xxxx

CLI -- GOOD A:x B:x P:x J:xxxx A:x B:x P:x J:xxxx

CLI -- XOR A:x B:x P:x J:xxxx A:x B:x P:x J:xxxx

Problem: While KLINIT was trying to verify the microcode, the contents of octal location xxxxxx in the KL10 dispatch RAM did not match the corresponding code in the appropriate microcode file. The actual contents of the location are printed, the even location first, and the odd location next. The next line is the expected contents of the two locations. The last line is the result of a bit-by-bit exclusive-OR (XOR) of the actual and the expected values.

Solution: Reload the KL microcode and verify it with the KLINIT operator dialog. If the problem persists, call your Field Service representative.

CLI -- ? DEPOSIT FAILED

Problem: KLINIT could not store information in KL10 memory.

Solution: Reload the system and try to deposit again. If the problem persists, call your Field Service representative.

CLI -- ? DEVICE 'device' FULL

Problem: KLINIT could not find room on the specified front-end load device for an updated copy of the configuration file KL.CFG.

Solution: Exit from KLINIT and use an RSX-20F system program such as PIP to delete files and make room for the updated KL.CFG file. Then, reenter KLINIT and try the operation again.

CLI -- ? DF EXECUTE FAILED

Problem: A diagnostic Function Execute failed while KLINIT was initializing the KL10 processor.

Solution: Reload the system and try the operation again. If the problem persists, call your Field Service representative.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

CLI -- ? DF READ FAILED

Problem: A diagnostic Function Read failed while KLINIT was initializing the KL10 processor.

Solution: Reload the system and try the operation again. If the problem persists, call your Field Service representative.

CLI -- ? DF WRITE FAILED

Problem: A diagnostic Function Write failed while KLINIT was initializing the KL10 processor.

Solution: Reload the system and try the operation again. If the problem persists, call your Field Service representative.

CLI -- ? DIRECTIVE ERROR -n ON FILE 'filename'

where n is an octal error code used by Software Support.

Problem: A system error occurred while KLINIT was trying to access the file 'filename.'

Solution: Reload the system and try the operation again. If the problem persists, call your software specialist.

CLI -- ? EXAMINE FAILED

Problem: KLINIT cannot examine the contents of KL10 memory.

Solution: Reload the system and try the operation again. If the problem persists, call your Field Service representative.

CLI -- ? FATAL MEMORY CONFIGURATION ERROR - CODE xxx

where xxx is an error code that specifies the type of error. (See below for definitions of the error codes.)

Problem: KLINIT encountered an error while it was trying to configure memory. Usually, this message prints when there is a hardware problem or a software bug.

Solution:	Code	Action
	3BB	None. This error code is a debugging aid that should not occur in normal operation. There may be a CPU fault. Call your Field Service representative.
	ABS	None. There is a CPU error. Call your Field Service representative.
	APL	Make sure that the microcode has been loaded and try again. If the problem persists, the CPU may have failed. In this case, call your Field Service representative.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

Code	Action
B4M	None. If the hardware environment has not changed, and you have been able to boot memory successfully in the past, the problem may be in the hardware. However, if you have an unusual hardware configuration, you may have encountered a software bug. Call your Field Service representative. If your Field Service representative cannot fix the problem, call your software specialist.
BCM	None. If the hardware environment has not changed, and you have been able to boot memory successfully in the past, the problem may be in the hardware. However, if you have an unusual hardware configuration, you may have encountered a software bug. Call your Field Service representative. If your Field Service representative cannot fix the problem, call your software specialist.
BTL	None. There is a software bug. Call your software specialist.
CES	None. There is a hardware problem. Call your Field Service representative.
CFT	None. If the hardware environment has not changed, and you have been able to boot memory successfully in the past, the problem may be in the hardware. However, if you have an unusual hardware configuration, you may have encountered a software bug. Call your Field Service representative. If your Field Service representative cannot fix the problem, call your software specialist.
CTF	Set all MF20 controllers to software state 0 and try again. If the problem persists, call your Field Service representative.
DCB	None. There is a software problem. Call your software specialist.
EDE	Make sure that the microcode has been loaded and try again. If the problem persists, call your Field Service representative.
FOE	None. Call your software specialist.
GOO	None. If the hardware environment has not changed, and you have been able to boot memory successfully in the past, the problem may be in the hardware. However, if you have an unusual hardware configuration, you may have encountered a software bug. Call your Field Service representative. If your Field Service representative cannot fix the problem, call your software specialist.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

Code	Action
HOV	None. There is a software problem. Call your software specialist.
IEE	Make sure that the microcode has been loaded and try again. If the problem persists, call your Field Service representative.
LDE	None. There is a software problem. Call your software specialist.
MAB	None. There is a software problem. Call your software specialist.
MFE	None. This halt often indicates a memory controller failure, especially if the hardware environment has not changed and you have been able to boot memory in the past. Also, you may have encountered a software bug. Call your Field Service representative. If your Field Service representative cannot fix the problem, call your software specialist.
MMR	None. There is a software problem. Call your software specialist.
MNA	None. If the hardware environment has not changed and you have been able to boot memory successfully in the past, there is probably a hardware problem. However, if you have an unusual hardware configuration, you may have encountered a software bug. Call your Field Service representative. If your Field Service representative cannot fix the problem, call your software specialist.
NBS	None. There is a software problem. Call your software specialist.
NHA	None. If the hardware environment has not changed and you have been able to boot memory successfully in the past, there may be a hardware problem. However, if you have an unusual hardware configuration, you may have encountered a software bug. Call your Field Service representative. If your Field Service representative cannot fix the problem, call your software specialist.
NMS	None. There is a software problem. Call your software specialist.
ODL	None. There is a software problem. Call your software specialist.
002	None. There is a software problem. Call your software specialist.
PDH	Make sure that the microcode has been loaded and try again. If the problem persists, call your Field Service representative.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

Code	Action
SB4	None. There is a software problem. Call your software specialist.
SIH	None. There is a software problem. Call your software specialist.
SNR	None. There is a software problem. Call your software specialist.
SS0	None. There is a software problem. Call your software specialist.
TMD	None. There is a software problem. Call your software specialist.
UMB	None. If the hardware environment has not changed and you have been able to boot memory successfully in the past, there may be a hardware problem. However, if you have an unusual hardware configuration, you may have encountered a software bug. Call your Field Service representative. If your Field Service representative cannot fix the problem, call your software specialist.
X00	None. If the hardware environment has not changed and you have been able to boot memory successfully in the past, there may be a hardware problem. However, if you have an unusual hardware configuration, you may have encountered a software bug. Call your Field Service representative. If your Field Service representative cannot fix the problem, call your software specialist.

CLI -- ? FILE 'filename' NOT FOUND

Problem: KLINIT cannot find BOOT.EXB, the appropriate microcode file, or the alternate KL bootstrap file in the RSX-20F file directory [5,5] on SY0:.

Solution: Make sure that the file you requested resides on the front-end load device and try the operation again.

CLI -- ? I/O ERROR -n ON FILE 'filename'

where n is an RSX-11 octal error code used by Software Support.

Problem: An I/O error occurred while KLINIT was trying to access the file 'filename.'

Solution: Reload the system and try the operation again. If the problem persists, call your software specialist.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

CLI -- ? ILLEGAL BUS-MODE

Problem: You specified a bus-mode under which the current DMA20 configuration cannot operate.

Solution: Try the operation again without the illegal bus-mode setting. If the problem persists, call your software specialist.

CLI -- ? ILLEGAL MF20 TIMING FILE FORMAT

Problem: The MF20 timing file is in the wrong format.

Solution: Try the operation again with a new copy of the timing file. The current MF20 timing file name is BF16N1.All.

CLI -- ? INPUT RECORD LENGTH ERROR

Problem: An error occurred while KLINIT was trying to read KL.CFG, the appropriate microcode file, or the KL bootstrap file. This error could have been caused by software or hardware failure.

Solution: If possible, try other copies of the files. If the problem persists, call your software specialist. If the file in question is KL.CFG, you can solve the error by renaming or deleting the file. KLINIT will then write a new KL.CFG file.

CLI -- ? INSUFFICIENT MEMORY FOR BOOTSTRAP

Problem: KLINIT tried to load the bootstrap program where there is not enough or no memory available. The memory-selection switches on the memory units may be set incorrectly.

Solution: Check the memory-selection switches on the memory units and try the operation again. If the problem persists, call your Field Service representative.

CLI -- ? KL HALT DURING RESTART

Problem: The KL processor stopped on a HALT instruction while KLINIT was monitoring a restart operation.

Solution: Boot and load the KL monitor again. If the problem persists, call your software specialist.

CLI -- ? MASTER RESET FAILED

Problem: There is a hardware error. A master reset function to the KL failed.

Solution: Reload the system and try the operation again. If the problem persists, call your Field Service representative.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

KLI -- ? MEMORY CONFIGURATION FAILED

Problem: A hardware or software error occurred while KLINIT was configuring memory.

Solution: Reload the system and try the operation again. If the problem persists, call your Field Service representative.

KLI -- ? MF20 TIMING FILE CHECKSUM ERROR

Problem: A checksum error occurred while KLINIT was accessing the MF20 timing file. This occurs during memory configuration.

Solution: Try the operation again. If the problem persists, try once more with a new copy of the timing file. The current MF20 timing file name is BF16N1.All.

KLI -- ? MF20 TIMING FILE READ ERROR

Problem: A read error occurred while KLINIT was accessing the MF20 timing file.

Solution: Try the operation again. If the problem persists, try once more with a new copy of the timing file. The current MF20 timing file name is BF16N1.All.

KLI -- ? MICROCODE FIX FAILED

Problem: While KLINIT was trying to fix the microcode, it encountered more than five hard (irreparable) errors.

Solution: Reload the microcode. If the problem persists, call your Field Service representative.

KLI -- ? MICROCODE LOAD FAILED

Problem: A hardware or software error occurred while KLINIT was loading the KL microcode.

Solution: Reload the microcode. If the problem persists, call your Field Service representative.

KLI -- ? MICROCODE VERIFY FAILED

Problem: While KLINIT was verifying the KL microcode, it discovered errors. These errors are itemized in preceding error messages.

Solution: Reload the microcode and verify it. If the problem persists, call your Field Service representative.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

KLI -- ? NO MEMORY AT LOCATION ZERO

Problem: When KLINIT was configuring memory, it could not locate any memory unit whose address switches were set to zero.

Solution: Check the memory units and make sure that one memory unit has its address switches set to zero; then, try loading again.

KLI -- ? NO MF20 TIMING FILE

Problem: KLINIT cannot find an MF20 timing file.

Solution: Try the operation again with a new copy of the timing file. The current MF20 timing file name is BF16N1.All.

KLI -- ? NONEXISTENT CONTROLLER

Problem: KLINIT tried to configure a controller and found that it was not there.

Solution: Try the operation again. If the problem persists, call your Field Service representative.

KLI -- ? NONEXISTENT MODULE/BLOCK

Problem: KLINIT tried to configure a module or block that does not exist in the controller.

Solution: Try the operation again. If the problem persists, call your Field Service representative.

KLI -- ? OUTPUT RECORD LENGTH ERROR

Problem: An error occurred while KLINIT was trying to write an updated configuration file, KL.CFG.

Solution: Try the operation again. If the problem persists, call your software specialist.

KLI -- ? POWER-FAIL RESTART FAILED

Problem: KLINIT could not restart the KL processor during a power-fail recovery.

Solution: Reload the system using one of the load-switch procedures. If the system does not come up, call your Field Service representative.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

KLI -- ? READ ERROR

Problem: A hardware or software error occurred while KLINIT was accessing KL.CFG, the appropriate microcode file, or the KL bootstrap file.

Solution: Try the operation again. If the problem persists, call your software specialist. If the file in question is KL.CFG, you can get around the read operation by renaming or deleting the file. A new file will be written.

KLI -- ? READ PC FAILED

Problem: KLINIT cannot read the KL PC during memory configuration.

Solution: Try the operation again. If the problem persists, call your software specialist.

KLI -- ? SYSTEM ERROR DURING KL RESTART

Problem: A KLINIT software error occurred during a KL restart operation.

Solution: Reload the system using one of the load-switch procedures. If the problem persists, call your software specialist.

KLI -- ? TIMEOUT DURING KL RESTART

Problem: While KLINIT was monitoring a KL restart, the 30-second time limit was exceeded.

Solution: Try reloading the KL processor with the default KLINIT operator-dialog answers. If the problem persists, call your software specialist.

KLI -- ? WRITE ERROR

Problem: A hardware or software error occurred while KLINIT was writing an updated copy of the configuration file KL.CFG.

Solution: Try the write operation again. If the problem persists, call your software specialist.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

17.9 RECOVERING FROM PARITY AND NXM ERRORS

Memory-system errors are hardware errors. The types of memory-system errors are:

1. Parity errors
2. NXM (nonexistent memory) errors

When the system detects a parity or NXM error, it performs the following steps:

1. Prints a series of informational messages that describe the error.

You should record these informational messages in the system logbook. They are very important because they provide the system programmers and your Field Service representative with information that will help them troubleshoot the problem. To make the informational messages easy to identify, 15 asterisks (that is, *****) print on the CTY above and below each message series. (See Examples 1 through 3.)

2. Tries to automatically recover in the way that causes the least amount of damage.
3. Prints one of the following error messages if it cannot recover:

?Non-recoverable memory parity error in monitor.

[CPU Halt]

?Non-existent memory detected in monitor.

[CPU Halt]

If either of these error messages prints on the CTY, perform the following steps:

- a. Record the error messages that print on the CTY in the system logbook.
- b. Try to manually dump and reload the monitor. (See Section 17.2.2.)
- c. If you cannot dump and reload, reconfigure memory using the information supplied in the series of informational messages. To reconfigure memory, see Section 17.10.2.
- d. If you cannot reconfigure memory, call your Field Service representative.

Examples 1 through 3 are examples of what you will see on the CTY of the affected CPU when the monitor detects a memory error.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

Example 1: (CPU Parity Error Interrupt)

```
*****
CPU0 parity error interrupt at exec PC 562343 on dd-mmm-yy hh:mm:ss
CONI APR, = 007760,,204413
CONI PI, = 000000,010377
ERA = 334000,,560271
Error invoked by a cache write-back forced by a sweep instruction.
SBUS DIAGS:
CNTRLR FNC 0          FNC 1
000004 006420,,560271 000200,,000000
*****
```

Example 2: (CPU Parity Trap)

```
*****
CPU0 AR/ARX parity trap at user PC 011260 on dd-mmm-yy hh:mm:ss
Job 42[WRTBAD] was running
Page fail word = 767000,011271
Mapped page fail address = 547000,,560271
Incorrect contents = 000000,,000000
CONI PI, = 000000,,000377
Recovery unsuccessful. Offending location zeroed.
*****
```

Example 3: (Memory Parity Scan)

```
*****
Memory parity scan initiated by channel 0 on CPU0 on dd-mmm-yy
hh:mm:ss
Parity errors detected:
  at 253271 (phys.), Contents = 000000,,000000
*****
```

17.10 RECOVERING FROM BAD MEMORY

There may be times when an error message indicates that a portion of a memory module or a whole module is unusable. Under certain conditions, you can set a portion of memory off-line and let the system continue processing. If this is not possible, you will have to stop the system, reconfigure memory without the affected module, and reload the system.

17.10.1 Setting Memory Off-Line

To set memory off-line, first make sure that the following conditions are met:

1. There will still be a reasonable amount of memory left for user programs after memory is off-line. Your system administrator will determine what is a "reasonable amount."

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

2. The memory to be set off-line is not interleaved. (If interleaved memory is set off-line, memory that is good and usable will also be placed off-line.)

| Then, give the following command to OPR:

```
OPR>SET MEMORY OFF-LINE FROM N TO M <RET>
```

When the SET MEMORY OFF-LINE command is successful, the system continues. Memory that was set off-line is not referenced.

If the conditions above cannot be met, you must reconfigure memories. In this case, see Section 17.10.2.

17.10.2 Reconfiguring Memories

To reconfigure memories, perform the following steps:

1. Skip Steps 2 and 3 if the bad memory is in the lower 112K.
2. Set the bad memory off-line. (See Section 17.10.1.) However, if no job can run without that memory, do not try to make the command succeed; skip Step 3.
3. Stop timesharing. See Section 17.3 to stop timesharing at a specified time. Allow enough time for those jobs that can run to complete their processing.
4. Type everything that is in **UPPERCASE BOLD PRINT** in the following sample dialog:

^ \

Type CTRL/backslash, which does not print, to communicate with the PARSER.

```
PAR>SET CONSOLE MAINTENANCE<RET>
```

This changes the console mode.

```
PAR>RESET<RET>
```

This causes a master reset of the the KL10 processor.

5. Deselect the bad memory, check the lower-bound addresses (memory-address switches) to get contiguous memory, and correctly set the interleave switches.
6. Reload the monitor as usual. (See Chapter 11.)

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

17.11 RESTARTING A HUNG CONSOLE TERMINAL (LA36)

If you try to type commands at a CTY and no characters print, make certain the following conditions are met:

- o The CTY should be plugged in.
- o There should be paper in the CTY. (If you replenish the supply, and characters still do not print, switch the CTY to LOCAL and then back to ON-LINE.)
- o The fuse on the vertical panel under the keyboard should not appear burned out.
- o The CTY should work when it is set to LOCAL.
- o The CTY should be on-line.
- o The CTY should be set to the correct speed.
- o You should not be able to communicate with the PARSER by typing CTRL/backslash. If you can, type QUIT or CTRL/Z to return to the monitor.
- o No other terminals should work.

If the above conditions are met, reload the system from disk or magnetic tape. If not, or if the problem persists, call your Field Service representative.

17.12 FINDING A MISSING MONITOR FILE

If the bootstrap program BOOT is unsuccessful in loading the system from a cold start, or if BOOT cannot reload the monitor from disk, this message will appear on the CTY that is attached to the Boot CPU.

```
%File not found dev:file ext[p,pn]
```

In either case, the message indicates that the file you specified could not be located.

To solve either of these problems, check that you have:

- o Correctly specified a nondefault monitor name if your installation uses a nondefault monitor.
- o Loaded BOOT, and not BOOTM which loads the monitor from magnetic tape.
- o Mounted the correct disk packs.
- o Set the mounted disk packs on-line.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

If these conditions are met, but you still cannot load from disk, try loading from magnetic tape. (See Section 11.5.2.) If the system comes up for timesharing, the copy of the monitor file on the disk was probably a bad one. In this case, restore a good copy of the monitor from a BACKUP tape onto DSKB:.

However, if the system does not come up for timesharing, there may be problems with the file system. In this case, your software specialist may want to investigate the problem before you attempt to reconstruct the entire disk or recreate the file system.

17.13 RECOVERING FROM FRONT-END PROCESSOR ERRORS

The front-end processors fall into two categories:

1. The console/diagnostic front end, which allows you to communicate with the system and also acts as a tool for system diagnosis.
2. The communications front ends, which control local terminals and remote stations.

Front-end error recovery is based not only on processor use, but also on the type of interface to the CPUs. The console/diagnostic processor, DN20, and DN87S communications front ends use the DTE20 interface to access memory. The DN85 and DN87 communications front ends use the DL10 interface to access memory.

17.13.1 Recovering from DTE20-Interfaced Error

When a CPU senses that a communications front end is not running, it checks to see if DTELDR is running and if the /AUTO switch for automatic reloading of front ends is in effect. (/AUTO is a DTELDR switch; DTELDR is the program that dumps and loads front ends that are connected to a CPU by a DTE20 interface.)

If /AUTO is in effect, DTELDR automatically reloads the front end from a default load file. The default load file is named SYS:DTELxy.BIN where x is the number of the affected CPU and y is the DTE number 0, 1, 2, or 3. Unless you include the /NODUMP switch in the DTELDR command, DTELDR then dumps the front-end memory to a default dump file. Default dump files are named XPN:DTEDxy.BIN, where x is the number of the affected CPU and y is the DTE number 0, 1, 2, or 3. Successive dumps of the same front end are given unique file extensions of .B00, .B01, .B02, and so forth, up to .B99.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

Enabling automatic reloading from communications front ends is the same as enabling it for the console front end. To define the DTE subjob for the front end attached to DTE1, include the following entries in your OPR.ATO file:

<code>:SLOG<RET></code>	Log in a subjob.
<code>:DEF DTE=<RET></code>	Call the subjob DTE.
<code>DTE-R DTELDLDR<RET></code>	Run DTELDLDR.
<code>DTE-/INIT:1<RET></code>	Initialize the front end attached to DTE1.
<code>DTE-/AUTO<RET></code>	Automatically reload the front end after a crash.

If your OPR.ATO file does not include /AUTO, you can run DTELDLDR from any terminal logged in under [1,2]. In this case, you have a choice of restart procedures. You can either use the default file name, or specify one as shown below after the DTELDLDR star (*) prompt.

<code>.R DTELDLDR<RET></code>	Run DTELDLDR.
<code>*/RELOAD:2<RET></code>	Get the program in file SYS:DTELDL02.BIN <RET> (default name).
or	
<code>*DTA3:COMSYS.BIN/RELOAD:1/NODUMP<RET></code>	Reload the front end on DTE1 with the file COMSYS.BIN on DECTape drive 3. Do not take a front-end memory dump.

To print a description of the DTELDLDR program switches on your CTY, type /HELP after the * prompt prints.

17.13.2 Recovering from DL10-Interfaced Errors

When a DL10-interfaced front end (DN85, or DN87) crashes, one of the following error messages prints on the OPR terminal:

```
%%PDP-11 number n is not running
%%PDP-11 number n is halted at pc
```

where:

n is port number 0 though 3 for the first DL10, and 4 through 7 for the second, if any.

pc is the address of the halt in the front end.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

BOOT11 is the program that dumps and loads over a DL10. BOOT11 should be available on SYS:. To dump and reload DL10-interfaced front ends, type everything that is in **BOLD PRINT** in the following sample dialog:

.R BOOT11<RET>	Load BOOT11.
File:/DUMP/PORTNO:p<RET>	Dump the entire front-end memory attached to port p into the default file DSKB:PDPIp.LSD, where p is the port number.
File:DN87.BIN/CLEAR/START/PORTNO:p<RET>	Clear the front-end memory attached to port p and load and start the program from the file DSKB:DN87.BIN[1,2], or press RETURN to load the default file spec. DSKB:PDPXIp.BIN[1,2], where p is the port number.
"PDP-11 dumping	Front-end memory is being dumped into a TOPS-10 file.
"PDP-11 dumped	
"Clearing PDP-11	Front-end memory is being zeroed (cleared).
"PDP-11 loading	The front end is being loaded with formatted binary input file data.
"PDP-11 loaded	Loading is complete.
"PDP-11 started	The front end is now executing in its own memory.

For additional information on BOOT11 switches, see the BOOT11 specification in the Software Notebooks and the SYS:BOOT11.HLP file.

17.14 RECOVERING FROM DATA CHANNEL ERRORS

The DX10 data channel provides direct access to memory and is an integrated part of the TU70-series magnetic-tape systems. The DX10 contains a PDP-8A processor.

The DX20 data channel provides direct access to memory and is an integrated part of the TU70-series magnetic-tape systems and the RP20 disk systems. The DX20 contains a microprocessor.

You must load or reload this microprocessor whenever you first power up the DX10 or DX20 data channel, or after Field Service maintenance has been performed. Usually, the KL10 automatically reloads the DX10 or DX20 after a crash. If a power fail occurs, the data channel must be loaded manually. The procedure for manually reloading the DX10 or DX20 are described below.

If the PDP-8A in the DX10 halts, the following message prints on the OPR terminal:

```
%%Tape controller MTx is off line
```

where x specifies the controller that is attached to the data channel, for example, MTA, MTB.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

If the microprocessor in the DX20 halts, the following message prints on the OPR terminal:

```
%%Tape controller MTx if off line
```

where x specifies the controller that is attached to the DX20, for example, MTA, MTB.

To manually reload the DX10 or DX20 data channel, issue the following commands to the CONFIG program:

```
.R OPR<RET>  
OPR>ENTER CONFIG<RET>  
CONFIG>LOAD MTx<RET>  
CONFIG>EXIT
```

where x is the tape controlled identification.

17.15 ALLOWING SYSTEM DIAGNOSIS WITH KLINIK

The KLINIK link allows a DIGITAL Field Service representative or software specialist to diagnose a problem in your system from a remote location. This means that DIGITAL's Field Service product-support group and software specialists can collect and analyze performance data without traveling to your installation.

To allow access from the KLINIK link, you must first ask the person who is doing the diagnosis the following questions:

- o What is the link to be used for? Is it to be used as a timesharing terminal or as a remote CTY?
- o What is the password (only if it is to be used as a remote CTY)?
- o What is the time period in which access to the KLINIK link will be required?
- o What is the highest console mode?

To use the KLINIK link as a remote CTY, establish the password FGH, allow access between the current time and 24 hours later, and allow MAINTENANCE as the highest console mode, type everything that is in BOLD PRINT in the following sample dialog:

```
PAR>SET KLINIK<RET>
```

```
KLINIK mode: REMOTE<RET>  
Password: FGH<RET>  
Access window open date:<RET>  
Access window open time:<RET>  
Access window close date:<RET>  
Access window close time:<RET>  
Highest console mode: MAINTENANCE<RET>  
KLINIK inactive  
Access window open: dd-mmm-yy hh:mm<RET>  
Access window closed: dd-mmm-yy hh:mm<RET>  
KLINIK mode: REMOTE<RET>  
Highest console mode: MAINTENANCE<RET>
```

```
PAR>QUIT<RET>
```

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

To terminate an active KLINIK link, type everything that is in UPPERCASE BOLD PRINT in the following sample dialog:

```
PAR>CLEAR KLINIK<RET>
  KLINIK DISABLED
KLD -- KLINIK ACCESS TERMINATED BY OPERATOR
PAR>DISCONNECT<RET>
KLD -- KLINIK LINK DISCONNECTED
^
PAR>
```

To find out what KLINIK parameters have been set, type WHAT KLINIK to the PARSER.

For more information on CLEAR KLINIK, DISCONNECT, SET KLINIK, and WHAT KLINIK, refer to the TOPS-10/TOPS-20 RSX-20F System Reference Manual. Reference Manual.

17.15.1 KLINIK Informational Messages

While you are using KLINIK, you may receive one or more of the messages listed in this section. These messages are for your information only; they do not indicate errors.

KLD -- KLINIK access terminated by operator

If the KLINIK link is active and you give the CLEAR KLINIK command, this message prints on both the CTY and the remote KLINIK CTY. This means that the KLINIK access window has been closed, the KLINIK link has been terminated, and the KLINIK parameters have been cleared.

KLD -- KLINIK disconnect

This message prints on the CTY and the remote KLINIK CTY after you give the DISCONNECT command to the PARSER to terminate KLINIK access by hanging up the modem.

KLR -- KLINIK line connected to RSX-20F mode limit c

This message prints on the CTY and the remote KLINIK CTY when the remote KLINIK user specifies REMOTE KLINIK mode during the KLINIK link access procedure. The mode limit c is MAINTENANCE, PROGRAMMER, or OPERATOR--whatever you specified as the highest console mode with the SET KLINIK command.

KLR -- KLINIK line connected to TOPS-10

This message prints on the CTY and the remote KLINIK CTY when a remote KLINIK user is trying to gain access to the KLINIK link in USER KLINIK mode. The remote KLINIK CTY can then be used for timesharing.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

KLR -- KLINIK ring -- validating access

If you specified REMOTE KLINIK mode in the last SET KLINIK command and a user at a remote location has just dialed in to try to gain access to the KLINIK link, this message prints on the CTY.

SAV -- *DIAG* -- KLINIK line active in USER mode

This message prints on the CTY and the remote KLINIK CTY if RSX-20F is reloaded and the KLINIK link is active in USER mode.

SAV -- *DIAG* -- KLINIK line active in REMOTE mode

SAV -- *DIAG* -- KLINIK line connected to system console

These messages print on the CTY and the remote KLINIK CTY if RSX-20F is reloaded and the KLINIK link is active in REMOTE mode.

17.15.2 KLINIK Error Messages

While you are using KLINIK, you may receive an error message. Some of these error messages are printed by PARSER, others are printed by KLINIK. This section lists the error messages that are printed by KLINIK. For information on PARSER error messages, see Section 17.7.

KLR -- KLINIK LOGON timeout -- LOGON aborted

KLD -- KLINIK line disconnected

Problem: You specified REMOTE KLINIK mode in the last SET KLINIK command and the KLINIK user at a remote location gave the wrong password five times within 2 minutes. (These messages print on the CTY and the remote KLINIK CTY.)

Solution: The KLINIK user at a remote location must redial and go through the validation sequence again.

KLR -- KLINIK ring -- KLINIK window closed

Problem: A user at a remote location tried to gain access to the KLINIK link but the access window is closed or not defined. (This message prints on the CTY and the remote KLINIK CTY.)

Solution: The KLINIK user at a remote location must go through the validation sequence.

SAV -- *FATAL* -- Protocols not running

Problem: There may be a serious software or hardware problem.

Solution: Try to reload the system. If you cannot reload the system, call your Field Service representative.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

17.16 RECOVERING FROM ENVIRONMENTAL ERRORS

The causes of environmental crashes are varied. They include power fluctuations, power outages, temperature extremes, water leaks, accidental spills, mechanical shocks, and so forth. Some of these environmental problems are easy to detect before they cause the system to crash. For example, if the air-conditioning system fails, the rise in temperature could cause a system crash. Other environmental problems, however, will occur without warning.

Whenever possible, you should perform an orderly shutdown if any of these conditions are imminent. When the problem is solved, you can power up and reload the system.

When either a power fluctuation or outage occurs, a power-failure detection circuit senses it, and initiates a power-failure interrupt. This interrupt triggers the operation of a program that saves the PC, flags, mode information, and fast memory registers; then it halts the processors. The system will try to recover automatically when power is restored.

If the temperature rises above an acceptable level, it is sensed by temperature sensors, which causes the power to be shut down and initiates the power-failure interrupt sequence.

A power fluctuation is a variation in line voltage that occurs over a short time. Although the power is not lost completely, the system will probably go through an automatic restart procedure.

A power outage is a complete loss of power. If the power goes off and then comes back on suddenly, the surge of power can damage the equipment. Therefore, when the power goes off, turn the START/STOP switch on all disk drives to STOP. When the power has been restored, the system will go through an automatic restart procedure.

If the automatic restart procedure after a power outage or fluctuation is unsuccessful, perform the following steps:

1. Check all equipment to make sure that there is power. If there is power, try to power up. (See Sections 10.2 and 10.3.) If this fails, call your Field Service representative.
2. If necessary, reload the monitor. If the monitor will not reload, check the various controllers; clear them if necessary (refer to the TOPS-10 Hardware Reference Manual), and try to reload the monitor. If this also fails, call your Field Service representative.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

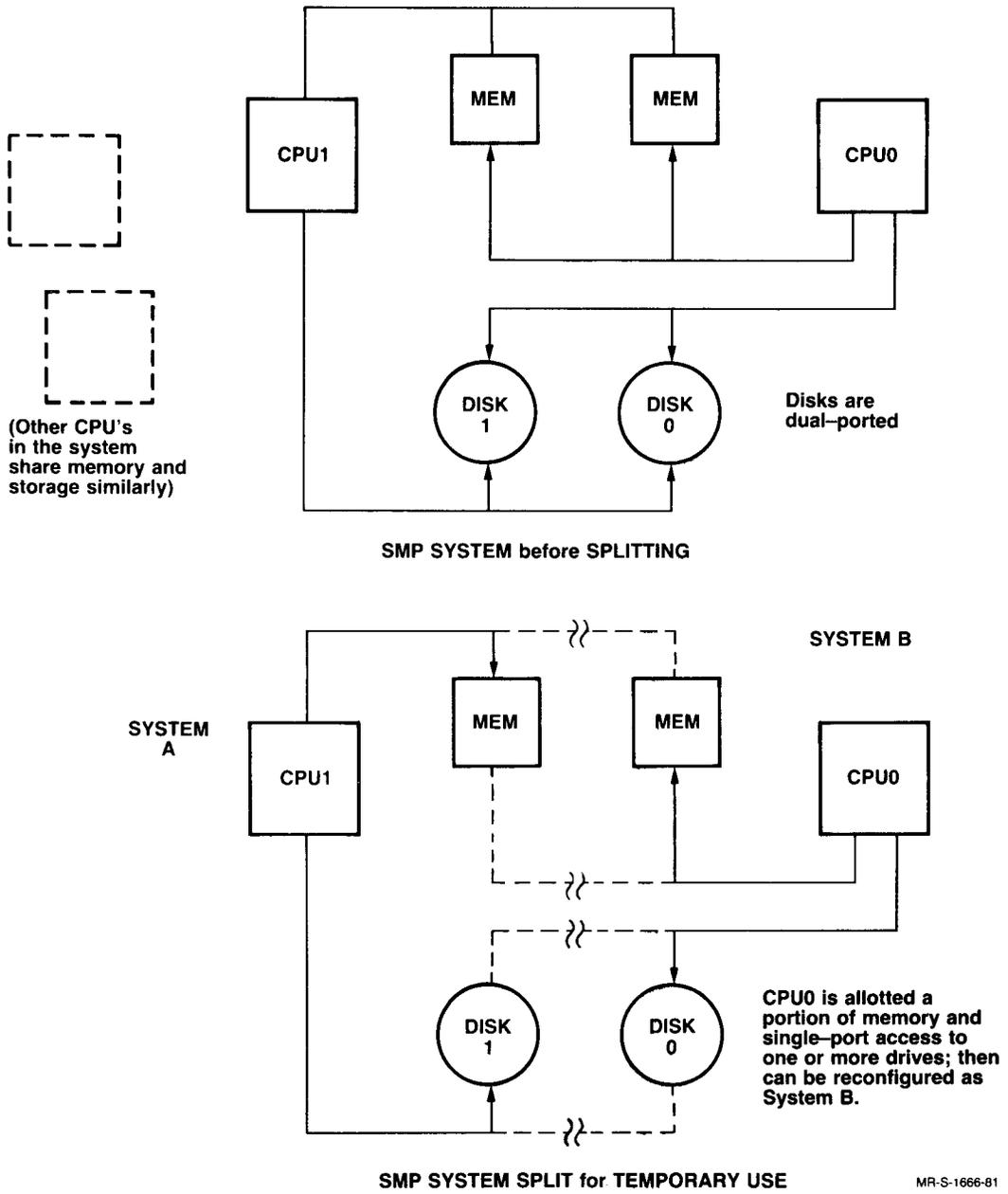


Figure 17-1: Conceptual Diagram of Splitting the System

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

17.17 SPLITTING AND REJOINING AN SMP SYSTEM

It is possible to split an SMP system into two or more smaller systems. For instance, Field Service could use one system to troubleshoot a problem without disrupting timesharing in the other parts of your SMP system. However, splitting the system is a delicate procedure. Therefore, do not attempt to split the system unless your system administrator requests you to do so.

Essentially, you turn off parts of the system (a processor, a portion of memory, and one or more disk units), and then allow Field Service to reconfigure those parts into a separate system for diagnostics. (In this explanation, we refer to the smaller system as System B and its processor as CPU0.) The remaining system (which we refer to as System A, with processor CPU1) can continue to provide timesharing. For this discussion, we assume a dual-processor system. On a system with more processors, all non-Policy CPU's are treated identically.

To split your SMP system, you must logically remove the one processor, the amount of memory your system administrator decides to allot, and one or more disk units from the system; you must also remove the components physically. Following is a description of the steps required to set aside one section of the system for diagnostics, while maintaining timesharing on the other sections, and then rejoin the two sections after Field Service has finished doing diagnostics.

NOTE

The following process allows removal of CPU0 from a multiprocessor system. The multiprocessor system dedicated to timesharing is called System A. CPU0 will be removed for Field Service use, reconfigured and called System B. In an actual situation you may remove any CPU in a multiprocessor system.

Step 1

Before you split the system and turn over the one portion to Field Service, you need to remove all system disk packs from the drives Field Service will require. (This ensures the safety of system and user data.) While the drives are off-line, set the port select switches so that only the Field Service system (System B) can access them. Be sure that you do not leave any switches in the middle position. You should also inform your users that these structures are being removed. You may want to remount them on drives that will be available to the timesharing section.

Step 2

To prepare your system for the removal of CPU0 and the portion of memory reserved for it, run OPR, and then enter CONFIG at the CTY for CPU1. (For more information on CONFIG, see the TOPS-10 Operator's Command Language Reference Manual.)

```
| .R OPR<RET>  
| OPR>ENTER CONFIG<RET>  
| CONFIG>REMOVE CPU0<RET>  
| CONFIG>REMOVE MEMORY nnnK to nnnnK<RET>  
| CONFIG>EXIT
```

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

If you have left any system disks on-line to CPU0, CONFIG will print an error message, and will not be able to complete until all the drives have been removed; note the example:

```
| .R OPR<RET>  
| OPR>ENTER CONFIG<RET>  
| CONFIG>REMOVE CPU0<RET>  
? Following packs MUST be dismantled:  
   BLKY0 on RPF0  
   DSKG0 on RPG5  
CONFIG>
```

Step 3

On the CTY that is connected to CPU0, type:

```
^\  
PAR>HALT<RET>  
PAR#RESET<RET>  
  
PAR#
```

NOTE

Optionally, you can halt the front end of CPU0 and power down and remove the front-end disk to ensure the safety of the front-end files.

Step 4

You will need to make changes at the memory cabinets for both systems. In the memory cabinets for System A, turn off the port switches to CPU0, according to Field Service instructions.

In the memory cabinets assigned for the B System, first deselect each cabinet with the Memory SELECT/DESELECT SWITCH. Then, turn off all System A active ports to include any externally connected devices (such as DX10, DL10, etc.), as Field Service instructs.

Step 5

You may have disk drives dual-ported between the timesharing section of your system and the CPU being turned over to Field Service.

NOTE

```
| The HSC50 disk controller cannot be dual-ported as  
| other disk drives can. Assign it to one CPU in the  
| split system. Refer to the HSC50 User's Guide for  
| information on this procedure.
```


ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

Step 2

To return to dual-ported capability, both the drive(s) used by Field Service and those that remained on-line for timesharing, perform these steps:

For RP04, RP06, and RP07 drives:

1. Type .XCHANGE drivename drivename.
2. Turn off the drive.
3. Set each drive's port switch to A/B.
4. Start the drive.

For RP20 drives, simply reset each drive's port switch to A/B.

Step 3

This step is done at the CTY of System B. First, you type RESET to the PARSE; then you carry out the KLINIT dialog, as shown below, to reload the correct microcode for your system and ensure that all Field Service work is cleared from memory.

```
^\  
PAR# RESET<RET>  
PAR# MCR KLI<RET>  
  
KLI -- VERSION YA12-27 RUNNING  
KLI -- ENTER DIALOG [NO,YES,EXIT,BOOT]?  
KLI>YES<RET>  
KLI -- KL10 S/N: 1042., MODEL B, 60 HERTZ  
KLI -- KL10 HARDWARE ENVIRONMENT:  
        EXTENDED ADDRESSING  
        INTERNAL CHANNELS  
        CACHE  
  
KLI -- RELOAD MICROCODE [YES,VERIFY,FIX,NO]?  
KLI>YES<RET>  
KLI -- MICROCODE VERSION 231 LOADED  
KLI -- RECONFIGURE CACHE [FILE,ALL,YES,NO]?  
KLI>ALL<RET>  
KLI -- ALL CACHES ENABLED  
KLI -- CONFIGURE KL MEMORY [FILE,ALL,REVERSE,YES,NO]?  
KLI>ALL<RET>  
  
LOGICAL MEMORY CONFIGURATION.  
  ADDRESS  SIZE  INT  TYPE  CONTROLLER  
  00000000 1024K   4   DMA20    4  
  
KLI -- LOAD KL BOOTSTRAP [FILE,YES,NO,FILENAME]?  
KLI>NO<RET>  
KLI -- WRITE CONFIGURATION FILE [YES,NO]?  
KLI>NO<RET>  
KLI -- EXIT [YES,RESTART]?  
KLI>YES<RET>
```

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

CAUTION

In the KLINIT dialog, you should answer NO to the bootstrapping question. Reloading the front-end would crash your system.

As a safety precaution, after exiting from KLINIT, type RESET to PARSE, then type J 400, and press RETURN to start CPU0:

```
PAR%RESET<RET>
PAR#J 400<RET>
```

Step 4

To complete the rejoining of System B to System A, run OPR and enter CONFIG on the operator's terminal for System A. Type:

```
.R OPR<RET>
OPR>ENTER CONFIG<RET>
CONFIG>ADD CPU0<RET>
CONFIG>ADD MEMORY nnnK to nnnnK<RET>
CONFIG>EXIT
```

Finally, go to the CTY that is connected to CPU0. This message should appear on the CTY:

```
[CPU0]
```

It indicates that the system is now rejoined and capable of full performance.

NOTE

You may run SYSDPY and use the "F" display to verify whether the expected disks are dual-ported again.

17.18 FAULT CONTINUATION (WARM RESTART)

Warm restart allows the console front end to restart the TOPS-10 monitor in an attempt to recover from front end-detected KL10 hardware errors. For example, if a CRAM or DRAM parity error occurs, the front end places an error code and the current program counter into a location available to the monitor. The front end also logs the error in the PARSE.LOG file by reading a command file for the type of error. The monitor receives control, reads the error code, and handles the error appropriately. If the error occurred while the processor was in user mode, the job is terminated, but the system continues to run. If the error occurred in exec mode, the system is reloaded. Note that if the front end detects a field service probe, then it does not store the error code and PC, but halts.

The following is a list of errors that will cause a warm restart by the front end:

- o EBUS parity error
- o Deposit examine failure (PI Level 0 interrupt failure)

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

- o Protocol timeout
- o Clock error stop - fast memory parity error
- o Clock error stop - CRAM parity error
- o Clock error stop - DRAM parity error

There are two kinds of stopcodes associated with warm restart: WRJ and WRF. WRJ is generated when the error occurred in user mode, in which case, the system is continued. WRF is generated when the error occurred in exec mode, in which case, the system is dumped and reloaded, depending on monitor uptime (see Section 17.6.3).

The following examples show recovery from errors in user mode (Example 1), and exec mode (Example 2).

Example 1:

User Mode - WRJ Stopcode

%DECsystem-10 not running

After the "%DECsystem-10 not running" message, a warm restart will take from 1 to 2 minutes, depending on the error, until the "[DECsystem-10 Continued]" message is printed.

CLOCK ERROR STOP

```
KLE>TAKE FMPAR
KLE>SET CON MAI
  CONSOLE MODE: MAINTENANCE
KLE>SET OUT LOG
```

***** LOGGING STARTED 19-AUGUST-1983 09:57 ,RSX-20F YE15-05

```
OUTPUT DEVICES: TTY,LOG
KLE>! FAST MEMORY PARITY ERROR
KLE>CLEAR OUT TTY
```

In this example, it takes approximately 18 seconds from the "CLEAR OUT TTY" command to <EOF>. This will vary depending on the length of the command file. In the case of HALT, or DEX, it will be longer, perhaps 20 seconds to verify microcode; at least 15 seconds until system is continued.

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

OUTPUT DEVICES: TTY
KLE> <EOF>
KLE> <END OF SNAPSHOT>
KLI -- VERSION YA13-05 RUNNING

KLI -- MICROCODE VERSION 324 VERIFIED
KLI -- ALL CACHES ENABLED
KLI -- % MOS MEMORY IS ALREADY CONFIGURED

LOGICAL MEMORY CONFIGURATION.
ADDRESS SIZE INT TYPE CONTROLLER
00000000 768K 4 MF20 10
03000000 768K 4 MF20 11
06000000 256K 4 MF20 12
07000000 256K 4 MF20 13

KLI -- FAULT CONTINUATION SUCCEEDED

?CPU0 monitor error. Stopcode name is WRJ
Job 3 on CTY running KLPAR7 User [1,2]
UUC is 47000000025 at user PC 400447
code = 6

CPU Status Block on dd-mmm-yy hh:mm:ss

APRID = 640324,,364113
ERA = 224000,,011451
CONI APR, = 007760,,000003
CONI PI, = 000000,,000377
CONI PAG, = 000000,,660001
DATAI PAG, = 700100,,006023
AR ARX Data Word = 000000,,000000
IO Page Fail Word = 000000,,000000

SBUS Diags:

CNTRLR	FNC 0	FNC 1
000004	001740,,045157	000200,,000000
000010	006160,,011603	000500,,001000
000011	007745,,750444	000500,,001000
000012	006126,,023507	000500,,001000
000013	007227,,430074	000500,,001000

[Dumping on DSKB:CRASH.EXE[1,4]]
[Aborting job]
?
?Monitor error at user PC 400446

[DECsystem-10 Continued]

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

Example 2:

Exec Mode - WRF Stopcode

This is an example of exec mode failure. The monitor will not continue the system automatically.

%DECsystem-10 not running Allow 1 to 2 minutes for warm restart to continue.

CLOCK ERROR STOP

KLE>TAKE CRAM
KLE>SET CON MAI
CONSOLE MODE: MAINTENANCE
KLE>SET OUT LOG

***** LOGGING STARTED 19-AUGUST-83 10:18 ,RSX-20F YE15-05

OUTPUT DEVICES: TTY,LOG
KLE>! CRAM PARITY ERROR
KLE>CLEAR OUT TTY
OUTPUT DEVICES: TTY
KLE> <EOF>
KLE> <END OF SNAPSHOT>
KLI -- VERSION YA13-05 RUNNING
KLI -- ? C-RAM DIFFERS AT 1414
KLI -- BAD 000000 000000 000000 000000 000000 00
KLI -- GOOD 004736 030003 100201 132402 000040 62
KLI -- XOR 004736 030003 100201 132402 000040 62
KLI -- MICROCODE VERSION 324 VERIFIED
KLI -- ALL CACHES ENABLED
KLI -- % MOS MEMORY IS ALREADY CONFIGURED

LOGICAL MEMORY CONFIGURATION.

ADDRESS	SIZE	INT	TYPE	CONTROLLER
00000000	768K	4	MF20	10
03000000	768K	4	MF20	11
06000000	256K	4	MF20	12
07000000	256K	4	MF20	13

KLI -- FAULT CONTINUATION SUCCEEDED

?CPU0 monitor error. Stopcode name is WRF
code = 7

CPU Status Block on dd-mmm-yy hh:mm:ss

APRID = 640324,,364113
ERA = 224000,,011451
CONI APR, = 000000,,000000
CONI PI, = 000000,,000000
CONI PAG, = 000000,,660001
DATAI PAG, = 700100,,000005
AR ARX Data Word = 000000,,000000
IO Page Fail Word = 000000,,000000

ERROR RECOVERY ON THE KL10 CENTRAL PROCESSOR

SBUS Diags:

CNTRLR	FNC 0	FNC 1
000004	001740,,045157	000200,,000000
000010	006160,,011603	000500,,001000
000011	006165,,777003	000500,,001000
000012	006446,,647251	000500,,001000
000013	007747,,470524	000500,,001000

Reload monitor

[Dumping on DSKB:CRASH.EXE[1,4]]

[Loading from DSKB:RL156A.EXE[1,4]]

RL156A DEC10 Development mm-dd-yy

Date: dd-mmm-yy

Time: hh:mm

Startup option: Q

INSERT TAB 3 "APPENDIXES" HERE.

APPENDIX A

SYSTEM DUMPING AND RELOADING PROCEDURES

A.1 BOOT ERROR MESSAGES

%Bad directory format for dev:file.ext[path]

While reading the file given in the command string, BOOT discovered an inconsistency in the directory format of the file. This generally means that the file has been corrupted.

%File not found dev:file.ext[path]

BOOT could not find the file given in the error message.

%I/O error on dev:file.ext[path]

While attempting to read or write the file given in the error message, BOOT detected a disk device or data error. If retries are successful, the error is usually a recoverable ECC error. If all retries fail, the file was probably written on a bad spot on the disk.

%Memory configuration too complicated for dev:file.ext[path]

The memory configuration of the system has so many fragmented NXMs that BOOT is unable to write the directory of the file in one block.

?No file found on any structure

The user didn't specify an explicit structure in the command string so BOOT attempted to load from structures starting at DSKA and continuing through DSKO. All attempts were unsuccessful.

?No file found on system dump list

The user didn't specify an explicit structure in the command string, so BOOT attempted to load from each structure in the system dump list. All attempts were unsuccessful.

%Not a REBOOTable dump dev:file.ext[path]

The file given in the error message does not contain a system sleep snapshot and may not be rebooted with the /REBOOT switch.

?NXM or memory parity error detected

CONI APR, = nnnnnn,,nnnnn

RDERA = nnnnnn,,nnnnn

While reading or writing memory, BOOT detected an NXM or memory parity error. The CONI APR status and the RDERA (KL1Ø only) are given to aid in error analysis.

SYSTEM DUMPING AND RELOADING PROCEDURES

?Only device may be specified for dump

The user typed more than just a structure name in the /DUMP command string to BOOT. BOOT does not allow the user to specify a filename extension or path with the /DUMP switch.

?Page fail trap

PFW = nnnnnn,,nnnnnn

PF PC = nnnnnn,,nnnnnn

CONI APR, = nnnnnn,,nnnnnn

RDERA = nnnnnn,,nnnnnn

BOOT got an unexpected page fail trap. The page fail word, page fail old PC, CONI APR, and RDERA (KL10 only) are included in the error message. The cause of the page fail trap may be determined by looking at the page fail word. This error is usually caused by a hardware error, the most common of which are AR and ARX parity errors. These two errors are indicated by an octal 36 or 37, respectively, in bits 0-5 of the page fail word.

%Structure not found for dev:file.ext[path]

BOOT could not find the structure given in the error message.

%Syntax error

BOOT detected a syntax error in the command string the user typed.

?Trap other than page fail

MUO = nnnnnn,,nnnnnn

MUO PC = nnnnnn,,nnnnnn

CONI APR, = nnnnnn,,nnnnnn

RDERA = nnnnnn,,nnnnnn

BOOT got an unexpected push down list overflow, trap 3, or MUO trap. The MUO and MUO PC are given in the error message. The CONI APR and RDERA (KL10 only) are also included to assist in debugging the problem. This error may be the result of a bug in BOOT or of a hardware problem. It may be possible to determine which by looking at the CONI APR and RDERA to see if any errors were detected by the processor.

?Unable to dump on any structure in the system dump list

Do you want to keep this dump?

The user didn't specify an explicit structure in the command string so BOOT attempted to dump on each structure in the system dump list. All attempts were unsuccessful. If you answer NO, BOOT will not take this dump. If you answer YES, BOOT will prompt you for a new filespec.

?Unable to find a file on which to dump

Do you want to keep this dump?

The user didn't specify an explicit structure in the command string so BOOT attempted to dump on structures starting at DSKA and continuing through DSKO. All attempts were unsuccessful. If you answer NO, BOOT will not take this dump. If you answer YES, BOOT will prompt you for a new filespec.

SYSTEM DUMPING AND RELOADING PROCEDURES

%Unexpected end-of-file on dev:file.ext[path]

While writing a dump or reading in a monitor, BOOT detected a premature end-of-file. For crash files, this usually indicates that the file is too small for the amount of memory on the system. For monitor loads, it usually indicates that the file is inconsistent.

%Unprocessed dump on dev:file.ext[path]

While attempting to dump on the file given in the error message, BOOT discovered that the crash file had not yet been processed by the CRSCPY program. If the user did not specify an explicit structure in the command string, BOOT will go on to the next structure in the default structure list. If the user specified an explicit structure, BOOT will ask if the unprocessed dump is to be overwritten.

A.2 BOOT ERROR CODES

BOOT error codes can occur when you are loading the system or when you are taking a dump of the monitor.

Error Code	Explanation
?B	No comma inside a pair of brackets ([]).
?C	Illegal switch or no start address before a /G.
?D	Input error.
?E	Input error when trying to read the EXE directory.
?F	First page of the file is not an EXE directory or it is an EXE directory that is too long.
?G	EXE directory describes pages that do not increase monotonically.
?H	Premature end-of-file.
?I	Output error.
?J	Cannot find the file specified.
?K	Bad RIB.
?L	Premature end-of-file when reading the UFD.
?M	Tried to read or write block 0.
?N	Logical block number exceeds disk size.
?O	End-of-file when trying to output.

SYSTEM DUMPING AND RELOADING PROCEDURES

A.3 SYSTEM DUMP LIST

The system dump list (SDL) is an ordered list of file structures on which dumps are written and from which monitors are loaded. The SDL is built at ONCE-only time.

The SDL allows BOOT to find the monitor in as few as six disk reads and to prepare to dump in as few as two disk reads. However, BOOT will only allow a dump to be written on CRASH.EXE[1,4]. You can perform operations to structures that are not in the SDL, but doing so results in performance degradation.

The position of a file structure in the SDL is defined in a manner similar to the system search list.

| Normally, BOOT reads all its commands from BOOTXT. However, there are
| two cases (a shutdown using the SET KSYS command to OPR, and when
| there have been several quick crashes) when you may type a command.
When the BOOT prompt (BOOT>) prints on the CTY, you must type a
command of the form:

```
dev:file.EXE[path]/switches
```

where switches can be:

- /LOAD Load but do not start the monitor.
- /GO:n Load and start the monitor at location n (default is
 .JBSA in the file being loaded).
- /DUMP Dump the monitor on the specified file. You must
 include /D to dump memory.
- /FORCE Ignore the in-core SDL data base and do exhaustive
 searches for units and file. This switch should only
 be necessary if the data base has been clobbered. BOOT
 defaults to this mode if dev: is not in the SDL.

The default for dumping is DSK:CRASH.EXE[1,4]. The default for reloading is DSK:SYSTEM.EXE[1,4]. In either case, DSK: refers to all structures in the SDL. If no operator is on duty or if you do not respond to the BOOT> prompt within 30 seconds, BOOT assumes its defaults.

A.4 THE CRSCPY PROGRAM

When a continuable stopcode dump is taken or when the monitor is reloaded, the monitor automatically runs a program that copies dumps from device SYS: to structures in the system dump list. The default name of this program is CRSCPY. To change this default name, define the symbol CPYNAM to be the SIXBIT name of the program that runs in the SIXBIT symbol definitions in the MONGEN dialog.

SYSTEM DUMPING AND RELOADING PROCEDURES

CRSCPYPY may also be run manually to copy crashes or to perform one of its other functions. To perform most functions, CRSCPYPY must be run while logged in to [1,2]. The CRSCPYPY sample program performs the following functions:

- o Automatically copies dumps taken by BOOT when invoked by the monitor.
- o Manually copies dumps, when run by the operator.
- o Logs the copied dumps and reports them.

CRSCPYPY is a sample program. Therefore, if your installation already has some semi-automatic mechanism to copy dumps, the system programmers at your installation can:

- o Use the CRSCPYPY concepts to modify your installation's own program to work with BOOT.
- o Tailor CRSCPYPY to fit your installation's needs.
- o Use CRSCPYPY without modification.

The general form for a CRSCPYPY command is:

COMMAND argument

There are three types of commands:

1. Action

Action commands cause something to happen immediately rather than storing a value or setting a flag for later processing. (See Section A.4.1.)

2. Status-setting

Status-setting commands set flags or store values directing the action of one of the Action commands. These commands do not initiate actions. (See Section A.4.2.)

3. Report-selection

Report-selection commands restrict the scope of the report generated by the REPORT command to the subset of the crashes that meet all criteria and restrictions. (See Section A.4.3.)

SYSTEM DUMPING AND RELOADING PROCEDURES

A.4.1 Action Commands

The following lists the action commands and gives a brief explanation of each command.

Command	Explanation
CLEAR filespec	Marks the specified file as having been processed so that BOOT can dump to it without operator intervention. This command is not usually required because the COPY command marks the crash file as having been copied when it finishes the copy. However, it may be useful after standalone time or after preventative maintenance to ensure that no old dumps are present.
COPY filespec=filespec	Copies the input filespec to the output filespec, makes a log entry in SYS:CRASH.SYS, and clears the unprocessed dump bit in the file being copied so that BOOT can dump to it without operator intervention. If you type only one filespec identifier, CRSCPY uses that filespec identifier as the filespec of the file to copy.
DISPOSITION seqnum	Gives a disposition for the crash with sequence number seqnum. The disposition is a one-line description of what caused the crash and is given after the crash is analyzed. To print the disposition, use the REPORT command with the DETAIL:DISPOSITION switch or command.
PURGE FILE	Deletes the contents of SYS:CRASH.SYS, but retains the header so that the crash sequence numbers do not start at 1. Therefore, you should use this command rather than simply deleting the file. You must type the argument FILE.
REPORT filespec	Generates a report on the specified file of the contents of SYS:CRASH.SYS. You can restrict the contents of this report by using one or more of the Report-selection commands described in Section A.4.3.

SYSTEM DUMPING AND RELOADING PROCEDURES

A.4.2 Status-Setting Commands

The following lists the status-setting commands and gives a brief explanation of each command.

Command	Explanation
DELETE	Automatically deletes the crash file when the crash is disposed. NODELETE disables this action and is the default.
INFORM name	Selects the destination of all output. Legal values of name are USER and OPR. USER is the default if CRSCPYPY is run manually and causes output to go to the user's terminal. OPR is the default if CRSCPYPY is run by the system and causes output to go to device OPR:. You should not use this command in normal operation.

STRUCTURE <str:blk,str:blk,...>,<str:blk,str:blk,...>,...

Selects the structure to which CRSCPYPY will copy crashes if no output structure is specified in the COPY command or if it is run by the system. str: is the name of a structure and blk is the number of blocks that must remain on that structure after the copy is completed. CRSCPYPY will not copy a crash to a structure unless it meets this minimum block restriction. The angle brackets group structures into sets. CRSCPYPY scans the sets from left to right and selects a structure from the first set that meets all restrictions. Within each set, CRSCPYPY selects the structure that meets the minimum block restrictions and that also contains the most space after the copy. This command usually appears in SWITCH.INI with a line of the form:

CRSCPYPY/STRUCTURE;(<str:blk,str:blk,...>,<str:blk,...>,...)

This line allows the system administrator to specify to which structures crashes may be copied if not explicitly overridden by the operator. Note that since CRSCPYPY runs logged out ([2,5]) when run by the system, you must place the SWITCH.INI file that contains the STRUCTURE command in [2,5].

SYSTEM DUMPING AND RELOADING PROCEDURES

A.4.3 Report-Selection Commands

The following lists the report-selection commands and gives a brief explanation of each command.

Command	Explanation
BEGIN date:time	Reports only on crashes that were dumped after the specified date and time.
CBEGIN date:time	Reports only on crashes that were copied after the specified date and time.
CEND date:time	Reports only on crashes that were copied before the specified date and time.
DETAIL value	Gives more detail than that given by the normal report. Legal arguments are ALL, which gives a full report, and DISPOSITION, which gives only the disposition, if any.
END date:time	Reports only on crashes that were dumped before the specified date and time.
MONVER n	Reports only on those crashes that were running the specified monitor version. The argument to this command is the version number from the monitor location MONVER.
PRIMETIME	Reports only on those crashes that occurred during prime time (0800 through 1700).
SEQUENCE n	Reports only on those crashes that occurred because of the specified stopcode.
UNDISPOSED	Reports only on those crashes that have not yet been disposed.

The report-selection commands may also appear as switches on the REPORT command line, for example:

```
CRSCP>REPORT/BEGIN:TODAY
```

If used in this manner, the value applies only to this command. Subsequent commands will continue to use any defaults specified by report-selection commands. Local switches override any previous defaults.

APPENDIX B

KS10 MICROPROCESSOR CONSOLE PROGRAM AND COMMANDS

B.1 MICROPROCESSOR CONSOLE PROGRAM

The DECSYSTEM-2020 consists of two major components, the microprocessor and the KS10 central processor. You can control the KS10 by typing certain commands on the console terminal (CTY) that is connected directly to the microprocessor. The console program running in the microprocessor processes the commands you type on the CTY (or enter through a KLINIK link). This console program resides in the microprocessor and runs automatically at power up.

The CTY operates in either console mode or user mode. Use console mode for the boot procedure, diagnostics, error recovery, and maintenance. You run TOPS-10 operator programs and communicate with timesharing users in user mode. The console program starts the CTY in console mode at power up.

In console mode, all characters you type on the CTY are directed to (and executed by) the console program. In this mode, you can type only microprocessor commands; that is, commands to the console program. In console mode, you can switch the CTY to user mode by:

- o Booting the system with the BT or MT command
- o Continuing execution with the CO and ST commands
- o Typing a CTRL/Z

In user mode, the console program controls passing all-characters that you type at the CTY to and from the KS10. TOPS-10 processes all commands, except CTRL/backslash. Therefore, in user mode, you can access all TOPS-10 features. When you type a CTRL/backslash in user mode, the CTY switches back to console mode, provided that the LOCK switch on the front panel is in the unlock position.

The message ENABLED prints on the CTY to indicate the transition from user mode to console mode. The message USR MOD prints on the CTY to indicate the transition from console mode to user mode. When the CTY is in console mode, you can type up to 80 characters on a single line without causing an error (?BFO). You can type more than one command on a single line by separating each command with a comma. All numbers that you type must be octal.

NOTE

Not all of the commands described in Sections B.2 and B.3 should be used by the operator. Commands marked by an asterisk (*) are for use by system programmers. Commands marked by a number sign (#) are for use by DIGITAL Field Service. The asterisk and number sign are not part of the command.

KS10 MICROPROCESSOR CONSOLE PROGRAM AND COMMANDS

B.2 COMMON CONSOLE COMMANDS

The following commands and special characters are a subset of the microprocessor commands. Note that these commands, except BT and ST, are executed only in console mode.

Command	Function
BT (Boot)	Boots the system using the last disk drive selected. The microcode and the monitor bootstrap are loaded and started from unit 0 on UBA1 (default address) or from the drive selected with the last DS command. The KS10 starts at memory address 1000. The bootstrap program prompts with BOOT>. This command switches the CTY from console mode to user mode.
CO (Continue)	Continues execution. Also, this command switches the CTY from console mode to user mode.
DS (Disk Select)	Allows you to select a disk drive other than unit 0. Use this command with the BT command.
DM xx (Deposit Memory)*	Deposits xx (36 bits) into KS10 memory. The address was previously loaded by the LA command.
EM (Examine Memory)*	Examines the contents of KS10 memory. The address was previously loaded by the LA command.
EM xx*	Examines the contents of KS10 memory address xx.
HA (Halt)	Halts the KS10.
LA xx*	Sets KS10 memory address to xx, where xx = 00000000 to 17777777.
MS (Magnetic Tape Select)	Allows you to select a magnetic tape drive other than unit 0. Use this command with the MT command.
MT (Magnetic Tape)	Boots the system from magnetic tape using either the last drive selected or unit 0, the default.
RP (Repeat)*	Repeats last command (or last command string) until you press any CTY key.
SH (Shutdown)	Allows you to do an orderly shutdown of the monitor after the last instruction is completed. When you give this command, the microprocessor also stops monitoring the keep-alive count.
ST xx (Start)*	Starts the KS10 program at memory address xx. This command allows you to enter user mode.

KS10 MICROPROCESSOR CONSOLE PROGRAM AND COMMANDS

Special Character	Function
CTRL/backslash	Switches the CTY from user mode to console mode.
CTRL/O	Suppresses printing at the terminal.
CTRL/Q	Resumes printing at the terminal after a CTRL/S has stopped it.
CTRL/S	Stops printing at the terminal and hangs the microprocessor.
CTRL/U	Deletes the current line.
CTRL/Z	Switches the CTY from console mode to user mode.
DELETE Key (or RUBOUT)	Deletes the last character.

B.3 MICROPROCESSOR COMMANDS

Sections B.3.1 through B.3.11 list the microprocessor commands alphabetically within functional groups. The functional groups are:

- o Boot Commands (See Section B.3.1.)
- o Enable/Disable Commands (See Section B.3.2.)
- o Examine Commands (See Section B.3.3.)
- o Mark/Unmark Microcode Commands (See Section B.3.4.)
- o Miscellaneous Commands (See Section B.3.5.)
- o Read CRAM Commands (See Section B.3.6.)
- o Select Device Commands (See Section B.3.7.)
- o Set and Deposit Commands (See Section B.3.8.)
- o Start/Stop Clock Commands (See Section B.3.9.)
- o Start/Stop Microcode Commands (See Section B.3.10.)
- o Start/Stop Program Commands (See Section B.3.11.)

KS10 MICROPROCESSOR CONSOLE PROGRAM AND COMMANDS

B.3.1 Boot Commands

Command	Function
B2 #	Loads a modified preboot program, which loads and runs a special sequence of modified functional diagnostics.
BC #	Performs a rudimentary test of some KS10 hardware. The test includes: <ul style="list-style-type: none">o Floating all 1's and all 0's across the KS10 buso Checking page 1 of the KS10 MOS memory in an addressing sequenceo Checking page 1 of the KS10 MOS memory for its ability to hold all 1's and all 0'so Using an addressing sequence for testing CRAM addressing to check the KS10 control store and to check each location for its ability to hold all 1's and all 0's
BT	Boots the KS10 from disk. This command loads and starts the microcode and the monitor boot program from drive 0 on UBA1 (the default address), or on the drive selected with the last DS command. The KS10 starts at memory address 1000.
BT 1 #	Same as the BT command, except that the diagnostic boot program is loaded and started rather than the monitor boot program.
LB *	Loads the monitor boot program from the last disk selected. This command does not load the microcode. The program must start at memory address 1000.
LB 1 #	Same as the LB command, except that the diagnostic boot program is loaded rather than the monitor boot program. The program must start at memory address 1000.
MB *	Loads the monitor boot program from the last magnetic tape selected. This command does not load the microcode. The program must start at memory address 1000.
MT	Boots the KS10 from magnetic tape. This command loads and starts the microcode and the monitor boot program from tape unit 0, from slave unit 0 on UBA3 (default), or from the drive selected by the last MS command.
MT 1	Same as the MT command, except that the diagnostic boot program is loaded and started rather than the monitor boot program.

KS10 MICROPROCESSOR CONSOLE PROGRAM AND COMMANDS

B.3.2 Enable/Disable Commands

If you press RETURN after the following commands, the current value prints on your CTY.

Command	Function
CE xx #	Enables (xx = 1) or disables (xx = 0) cache.
PE xx #	Enables or disables parity detection: PE 0 Disables all parity detection. PE 4 Enables KS10 bus parity detection. PE 5 Enables DPE/DPM parity detection. PE 6 Enables CRA/CRM parity detection. PE 7 Enables all parity detection.
SC xx #	Enables (xx = 1) or disables (xx = 0) soft CRAM error recovery.
TE xx #	Enables (xx = 1) or disables (xx = 0) CPU interval timer interrupts.
TP xx #	Enables (xx = 1) or disables (xx = 0) CPU traps.

B.3.3 Examine Commands

Command	Function
EB #	Examines the KS10 bus. This command prints the contents of console registers 100 through 103 and 300 through 303.
EC #	Examines the current contents of the CRAM control register. The CPU clock must be stopped to execute this command.
EC xx #	Examines the contents of CRAM address xx. The CPU clock must be stopped to execute this command.
EI #	Examines the contents of the I/O register. The address was previously loaded by the LI command.
EI xx #	Examines the contents of the I/O address xx.
EJ #	Examines the current CRAM address, the next CRAM address, the jump address, and the subroutine return address. The CPU clock must be stopped to execute this command.
EK #	Examines the contents of the microprocessor memory. The address was previously loaded by the LK command.
EK xx #	Examines the contents of the microprocessor memory address xx.

KS10 MICROPROCESSOR CONSOLE PROGRAM AND COMMANDS

Command	Function
EM *	Examine the contents of KS10 memory. The address was previously loaded by the LA command.
EM xx *	Examines the contents of KS10 memory address xx.
EN *	Examines the contents of the next KS10, microprocessor, or I/O address.
ER #	Examines the contents of an internal microprocessor I/O register. The address was previously loaded by the LR command.
ER xx *	Examines the contents of the internal microprocessor I/O register xx.

B.3.4 Mark/Unmark Microcode Commands

To execute the following commands, the CPU clock must be stopped.

Command	Function
MK xx #	Marks the microcode word (bit 95 is set) at CRAM address xx.
UM xx #	Unmarks microcode word (bit 95 is cleared) at CRAM address xx.

B.3.5 Miscellaneous Commands

Command	Function
EX xx *	Executes the single KS10 systems-level instruction xx.
KL xx (KLINIK)	Enables the KLINIK remote diagnosis link when used with the REMOTE DIAGNOSIS key switch. See Chapter 17 for detailed information on this command.
LT (Lamp test)	Turns the STATE, FAULT, and REMOTE lights on for 1 to 2 seconds, and then turns them off for 1 to 2 seconds. The lights then return to their original state.
MR (Master reset)	Resets the KS10 processor.
PW xx	Sets the KLINIK access password to xx, where xx = maximum of 6 alphanumeric characters. To clear the password storage area, type PW and then press RETURN.
RP	Repeats last command (or last command string) until you press any CTY key.
ZM	Zeroes memory in 1 to 6 minutes. This command deposits 0s into all KS10 memory locations.

KS10 MICROPROCESSOR CONSOLE PROGRAM AND COMMANDS

B.3.6 Read CRAM Commands

Command	Function
RC #	Performs diagnostic read functions from 0 to 17 to read the CRAM addresses and the contents of the current address as follows:
RC 0	CRAM bits 00 to 11
RC 1	Next CRAM address
RC 2	CRAM subroutine return address
RC 3	Current CRAM address
RC 4	CRAM bits 12 to 23
RC 5	CRAM bits 24 to 35 (Copy A)
RC 6	CRAM bits 24 to 35 (Copy B)
RC 7	Zero
RC 10	Parity bits A to F
RC 11	KS10 bus bits 24 to 35
RC 12	CRAM bits 36 to 47 (Copy A)
RC 13	CRAM bits 36 to 47 (Copy B)
RC 14	CRAM bits 48 to 59
RC 15	CRAM bits 60 to 71
RC 16	CRAM bits 72 to 83
RC 17	CRAM bits 84 to 95

B.3.7 Select Device Commands

Command	Function
DS	Selects the disk for bootstrap. The console program asks the following questions. The default answers are underlined.
	>>UBA?1 UBA number?
	>>RHBASE?776700 RH11 base address?
	>>UNIT?0 Disk drive unit number?
	The default value of the RH11 base address is currently the only value permitted. Also, if you press RETURN to respond to any question, the current value is retained.
MS	Selects the magnetic tape for bootstrap. The console program asks the following questions. The default answers are underlined.
	>>UBA?3 UBA number?
	>>RHBASE?772440 RH11 base address?
	>>TCU?0 Tape controller unit number?
	>>DENS?1600 Tape density?
	>>SLV?0 Slave number?
	The default value for the RH11 base address is currently the only value permitted. Also, if you press RETURN to respond to any question, the current value is retained.

KS10 MICROPROCESSOR CONSOLE PROGRAM AND COMMANDS

B.3.8 Set and Deposit Commands

Command	Function																		
DB xx #	Deposits xx (36 bits) onto the KS10 bus.																		
DC xx #	Deposits xx (96 bits) into CRAM. The address was previously loaded by the LC command. The CPU clock must be stopped to execute this command.																		
DI xx #	Deposits xx (16, 18, or 36 bits) into an I/O register. The address was previously loaded by the LI command.																		
DK xx #	Deposits xx (8 bits) into the microprocessor memory. The address was previously loaded by the LK command. Note that data cannot be deposited in PROM addresses; only in RAM addresses.																		
DM xx *	Deposits xx (36 bits) into KS10 memory. The address was previously loaded by the LA command.																		
DN xx *	Deposits xx into the next KS10, microprocessor, or I/O address.																		
DR xx #	Deposits xx (8 bits) into internal microprocessor registers. The address was previously loaded by the LR command.																		
LA xx *	Sets KS10 memory address to xx, where xx is 00000000 to 17777777.																		
LC xx #	Sets CRAM address to xx, where xx = 0000 to 3777.																		
LF xx #	Loads diagnostic Write Function xx, where xx = 0 to 7. The function specifies a 12-bit group within a CRAM address.																		
	<table border="0" style="margin-left: 40px;"> <thead> <tr> <th style="text-align: left;">LF</th> <th style="text-align: left;">CRAM Bits</th> </tr> </thead> <tbody> <tr><td>0</td><td>00 to 11</td></tr> <tr><td>1</td><td>12 to 23</td></tr> <tr><td>2</td><td>24 to 35</td></tr> <tr><td>3</td><td>36 to 47</td></tr> <tr><td>4</td><td>48 to 59</td></tr> <tr><td>5</td><td>60 to 71</td></tr> <tr><td>6</td><td>72 to 83</td></tr> <tr><td>7</td><td>84 to 95</td></tr> </tbody> </table>	LF	CRAM Bits	0	00 to 11	1	12 to 23	2	24 to 35	3	36 to 47	4	48 to 59	5	60 to 71	6	72 to 83	7	84 to 95
LF	CRAM Bits																		
0	00 to 11																		
1	12 to 23																		
2	24 to 35																		
3	36 to 47																		
4	48 to 59																		
5	60 to 71																		
6	72 to 83																		
7	84 to 95																		
LI xx #	Loads I/O address (a single 22-bit number). The address is a control number and a register address. I/O addresses that are accessible from the console are listed below. The address of the console instruction register is not included in this list. If the console tries to access its own instruction register, there is no response.																		

KS10 MICROPROCESSOR CONSOLE PROGRAM AND COMMANDS

	CTL	Address	Register
	0	100000	Memory status register
	1,3	763000-77	UBA paging RAM
	1,3	763100	UBA status register
	1,3	763101	UBA maintenance register
	1,3	7xxxxx	UNIBUS device registers
LK xx #		Sets microprocessor memory address to xx (PROM address = 00000 to 17777; RAM address = 20000 to 21777).	
LR xx #		Sets internal microprocessor I/O register address to xx.	

B.3.9 Start/Stop Clock Commands

Command	Function
CH #	Halts the CPU clock.
CP #	Pulses the CPU clock. The CPU clock must be stopped to execute this command.
CP xx #	Pulses the CPU clock xx times (up to 376 octal). The CPU clock must be stopped to execute this command.
CS #	Starts the CPU clock.

B.3.10 Start/Stop Microcode Commands

To execute the following commands, the CPU clock must be stopped.

Command	Function
PM #	Pulses the microcode. This command performs a CP command to execute a microinstruction followed by an EJ command to print the current CRAM address, the next CRAM address, the jump address, and the subroutine return address.
SM	Resets and starts the microcode at CRAM address 0 (the normal starting address).
SM xx #	Resets and starts the microcode at CRAM address xx. SM 1 causes a dump of the KS10 processor status into the halt-status block which is commonly located at location 424 or location 371000.
TR #	Repeats the PM command until you press any CTY key.
TR xx #	Repeats the PM command until it reaches CRAM address xx or until you press any CTY key.

KS10 MICROPROCESSOR CONSOLE PROGRAM AND COMMANDS

B.3.11 Start/Stop Program Commands

Command	Function
CO	Continues KS10 program execution. This command switches the CTY from console mode to user mode.
HA	Halts the KS10 program. The KS10 microcode enters a halt loop.
SH	Shuts down the monitor by depositing nonzero data into KS10 memory location 30.
SI *	Executes the next KS10 instruction.
ST xx *	Starts the KS10 program at address xx. This command switches the CTY from console mode to user mode.

APPENDIX C

PARSER

The command language processor for the front-end operating system is called the PARSER. It is a nonresident system task and executes in the GEN partition when it is invoked. The PARSER is the primary means of communications between you (the system operator) and the front-end programs. It also provides access to the KL10's memory and diagnostic registers.

PARSER input is in the form of ASCII character strings typed at the console terminal (CTY).

For updated information on the PARSER commands, refer to the TOPS-10/TOPS-20 RSX-20F System Reference Manual.

C.1 ENTERING AND EXITING THE PARSER

If you are currently communicating with the TOPS-10 monitor or a TOPS-10 job, type a CTRL/backslash to invoke the PARSER.

If you are currently communicating with another RSX-20F task or utility, such as KLINIT or PIP, type a CTRL/Z to exit from the current task and then type CTRL/backslash to invoke the PARSER.

When you enter the PARSER, one of the following prompts prints on the CTY:

- PAR> indicates that the PARSER is ready to accept commands and that the KL10 is running.
- PAR% indicates that the PARSER is ready to accept commands, but that the KL10 microcode is in the HALT loop.
- PAR# indicates that the PARSER is ready to accept commands, but the KL clock is stopped and the KL10 is not running.

NOTE

If you ever see the PAR# prompt print during timesharing, reload the system.

If the PARSER encounters an error during its initialization, an error message precedes the prompt.

To exit from the PARSER, type QUIT or CTRL/Z to return to the RSX-20F monitor, or type the PARSER command MCR to load and start another program.

PARSER

C.2 PARSER COMMAND SYNTAX

Type commands to the PARSER, one or more to a line, to respond to a PAR>, PAR%, or PAR# prompt. The following rules apply when you type a command to PARSER:

1. To type more than one command in a command line, separate each command with a semicolon. For example:

```
PAR>EXAMINE PC;EXAMINE 20;SHUTDOWN<RET>
```

2. To continue a command or command line on the next line, end the line to be continued with a hyphen (-) and press RETURN. The PARSER will then prompt you for the continuation line by printing another hyphen. For example:

```
PAR>EXAMINE PC;EXAMINE 20;-<RET>  
-EXAMINE NEXT<RET>
```

The maximum number of characters in a command line is 280.

3. To add a comment to the end of a command line or have a comment be an entry in itself, type ! at the beginning of the comment and press RETURN at the end. For example:

```
PAR>CLEAR CONSOLE!RESET TO OPERATOR MODE<RET>  
PAR>!THIS IS A COMMENT LINE<RET>
```

4. To suppress output on your terminal, type CTRL/O.
5. To abbreviate a command, type only enough of the command to make it unique. For example:

```
PAR>H!HALT THE KL10 CPU<RET>
```

If the abbreviation is not unique, an error message prints on the CTY. For example:

```
PAR>RE 5<RET>  
PAR -- [PARSER] AMB - AMBIGUOUS KEYWORD "RE"
```

In this example, the PARSER found two commands that start with "RE": REPEAT and RESET.

6. Integers in a command are, by default, octal if an address or 36-bit value is expected; otherwise, they are, by default, decimal.
7. An underscore (_) between two numbers causes the left-hand number to be binary shifted to the left by the number of bits indicated in the right-hand number. For example:

```
PAR>EXAMINE 2_3<RET>
```

results in:

```
20/ xxxxxx xxxxxx
```

(Rule 6 applies to both the left-hand and the right-hand numbers.)

PARSER

8. To specify a negative number, type - before the number. For example, to specify that you want to deposit -1 in location 30, type:

```
PAR>DEPOSIT TEN 30:-1<RET>
```

9. To specify numeric values, type them as arithmetic expressions using addition (+), subtraction (-), multiplication (*), and division (/). For example:

```
PAR>EXAMINE 123656+33<RET>
123707/ xxxxxx xxxxxx
```

```
PAR>START TEN 407-6<RET>
```

```
PAR>SET INCREMENT 2*3<RET>
KL INCREMENT: 6
```

```
PAR>REPEAT 8/4;EXAMINE PC<RET>
PC/ xxxxxx xxxxxx
PC/ xxxxxx xxxxxx
```

In evaluating arithmetical expressions, multiplication, division, and binary shifts take precedence over addition and subtraction.

10. To add the PDP-11 relocation factor (offset) to a number, type ' after the number. To subtract the offset from a number, type " after the number. For example:

```
PAR>SET OFFSET 101204<RET>
PDP-11 OFFSET: 101204
PAR>EXAMINE ELEVEN 33'<RET>
101237
PAR>EXAMINE ELEVEN 101237"<RET>
33/ xxxxxx
```

You may use the PDP-11 offset to modify KL10 memory addresses as well as to modify PDP-11 memory addresses.

When you press RETURN to end a command line, the PARSER scans the command line buffer for illegal characters. If it finds any illegal characters, the PARSER discards the entire command line and prints the following message on the CTY:

```
PAR -- [PARSER] ILC - ILLEGAL CHARACTER "c"
```

where c is the first illegal character found.

If there are no illegal characters in the command line, the PARSER executes the commands one by one. If the PARSER encounters an invalid command, that command and any other that remain in the command line are not executed. Each invalid command also causes the PARSER to print an error message. (See Section 17.7 for a complete list of the PARSER error messages.)

PARSER

C.3 PARSER CONSOLE MODES

The PARSER command set is available in the following console modes:

OPERATOR Mode	This mode allows you to give only those commands that will not crash the TOPS-10 or TOPS-20 monitor.
PROGRAMMER Mode	This mode allows you to give all PARSER commands except those that direct diagnostic functions.
MAINTENANCE Mode	This mode allows you to give any PARSER command.
USER Mode	This mode causes you to exit from the PARSER. When you enter USER mode, it is the same as giving a QUIT command.

When RSX-20F is loaded for the first time, the console mode in effect is the same one that was in effect when the PARSER was last saved. There is a SET CONSOLE command that you can give to change the mode, there is a CLEAR CONSOLE command that you can give to reset the mode to OPERATOR mode, and there is a WHAT CONSOLE command that you can give to find out what current mode is. (See Section C.4 for more information on these commands.)

C.4 PARSER HELP FACILITY

The PARSER help facility prints the list of commands that are available for the current console mode.

To use the PARSER help facility, type everything that is in UPPERCASE BOLD PRINT in the following dialog:

```
PAR>?<RET>  
PARSER COMMANDS ARE:
```

If you are in OPERATOR mode, the PARSER prints:

```
ABORT  
CLEAR  
DISCONNECT  
EXAMINE  
JUMP  
MCR  
REPEAT  
RUN  
SET  
SHUTDOWN  
QUIT  
WHAT
```

PARSER

If you are in PROGRAMMER mode, the PARSER prints:

```
ABORT
CLEAR
CONTINUE
DISCONNECT
EXAMINE
HALT
INITIALIZE
JUMP
MCR
REPEAT
RESET
RUN
SET
SHUTDOWN
START
QUIT
WHAT
XCT
ZERO
```

The PARSER help facility extends to the argument and subargument levels. This means that if you cannot remember the arguments for a particular command or you can remember the arguments but you cannot remember whether the particular command can take another argument (a subargument), type whatever you know, type a space, and type ?. The PARSER will then print all of the choices available to you. For example, if you type:

```
PAR>SET CONSOLE ?<RET>
```

The PARSER will print the following list of possible subarguments to the SET command:

SET COMMANDS ARE:

MAINTENANCE OPERATOR PROGRAMMER USER

C.5 PARSER COMMANDS

This section lists all of the PARSER commands, except those that require MAINTENANCE mode. The commands that require MAINTENANCE mode are restricted to DIGITAL Field Service personnel. Some PARSER commands require that the KL10 be stopped. To stop the KL10, type HALT or ABORT to reply to the PARSER prompt.

The commands listed in this section use the following notational conventions:

1. Any single argument not in brackets ([and]) must be specified.
2. Uppercase arguments are keywords and must be entered as shown or abbreviated according to the rules listed in Section C.2.
3. A multiple-choice list enclosed in braces ({ and }) means that one of the entries must be specified.

PARSER

ABORT

OPERATOR Mode

The ABORT command stops the KL10 by trying to force it into the HALT loop. If this fails after a reasonable number of EBOX clock ticks, the command tries to START MICROCODE, which implies a master reset of the KL10 processor. This is a way to put the KL10 into a known state when a previous state left it in a hung condition.

CLEAR CONSOLE

OPERATOR Mode

The CLEAR CONSOLE command forces the PARSER into OPERATOR mode. This command is the equivalent of SET CONSOLE OPERATOR.

CLEAR DATE

PROGRAMMER Mode

The CLEAR DATE command clear the validity bit and prompts you for a new date and time (see the SET DATE command). This command is not valid if RSX-20F is in primary protocol.

CLEAR INCREMENT

OPERATOR Mode

The CLEAR INCREMENT command resets the KL10 increment factor to zero. (See the EXAMINE INCREMENT command.)

CLEAR KLINIK

OPERATOR Mode

The CLEAR KLINIK command closes the KLINIK access window and terminates the KLINIK link.

CLEAR MEMORY

OPERATOR Mode

The CLEAR MEMORY command forces all subsequent EXAMINES and DEPOSITs to reference KL10 memory. This command is the equivalent of the SET MEMORY TEN command.

PARSER

CLEAR NOT

OPERATOR Mode

The CLEAR NOT command is the equivalent of the SET command.

CLEAR OFFSET

PROGRAMMER Mode

The CLEAR OFFSET command sets the relocation factor to zero. (See Rule 10 in Section C.2.)

CLEAR RELOAD

PROGRAMMER Mode

The CLEAR RELOAD command disables the automatic reload of the KL10 following a fatal error.

CLEAR REPEAT

OPERATOR Mode

The CLEAR REPEAT command resets the command line repeat factor to zero. A repeat factor of zero is the same as a repeat factor of one; subsequent command lines are executed once.

CLEAR RETRY

PROGRAMMER Mode

The CLEAR RETRY command resets the RETRY flag in the PARSER. When this flag is off, a Keep-Alive-Cease error causes the KLERR routine to take a system snapshot and then call KLINIT to perform a system reload of the KL10. (See the SET RETRY command.)

CLEAR TRACKS

PROGRAMMER Mode

The CLEAR TRACKS command stops RSX-20F from typing all KL10 operations and results on the controlling terminal.

CONTINUE

PROGRAMMER Mode

The CONTINUE command takes the KL10 out of the HALT loop and starts execution at the instruction pointed to by the PC.

PARSER

DEPOSIT AR:newdata

PROGRAMMER Mode

The DEPOSIT AR command sets the contents of the arithmetic register to newdata.

DEPOSIT	ELEVEN	addr	:newdata
	TEN	DECREMENT	
		INCREMENT	
		NEXT	
		PREVIOUS	
		THIS	

The DEPOSIT memory address command displays the contents of the specified or implied memory address and then replaces the contents with newdata.

addr is the actual memory address in octal notation. When referencing PDP-11 memory, this must be an even number.

DECREMENT means subtract the KL10 increment factor from the address last referenced, to arrive at the deposit address. If PDP-11 memory is being referenced, this command is the equivalent of DEPOSIT PREVIOUS.

INCREMENT means add the KL10 increment factor to the address last referenced, to arrive at the deposit address. If PDP-11 memory is being referenced, this command is the equivalent of DEPOSIT NEXT.

NEXT means add one (for a KL10) or two (for a PDP-11) to the address last referenced to arrive at the deposit address.

PREVIOUS means subtract one (for a KL10) or two (for a PDP-11) from the address last referenced to arrive at the deposit address.

THIS means use the address last referenced as the deposit address.

DISCONNECT

OPERATOR Mode

The DISCONNECT command disconnects the KLINIK link by running the KLDISC task. This command does not clear any KLINIK parameters.

EXAMINE PC

OPERATOR Mode

The EXAMINE PC command prints the contents of the KL10 program counter (PC) in octal on the CTY.

PARSER

EXAMINE KL

OPERATOR Mode

The EXAMINE KL command performs the EXAMINE PC, EXAMINE VMA, EXAMINE PI, and the EXAMINE FLAGS commands, in that order.

EXAMINE	ELEVEN	addr
	TEN	DECREMENT
		INCREMENT
		NEXT
		PREVIOUS
		THIS

OPERATOR Mode

The EXAMINE memory address command displays the contents of the specified or implied memory address in octal, on the CTY.

ELEVEN specifies that the command is referencing an address in the PDP-11 memory.

TEN specifies that the command is referencing an address in the KL10 memory.

If neither ELEVEN nor TEN is specified, the memory to be referenced is determined by the most recent SET MEMORY command. If no SET MEMORY command has been issued, KL10 memory is referenced.

There are six arguments that determine the specific memory address to be examined; one of them must be entered.

addr is the actual memory address in octal notation. When referencing PDP-11 memory, this must be an even number.

DECREMENT means subtract the KL10 increment factor from the address last referenced, to arrive at the examine address. If PDP-11 memory is being referenced, this command is the equivalent of EXAMINE PREVIOUS.

INCREMENT means add the KL10 increment factor to the address last referenced, to arrive at the examine address. If PDP-11 memory is being referenced, this command is the equivalent of EXAMINE NEXT.

NEXT means add one (for a KL10) or two (for a PDP-11) to the address last referenced to arrive at the examine address.

PREVIOUS means subtract one (for a KL10) or two (for a PDP-11) from the address last referenced to arrive at the examine address.

THIS means use the address last referenced as the examine address.

PARSER

EXAMINE AB

PROGRAMMER Mode

The EXAMINE AB command displays the contents of the address break register.

EXAMINE AD

PROGRAMMER Mode

The EXAMINE AD command displays the contents of the arithmetic addr.

EXAMINE ADX

PROGRAMMER Mode

The EXAMINE ADX command displays the contents of the arithmetic adder extension.

EXAMINE AR

PROGRAMMER Mode

The EXAMINE AR command displays the contents of the arithmetic register.

EXAMINE ARX

PROGRAMMER Mode

The EXAMINE ARX command displays the contents of the arithmetic register extension.

EXAMINE BR

PROGRAMMER Mode

The EXAMINE BR command displays the contents of the buffer register.

EXAMINE BRX

PROGRAMMER Mode

The EXAMINE BRX command displays the contents of the buffer register extension.

PARSER

EXAMINE CRADDR

PROGRAMMER Mode

The EXAMINE CRADDR command displays the contents of the CRAM address register.

EXAMINE CRLOC

PROGRAMMER Mode

The EXAMINE CRLOC command displays the contents of the CRAM location register.

EXAMINE DRADDR

PROGRAMMER Mode

The EXAMINE DRADDR command displays the contents of the DRAM address register.

EXAMINE DTE-20

PROGRAMMER Mode

The EXAMINE DTE-20 command displays the contents of the three diagnostic registers and the status register for the console DTE.

EXAMINE EBUS

PROGRAMMER Mode

The EXAMINE EBUS command displays the contents of the EBUS register.

EXAMINE FE

PROGRAMMER Mode

The EXAMINE FE command displays the contents of the floating exponent register.

EXAMINE FLAGS

PROGRAMMER Mode

The EXAMINE FLAGS command displays the current state of the flag bits (0 through 12) in the left half of the PC: OVF, CY0, CY1, FOV, DIS, USR, UIO, LIP AFI, AT1, AT0, FUF, and NDV.

PARSER

EXAMINE FM

PROGRAMMER Mode

The EXAMINE FM command displays the contents of the fast memory register.

EXAMINE MQ

PROGRAMMER Mode

The EXAMINE MQ command displays the contents of the multiplier quotient register.

EXAMINE PI

PROGRAMMER Mode

The EXAMINE PI command displays the current state of the priority interrupt system.

EXAMINE REGISTERS

PROGRAMMER Mode

The EXAMINE REGISTERS command displays the contents of the following registers: AD, ADX, AR, ARX, BR, BRX, EBUS, FM, MQ, and PC.

EXAMINE SBR

PROGRAMMER Mode

The EXAMINE SBR command displays the contents of the subroutine return register.

EXAMINE SC

PROGRAMMER Mode

The EXAMINE SC command displays the contents of the shift count register.

EXAMINE VMA

PROGRAMMER Mode

The EXAMINE VMA command displays the contents of the virtual memory address register.

PARSER

EXAMINE VMAH

PROGRAMMER Mode

The EXAMINE VMAH command displays the contents of the virtual memory address half register.

HALT

PROGRAMMER Mode

The HALT command tries to put the KL10 into the HALT loop by clearing the RUN flop (FXCT 10) and waiting. If the KL10 refuses to go into the HALT loop, the front end tries to force it in by using BURST mode. If the attempt is unsuccessful, the following error message is issued:

```
PAR -- [HALT] CFH - CAN'T FIND KL HALT LOOP
```

INITIALIZE

PROGRAMMER Mode

The INITIALIZE command sets up the KL10 state flag word with default values and restarts the KL10 based on those values.

JUMP addr

OPERATOR Mode

The JUMP command starts the KL10 at the specified address and exits from the PARSER. At this point, the CTY is connected to the TOPS-10 operating system. The argument addr must be an octal, positive, nonzero address with a maximum value of 17777777.

MCR taskname

OPERATOR Mode

The MCR command loads and starts the specified task file.

QUIT

OPERATOR Mode

The QUIT command causes the PARSER to be exited. At this point, the CTY is connected to the TOPS-10 operating system. This command is equivalent to SET CONSOLE USER or CTRL/Z.

PARSER

REPEAT nnn;[[command1;command2;...]]

OPERATOR Mode

The REPEAT command causes the subsequent commands in the current command line to be repeated the number of times specified by nnn. The argument nnn must be a positive, decimal, nonzero integer.

The command line can contain as many commands as can fit within the 280-character buffer limitation. You can nest REPEATs within the command line. Also, if a SET REPEAT command is in effect, the two repeat factors are multiplied to arrive at the actual number of times commands are repeated.

For example, the command:

```
REPEAT 10;EXAMINE PC
```

will examine the PC 10 times.

The command:

```
REPEAT 3;EXAMINE PC;REPEAT 2;EXAMINE NEXT
```

will execute the following sequence:

```
EXAMINE PC
EXAMINE NEXT
EXAMINE NEXT
EXAMINE PC
EXAMINE PC
EXAMINE NEXT
EXAMINE NEXT
EXAMINE PC
EXAMINE NEXT
EXAMINE NEXT
```

If SET REPEAT 4 had been previously entered, the above sequence would be repeated four times.

If no commands are specified, the effect is that of a null command.

RESET

PROGRAMMER Mode

The RESET command performs a master reset of the KL10 and retains the clock and parity-stop flags that existed before the reset. This command is not allowed while the KL10 is running.

RESET ALL

PROGRAMMER Mode

The RESET ALL command executes the RESET APR, RESET DTE-20, RESET PAG, and RESET PI commands. This command is not allowed while the KL10 is running.

PARSER

RESET APR

PROGRAMMER Mode

The RESET APR command executes a CONO APR,,267760 instruction to clear the arithmetic processor. This command is not allowed while the KL10 is running.

RESET DTE-20

PROGRAMMER Mode

The RESET DTE-20 command resets the DTE-20 by depositing a 1 in bit 6 of the BTE diagnostic word 2. Bit 0 in diagnostic word 3 is set to 1 to indicate word-mode transfers.

RESET ERROR

PROGRAMMER Mode

The RESET ERROR command executes a CONO APR,,27760 instruction to reset the error flags.

RESET INITIALIZE

PROGRAMMER Mode

The RESET INITIALIZE command performs a master reset of the KL10 and sets up normal clock and parity-stop enables. This command is not allowed while the KL10 is running.

RESET IO

PROGRAMMER Mode

The RESET IO command executes a CONO APR,,200000 instruction to perform an I/O reset of the KL10.

RESET PAG

PROGRAMMER Mode

The RESET PAG command executes a CONCO PAG,,0 instruction followed by a DATAO PAG,,100 instruction to reset the KL10 PAGING box. This command requires that the KL10 clock be running.

RESET PI

PROGRAMMER Mode

The RESET PI command executes a CONO PI,,100000 instruction to reset the KL10 programmable interrupt system.

PARSER

RUN taskname

OPERATOR Mode

The RUN command loads and starts the specified task file. This command is an alias for the MCR command.

SET CONSOLE OPERATOR
 PROGRAMMER
 USER

OPERATOR Mode

The SET CONSOLE command sets the console mode of operation and, therefore, the allowable subset of PARSER commands:

OPERATOR allows only those PARSER commands that cannot crash the TOPS-10 or TOPS-20 monitor.

PROGRAMMER allows all PARSER commands except diagnostic functions.

USER exits from the PARSER.

If no subargument is entered, the console is set to PROGRAMMER MODE.

NOTE

If KLINIK is enabled and active, the PARSER does not let you set the console mode any higher than that specified when the KLINIK window was defined.

SET DATE

PROGRAMMER Mode

The SET DATE command sets RSX-20F's internal date. This date is used in setting up and accessing KLINIK. This command is not available if RSX-20F thinks that it already has a valid date (validity flag is ON). In response to the SET DATE command, the PARSER prompts you as follows:

```
PAR>SET DATE<RET>
DATE: dd mmm yy<RET>
TIME: 1211<RET>
CURRENT SYSTEM DATE:
MONDAY, dd-mmm-yy hh:mm<RET>
VALIDITY FLAG IS:ON<RET>
PAR>
```

SET INCREMENT n

OPERATOR Mode

The SET INCREMENT command sets the KL10 increment counter to the value specified by the octal integer, n. The increment counter is used by the INCREMENT and DECREMENT arguments of the EXAMINE and DEPOSIT commands. Only KL10 memory addresses are modified by the increment counter. PDP-11 addresses that are INCREMENTED or DECREMENTED default to NEXT and PREVIOUS, respectively.

PARSER

SET KLINIK

OPERATOR Mode

The SET KLINIK command enables access to the KLINIK link. The command initiates a dialog in which a KLINIK access window and security parameters are established.

SET MEMORY ELEVEN
 TEN

OPERATOR Mode

The SET MEMORY command establishes the default memory for EXAMINES and DEPOSITS.

ELEVEN means default to the PDP-11 memory.

TEN means default to the KL10 memory.

The command itself has no default; an argument must be entered. When RSX-20F is first loaded, the default memory is TEN.

SET NOT argument

OPERATOR Mode

The SET NOT command is the equivalent of the CLEAR command and requires an argument. (See the CLEAR commands.)

SET OFFSET nnnnnn

PROGRAMMER Mode

The SET OFFSET command sets the PDP-11 relocation factor to the value specified by nnnnnn, an octal number in the range 77777 (+32,767) through 100000 (-23,768). The relocation factor when RSX-20F is first loaded is the address of the PARSER root overlay.

SET RELOAD

PROGRAMMER Mode

The SET RELOAD command enables the automatic reload of the KL10 by the PDP-11 front end in situations such as Keep-Alive-Failed or CPU errors.

SET REPEAT n

OPERATOR Mode

The SET REPEAT command sets the command line repeat factor to n. The value n must be specified as a positive decimal number. Each subsequent command line is repeated n times.

PARSER

SET RETRY

PROGRAMMER Mode

The SET RETRY command sets the RETRY flag in the PARSER. When this flag is set, the first occurrence of a Keep-Alive-Failed error results in the execution of the instruction in location 71. This instruction usually branches to a routine that causes the KL10 monitor to dump memory and request a reload (stopcode). If the KL10 cannot accomplish this before the end of the Keep-Alive period (5 seconds), RSX-20F assumes that the KL10 is incapacitated. In this case, KLERR is called to take a KL10 hardware snapshot and then reload the KL10.

If the RETRY flag is reset (see CLEAR RETRY), every occurrence of a Keep-Alive-Failed error results in a KLERR snapshot/reload of the KL10.

SET TRACKS

PROGRAMMER Mode

The SET TRACKS command causes RSX-20F to type out, on the CTY, all KL10 operations and their results.

SHUTDOWN

OPERATOR Mode

The SHUTDOWN command deposits a -1 into the KL10 EXEC, virtual location 30 (octal). It is used to gracefully bring down a TOPS-10 operating system.

START TEN addr

PROGRAMMER Mode

The START TEN command starts the KL10 at the address specified. Control then returns to the PARSER. The starting address, addr, is a required argument and must not be zero.

START MICROCODE [[addr]]

PROGRAMMER Mode

The START MICROCODE command performs a master reset of the KL10 and then starts the microcode at the specified address. If addr is omitted, the default address is zero. Starting the microcode at an address other than zero is not recommended.

PARSER

WHAT CLOCK

PROGRAMMER Mode

The WHAT CLOCK command displays the current source, rate, and control of the KL10's clocks.

WHAT CONSOLE

OPERATOR Mode

The WHAT CONSOLE command displays the current console mode: OPERATOR, PROGRAMMER, MAINTENANCE, or USER.

WHAT DATE

OPERATOR Mode

The WHAT DATE command displays the day, date, and time that is currently stored in RSX-20F. The status of the date validity flag is also displayed.

WHAT INCREMENT

OPERATOR Mode

The WHAT INCREMENT command displays the current value of the KL10 increment counter used in EXAMINES and DEPOSITS.

WHAT KLINIK

OPERATOR Mode

The WHAT KLINIK command displays the current access status of the KLINIK link. If no access window has been set up (see SET KLINIK command) the reply is:

KLINIK DISABLED

If an access window has been set up but the link is in use, the reply is:

KLINIK ACTIVE

If an access window has been set up and the link is not in use, the reply is:

KLINIK INACTIVE

In either of the last two instances, the status is followed by a display of the KLINIK window parameters.

PARSER

WHAT MEMORY

OPERATOR Mode

The WHAT MEMORY command displays the default memory for DEPOSITS and EXAMINES.

WHAT OFFSET

PROGRAMMER Mode

The WHAT OFFSET command displays the current PDP-11 relocation factor.

WHAT PARITY-STOP

PROGRAMMER Mode

The WHAT PARITY-STOP command displays the current status of the parity stop enable bit and which parity stops are currently enabled.

WHAT RELOAD

PROGRAMMER Mode

The WHAT RELOAD command displays the current status of the automatic reload function.

WHAT REPEAT

OPERATOR Mode

The WHAT REPEAT command displays the current value of the repeat factor.

WHAT RETRY

PROGRAMMER Mode

The WHAT RETRY command displays the current status of the RETRY flag in the PARSER.

WHAT TRACKS

PROGRAMMER Mode

The WHAT TRACKS command displays the current KL10 tracking status.

PARSER

WHAT VERSION

OPERATOR Mode

The WHAT VERSION command displays the current versions of RSX-20F and the PARSER.

XCT argument

PROGRAMMER Mode

The XCT command takes a 360-bit numerical expression as an argument and executes it as a KL10 instruction. Note that executing an instruction with an opcode (bits 0 through 8) of zero is not allowed. If attempted, you receive an ILLEGAL KL OPCODE error message.

ZERO loaddr>hiaddr

PROGRAMMER Mode

The ZERO command zeroes a specified area of KL10 memory. ZERO accepts as an argument the boundary addresses of the area to be zeroed: loaddr and hiaddr.

APPENDIX D

KLINIT OPERATOR DIALOG

If you use the SW REG load switch to load and start a KL10-based system, you can enter the KLINIT operator dialog. The KLINIT operator dialog consists of questions, which you must answer. There are a few general rules that you must follow when you answer each question. Therefore, this appendix is divided into the following sections:

- o Section D.1, KLINIT Operator Dialog Rules, which lists the rules that you must follow to answer a KLINIT operator dialog question.
- o Section D.2, Answering KLINIT Operator Dialog Questions, which lists the acceptable answers to the KLINIT operator dialog questions and describes each answer.

D.1 KLINIT OPERATOR DIALOG RULES

During the KLINIT operator dialog, the following rules hold:

- o Press RETURN to end each answer.
- o Press RUBOUT or DELETE to delete a character.
- o Press RETURN and do not type anything to select the default answer to a question.
- o The first answer enclosed in brackets is the default answer to a question.
- o Type CTRL/Z to end the KLINIT operator dialog and exit to the PARSER without rewriting the configuration file, KL.CFG. If you end the KLINIT operator dialog by typing CTRL/Z, the KL hardware may not be completely initialized.
- o Type CTRL/U to delete the current input line.
- o Type BACK to return to the previous question unless stated otherwise.
- o Type RESTART to the EXIT question to return to the first question in the KLINIT operator dialog.

KLINIT OPERATOR DIALOG

- o Press ESCape at any point in an answer before you press RETURN to restart the dialog. (ESCape does not print on your terminal.)
- o An unacceptable answer causes the question to repeat and an error message to print.
- o Type at least two characters to abbreviate an answer other than a file name.

D.2 ANSWERING KLINIT OPERATOR DIALOG QUESTIONS

This section lists all of the possible KLINIT operator dialog questions and describes each acceptable answer to them. The questions are listed in order of appearance, unless stated otherwise.

KLINIT automatically bypasses any questions that do not apply to your system configuration. Therefore, on any one system, only a subset of the possible KLINIT operator dialog questions will print on the CTY. Also, a particular answer to a question may cause KLINIT to bypass other questions.

There are two commands that are not used in response to any particular question, but can be used at almost any time. The first of these commands is BACK, which causes KLINIT to return to the previous question. You can use this command at any time except on the first question of the dialog.

The second of these commands has four forms. Each of these forms toggle on and off the tracking capability. They are: T+, T-, L+, and L-. To print a report on each operation of the initialization procedure, type L+. This causes the complete listing to print on the line printer. The T+ command causes the same listings to print on the CTY. However, these listings are very long and take a great deal of time to print on the CTY.

Answer each of the following KLINIT operator dialog questions after the KLI> prompt prints on the CTY:

KLI -- ENTER DIALOG [NO,YES,EXIT,BOOT]?

- | | |
|------|---|
| NO | Assume the default answers for all of the remaining questions. This is your last chance to bypass the dialog and take the default answers. |
| YES | Continue the dialog. |
| EXIT | Discontinue the dialog and return to the RSX-20F monitor. |
| BOOT | Skip the rest of the dialog, enable cache memory, as directed by the KL.CFG file, and immediately load and start the standard KL bootstrap program found in the file BOOT.EXB. This answer causes KLINIT to take no defaults. |

KLINIT OPERATOR DIALOG

KLI -- RELOAD MICROCODE [YES,VERIFY,FIX,NO]?

- YES Load the microcode from the bootstrap device into the KL processor. If you want to load the microcode from a file that has been saved with a name other than the default, type a file name before you press RETURN to end your answer.
- VERIFY Verify that the microcode in the KL processor matches the microcode on the bootstrap device. KLINIT prints an error report for each location in which it finds an error and increments an error count. (Refer to the RSX-20F System Reference Manual for more information on this error report.) If KLINIT detects any errors, it prints VERIFY FAILED on the CTY and returns to the beginning of the dialog. Then, you can reload the microcode and try again.
- FIX Verify the microcode as in the VERIFY option. When KLINIT detects an error, it attempts to reload that location. If the reload is successful, the error count is decremented. If the reload fails, KLINIT prints MICROCODE FIX FAILED. In either case, verification continues with the next location. If verification continues through all the microcode and the final error count is greater than zero, it prints VERIFY FAILED and returns to the beginning of the dialog. Then, you can reload the microcode and try again.
- NO Do not load or verify the microcode.

KLI -- RECONFIGURE CACHE [FILE,ALL,YES,NO]?

- FILE Configure cache memory as specified in the configuration file, KL.CFG. If the KL.CFG file does not exist, all cache memory is enabled. The dialog continues with the CONFIGURE KL MEMORY question.
- ALL Enable all cache memory. The dialog continues with the CONFIGURE KL MEMORY question.
- YES Configure cache memory under dialog control.
- NO Do not reconfigure cache memory. Instead, leave the existing configuration as is. The dialogue continues with the CONFIGURE KL MEMORY question.

KLI -- ENABLE WHICH CACHE [ALL,NONE,0-3]?

- ALL Enable all cache memory.
- NONE Disable all cache memory.
- 0-3 Enable only the caches specified. For example, to enable caches 0, 1, and 3, type the following:
KLI>0,1,3<RET>

KLINIT OPERATOR DIALOG

KLI -- CONFIGURE KL MEMORY [FILE,ALL,REVERSE,FORCE,YES,NO]?

FORCE prints only on 1091 systems. Also, if you type BACK to answer this question, KLINIT returns you to the RECONFIGURE CACHE question.

FILE Configure KL memory as specified in the configuration file, KL.CFG. If this file does not exist, KLINIT assumes ALL. Then, KLINIT prints the logical memory map. The dialog continues with the LOAD KL BOOTSTRAP question.

If the configuration in the KL.CFG file is not the same as the actual system configuration, KLINIT prints an error message and the KLINIT operator dialog starts over from the beginning.

ALL Configure KL memory in the normal (forward) direction with as much memory as possible. Then, KLINIT prints the logical memory map. The dialog continues with the LOAD KL BOOTSTRAP question.

REVERSE Configure memory under dialog control. This is a maintenance feature. (Refer to the RSX-20F System Reference Manual for more information on this answer.)

FORCE (Prints on 1091 system only) Allow the operator to force KLINIT into a Double-Bit-Error (DBE) scan of the MF20 MOS memory controllers. This scan allows KLINIT to attempt to recover "lost" MF20 blocks. The scan requires approximately 25 seconds for each 256K of memory to be scanned.

YES Configure memory under dialog control in the normal (forward) direction. Before KLINIT prints the next question, it examines memory and prints out a physical memory map.

NO Do not configure memory; the previous memory configuration remains. The dialog continues with the LOAD KL BOOTSTRAP question.

NOTE

KLINIT saves the forward/reverse configuration indicator in the KL.CFG file. This allows KLINIT to restore the reverse configuration over reloads. If the KL.CFG file does not exist, the default is normal (forward) configuration.

KLI -- CONFIGURE INTERNAL CORE MEMORY [ALL,YES,NO]?

ALL Configure all internal core memory. The dialog continues with the INTERNAL CORE MEMORY INTERLEAVE UPPER LIMIT question.

YES Configure internal core memory under dialog control.

NO Delete all internal core memory. The dialog continues with questions on other types of memory, if any. (Refer to the RSX-20F System Reference Manual for more information on this answer.)

KLINIT OPERATOR DIALOG

KLI -- MODULES/BLOCKS WITHIN CONTROLLER n [ALL,NONE,SPECIFY]?

This question repeats for each controller, where n is the current controller number.

ALL Configure all the memory modules for controller n.

NONE Delete all the memory modules for controller n.

SPECIFY Configure the specified module. Do not type SPECIFY. Valid module numbers are 0 through 3. You must separate the entries with commas. For example, to configure modules 0 and 1, type the following:

KLI>0,1<RET>

KLI -- INTERNAL CORE MEMORY INTERLEAVE UPPER LIMIT [4,2,1]?

4 Allow up to 4-way interleaving.

2 Allow up to 2-way interleaving.

1 Allow no interleaving.

The dialog continues with questions on other types of memory, if any. If none, KLINIT prints the logical memory map. The dialog continues with the LOAD KL BOOTSTRAP question.

KLI -- CONFIGURE EXTERNAL CORE MEMORY [YES,NO]?

YES Set the bus-mode for external memory.

NO Delete all external core memory. The dialog continues with question on other types of memory, if any.

KLI -- EXTERNAL CORE MEMORY BUS-MODE [OPTIMAL,1,2,4]?

OPTIMAL Set the bus-mode for optimal performance.

1 Set the bus-mode to 1.

2 Set the bus-mode to 2.

4 Set the bus-mode to 4.

The dialog continues with questions on other types of memory, if any. If none, KLINIT prints the logical memory map. The dialog continues with the LOAD KL BOOTSTRAP question.

KLI -- CONFIGURE MOS MEMORY [ALL,YES,NO]?

ALL Configure all MOS memory. KLINIT prints the logical memory map. The dialog continues with the LOAD KL BOOTSTRAP question.

YES Configure MOS memory under dialog control.

NO Delete all MOS memory. KLINIT prints the logical memory map. The dialog continues with the LOAD KL BOOTSTRAP question.

KLINIT OPERATOR DIALOG

KLI -- MODULES/BLOCK WITHIN CONTROLLER n [ALL,NONE,SPECIFY]?

NOTE

This question repeats for each controller, where n is the current controller number.

- ALL Configure all memory blocks for controller n.
- NONE Delete all memory blocks for controller n.
- SPECIFY Configure the blocks specified. Do not type SPECIFY. Type a list of block numbers (0 through 13 octal) separated by commas. For example, to configure blocks 0, 1, 2, 7, 10, and 11, type the following:

KLI>0,1,2,7,10,11<RET>

KLI -- LOAD KL BOOTSTRAP [FILE,YES,NO, FILENAME]?

- FILE Load the bootstrap specified in the KL.CFG file. If no KL.CFG file exists, KLINIT uses the default bootstrap.
- YES Load the default bootstrap.
- NO Do not load a bootstrap.
- FILENAME Load the specified file as the bootstrap.

KLI -- WRITE CONFIGURATION FILE [YES,NO]?

- YES Write a new KL.CFG file that contains the current configuration and load parameters.
- NO Do not change the existing KL.CFG file.

At this point, if you requested a bootstrap, the bootstrap program is loaded into the KL and started. If you answered NO to the LOAD KL BOOTSTRAP question, KLINIT prints the next question.

KLI -- EXIT [YES,RESTART]?

- YES Write a new KL.CFG file (if requested) and then exit from the KLINIT operator dialog.
- RESTART Restart the KLINIT operator dialog. KLINIT prints the ENTER dialog question.

APPENDIX E

SAVING AND RESTORING DISK FILES WITH BACKUP

BACKUP is a system program used to save disk files on magnetic tape, or restore any or all of these files to disk. Magnetic tape is the medium used for backup storage of disk files and for transporting files between sites.

E.1 BACKUP FEATURES

BACKUP allows you to choose the files that you want to transfer between disk and tape. You specify files in the following format:

```
dev:filename.ext[project,programmer]
```

BACKUP supports wildcard characters and subfile directories (SFDs). You may also select files by specifying the dates or times associated with those files.

The USAGE command enables USAGE accounting for BACKUP. This status-setting command is a SAVE-only operation that writes accounting records to the system ACTDAE, describing the disk usage for each directory saved.

Automatic volume switching is done by PULSAR, for GALAXY 4.1 and later versions of GALAXY. When the tape was mounted with tape label processing enabled (with /LABEL-TYPE:ANSI, EBCDIC, or NOLABELS), PULSAR performs volume switching instead of BACKUP. When end-of-volume (EOT) is reached, a mount request is sent to the operator. When the next volume is mounted, the last BACKUP command is continued where it left off.

BACKUP has no control over volume switching that is performed by PULSAR. For this reason, the MULTIREEL and REPEAT commands will not work when label processing is in effect. Those commands will work if /LABEL-TYPE is used with the BYPASS, BLP, or USER-EOT arguments. With BYPASS (or BLP, which are indetical), BACKUP sends the \$BKPEOT message to the operator when EOT is reached. If USER-EOT were specified, an informational message ([BKPAMD]) would be sent to the user, in addition to the \$BKPEOT message being sent to the operator.

If you use automatic volume switching, remember that BACKUP relinquishes control to PULSAR, until a subsequent tape has been mounted. Therefore, you should be sure to assign and use logical names while running BACKUP.

Refer to the TOPS-10 Tape Processing Manual for more information about label processing.

SAVING AND RESTORING DISK FILES WITH BACKUP

If you are backing up the disk file structure, you can recover from a system crash without starting completely over. You can produce a directory listing of the tape at the same time you perform a save. Another operator feature is a set of runtime commands compatible with the spoolers.

To facilitate transporting files between sites, BACKUP provides an "interchange" mode that prevents writing system-specific overhead information on the tape. TOPS-10 distribution tapes are produced with BACKUP in interchange mode.

To increase reliability, BACKUP responds to hardware-reported tape-write errors by rewriting the data in a repeater record. When the tape is read later, these repeater records are used instead of the originals.

Sections E.2 and E.3 describe these features in more detail.

E.2 BACKUP COMMANDS

BACKUP commands fall into four categories:

1. Action commands

Action commands perform I/O and operate on the tape specified by the last TAPE command (one of the status-setting commands). (See Section E.2.1.)

2. Status-setting commands

Status-setting commands set a parameter that affects future action commands. (See Section E.2.2.)

3. Tape-positioning commands

Tape-positioning commands take immediate effect. Tape-positioning commands can take any one of a list of tapes as an argument. (See Section E.2.3.)

4. Runtime commands

Runtime commands can be given during execution of the action commands. (See Section E.2.4.)

Sections E.2.1 through E.2.4 list the BACKUP commands and their functions.

E.2.1 Action Commands

The action commands perform I/O and operate on the tape specified by the last TAPE command (one of the status-setting commands). Before you can use any of the action commands, you must specify a tape. The conventions used in the following list of commands and switches are:

spec	means the file specification;	that is,
	dev:filename.ext[directories]	
date	means the date in the form dd-mm-yy	
time	means the time in the form hh:mm:ss	

SAVING AND RESTORING DISK FILES WITH BACKUP

The action commands are:

Command	Explanation
SAVE spec-list	Saves the specified disk files on tape.
RESTORE spec-list	Restores the specified tape files to disk.
CHECK spec-list	Verifies that the tape and disk files agree.
[N]PRINT spec	Prints a directory of the entire tape on the line printer. N is an optional prefix meaning narrow. PRINT produces the effect of a NODIRECTORIES command; that is, no user directories are typed.

An action commands take as an optional argument a list of file specifications in a format similar to the monitor's COPY command. The file specifications may contain wildcards and SFDS.

For each entry in the list of file specifications, you may specify both input and output file specifications (in the form output=input), or just the input specification. This allows you to rename files as they are saved or restored. If you do not specify an output specification, then the specified files are transferred without being renamed. You must separate entries in the list of file specifications with commas.

If you do not supply an argument with an action command, BACKUP defaults to ALL:*.**[*,*,*,*,*,*,*]. This specifies all files on all UFDs and all SFDS of all file structures with no renaming.

If you are not logged in under [1,2], the default for the SAVE command is ALL:*.**[PPN,*,*,*,*,*]=DSK:*.**[PPN,*,*,*,*,*].

For the CHECK and RESTORE commands, the default is DSK:*.**[PPN,*,*,*,*,*]=ALL:*.**[PPN,*,*,*,*,*].

The argument for the PRINT command is a single file specification. Its default is LPT:BACKUP.LOG.

Note that specifying a field of a file-specification overlays only that parameter and leaves the rest of the defaults as is. Fields are device, file name, file extension, and directory specification. Under no circumstances do the file-specification parameters become "sticky" parameters. (A sticky parameter is one that carries over to the next file specification in the list.) Therefore, if you specify a PPN for one file specification, it does NOT carry over to the next file specification in the list.

E.2.2 Status-Setting Commands

Status-setting commands set a parameter that affects future action commands. Once a status parameter is set, it remains in effect until you change it again. The format for date and time arguments is dd-mm-yy, hh:mm:ss, relative date and times (prefixed by + or -), and special mnemonic words (YESTERDAY, TODAY, TOMORROW, LOGIN, NOON, MIDNIGHT).

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If you type NO before a command, either the effect of the command is negated or a different action is taken. The explanation of what happens when you type NO before a command is enclosed in brackets [] in the explanation of each command below. The default for any command is the action that is described within the brackets, unless the default is specified otherwise in the explanation.

The status-setting commands are:

Command	Explanation
ABEFORE date	Includes only files accessed before the specified date.
[NO]APPEND	Appends to existing list file (default). [List file will supersede any existing file.]
ASINCE date	Includes only files accessed since the specified date.
BEFORE date-time	Includes only files created and last modified before the specified date or time.
[NO]CPOINT	Uses checkpoints. [Does not use checkpoints.]
[NO]DATE75	Always accepts files with possible DATE75 problems (default). [Never accepts these files.]
[NO]DELETE	Deletes disk files after saving them. [Does not delete.]
DENSITY (200, 556, 800, 1600, 6250)	Sets tape density (default is system dependent).
[NO]DIRECTORIES	Types each user's directory while running (default). [Does not type directories at all.]
[NO]ENCRYPT	Encrypts the magnetic tape (asks for key later). (A key is similar to a password and it can consist of up to 30 alphabetic characters.) [Does not encrypt.]
[NO]EXEMPT	Exempts PPNs of the form [A,*] and [10,B], where A and B are less than 7, from date/time and length restrictions (default). [Does not exempt.]
[NO]FILES	Types each file name while running. [Does not type file name at all.]
INITIAL spec	Starts processing at spec.

SAVING AND RESTORING DISK FILES WITH BACKUP

Command	Explanation
[NO] INTERCHANGE	Runs in interchange mode. (In interchange mode, only the file names, extensions, and versions are written. There is no information on what UFD a file was in when it was saved.) [Runs in normal mode, in which UFDs and device names are written.]
LENGTH low:high	Includes only files whose length is between low and high.
[NO] LIST spec	While running, makes a listing file on spec (default spec is LPT:BACKUP.LOG). (Does not make listing file.) LIST produces the effect of a NODIRECTORIES command, that is, no user directories will be typed.
MBEFORE date-time	Includes only files that have been last moved or modified before the specified date-time.
MESSAGE [NO] PREFIX	Suppresses error-message prefix. [Does not suppress.]
MESSAGE [NO] FIRST	Suppresses first line of error-message text. [Does not suppress.]
[NO] MULTIREEL	Allows multiple reels during a save (default; multiple reels are always permitted on a restore). [Does not allow multiple reels during a save.]
[NO] NFS	Does not save files that have the RP.NFS RIB status bit set (default is to honor the "don't save this file" status). [Ignores the RP.NFS setting.]
OPTION NAME	Uses option BACKUP:name from SWITCH.INI.
PARITY (EVEN, ODD)	Sets tape parity.
[NO] REPEAT	Repeats a split file on the continuation tape. [Does not repeat.]
RESUME n	Resumes at block n of initial file.
[NO] SDELETE	Deletes a file without respect to its protection code, if the user has sufficient privilege to rename the file to a lower protection code. [Does not allow a sufficiently protected file to be deleted.]

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Command	Explanation
SILENCE	Does not type file names or directories while running.
SINCE date-time	Includes only files created or modified since the specified date-time.
SORT DIRECTORIES x	Sorts directories within each file structure in order x when saving. x = ALPHABETICAL, LOCATION (by compressed-file-pointer, which is related to a file's physical location on disk), or NONE (by Master File Directory).
SORT FILES x	Sorts files within each directory in order x when saving. x = ALPHABETICAL, LOCATION, or NONE (by directory)
SSNAME name	Specify the saveset name (up to 30 characters; ALL = all savesets on tape).
SUPERSEDE ALWAYS	Always restores file from tape.
SUPERSEDE NEVER	Restores files from tape only if files is not on disk.
SUPERSEDE OLDER	Restores only the new files from tape (default).
TAPE MTA0	Uses tape unit MTA0. If a magnetic tape drive has the logical name BACKUP, then the TAPE command need not be specified.
TPNUMB x	Sets the number of the current tape to x (decimal).
UPROTECTION NNN	Sets the protection for created directories.
[NO]USAGE	Enables Usage accounting. When USAGE is enabled, BACKUP writes accounting records to the system ACTDAE, for every directory in a SAVE operation. You must have [1,2] privileges to enable or [disable] accounting.
[NO]USETI	Runs in USETI mode (speeds up saves with /SINCE, and so forth). [Does not run in USETI.]
[NO]WRITE	Suppresses disk writing during a restore. [Allows disk writing during a restore.]

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E.2.3 Tape-Positioning Commands

A tape-positioning command takes immediate effect; it can take any one of a list of tapes as an argument. If you do not specify a tape for a given command, BACKUP positions the last tape declared by a TAPE command. The tape-positioning commands are:

Command	Explanation
EOT tape list	Skips to the end-of-tape mark for each tape in the list.
REWIND tape list	Rewinds to the beginning of the tape for each tape in the list.
SKIP n tape list	Skips n savesets forward for each tape in the list.
SKIP 0 tape list	Backs up to the start of the current saveset for each tape in the list.
SKIP -n tape list	Skips n savesets backward for each tape in the list.
UNLOAD tape list	Unloads each tape from its drive for each tape in the list.

You may include the following switches in the file specification list for the action commands. These switches can be either temporary or permanent. A temporary switch immediately follows the file to which it applies. A permanent switch precedes the list of files to which it applies, or may be typed on a separate line like a status-setting command.

ABEFORE date	(On input file) include only if accessed before date.
ASINCE date	(On input file) include only if accessed since date.
BEFORE date-time	(On input file) include only if created before date-time.
ERNONE	(On input file) give error if no files match.
ERPROTECTION	(On input file) give error is there is a protection failure.
ERSUPERSEDE	(On output file) do not restore from tape if on disk.
ESTIMATE n	(On output file) estimate output size.
LENGTH l:h	(On input file) include only if the file length is between l:h.

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MBEFORE date-time	(On input file) include only if modified before date-time.
MSINCE date-time	(On input file) include only if modified since date-time.
OKNONE	(On input file) do not given an error if no files match.
OKPROTECTION	(On input file) do not give an error if there is a protection failure.
OKSUPERSEDE	(On output file) always restore even if on disk.
[NO]PHYSICAL	(Input or output) ignore logical names. [Accept logical names.]
PROTECTION nnn	(On output file) set the protection code.
[NO]STRS	(On input file) search all structures associated with the specified logical name; back up all occurrences of the file specified (default). [Backup only the file(s) satisfying the filespec on the first structure where a match is found. (If such files are located on two or more structures, the only file(s) that will be backed up are the file(s) on the earliest structure where a match occurs.)]
SINCE date-time	(On input file) include only if created since the specified date-time.
VERSION v	(On output file) set output file version number.

E.2.4 Runtime Commands

You may give the following runtime commands during execution of the action commands. BACKUP prints an exclamation point (!) when it is ready to accept a runtime command. (EXIT, HELP, and RESET also use a slash (/) as a prompt.

If you type NO before you type the command, either the command is negated or a different action is taken. The explanation of what happens when you type NO before a command is enclosed in brackets [] in the explanation of each command below. The explanation in brackets is the default, unless the default action is otherwise specified.

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The runtime commands are:

Command	Explanation
[NO]DIRECTORIES	Starts typing every directory processed. [Does not type these directories.]
EXIT	Exits from BACKUP when done.
[NO]FILES	Starts typing every file and directory processed. [Does not type these files.]
GO	Continues after a STOP.
HELP	Lists these commands and explanations.
KILL	Aborts execution of the current action command.
PAUSE	Does not exit from BACKUP when done.
RESET	Resets all status settings to their original defaults when done.
SILENCE	Stops typing every directory or file.
STOP	Stops temporarily; can be continued by GO.
WHAT	Displays current file name and status.

BACKUP also supports "/@ file" construction, which allows you to use indirect command files, like the COMPIL-class commands. (Refer to the TOPS-10 Operating System Commands Manual for information on COMPIL-class commands.) You can use all BACKUP commands and switches in an indirect file, except for the runtime commands. (Note that "/verb @ file" is NOT a valid alternate format.)

E.3 BACKUP EXAMPLES

The following examples demonstrate the applications of BACKUP. Section E.3.1 contains console user examples and Section E.3.2 contains operator task examples.

E.3.1 Console User Examples

The console user can execute all of the BACKUP commands on his own disk area. He can save his disk area or any other files accessible to him on his own magnetic tape and later restore to his area all his files or a subset of his files. In the following examples, the user is logged in under [10,123]. Everything that you (the user) must type is in UPPERCASE BOLD PRINT.

SAVING AND RESTORING DISK FILES WITH BACKUP

E.3.1.1 Saving a User's Disk Area - To save all files in your own disk area on a magnetic tape mounted on MTA0, type:

```
.R BACKUP<RET>
/TAPE MTA0<RET>
/REWIND<RET>
/SAVE<RET>
!10,123 DSKB
 10,123 DSKC
"Done
/UNLOAD<RET>
/^C
```

E.3.1.2 Restoring Selected Files - To retrieve a specific file and a set of files from a BACKUP tape by using wildcards, type:

```
.R BACKUP<RET>
/TAPE MTA1<RET>
/REWIND<RET>
/RESTORE FIL.TXT, TST???.*<RET>
!10,123 DSKB
"Done
/UNLOAD<RET>
/^C
```

E.3.1.3 Renaming Files as They are Transferred - In the following example, the file name FILEA.MAC on tape is copied to disk as FILEB.MAC, but its path (device and directory level) is not changed. To change a file's name or location path as it is moved between tape and disk, type:

```
.R BACKUP<RET>
/TAPE MTA0<RET>
/REWIND<RET>
/RESTORE FILEB.MAC=FILEA.MAC<RET>
!10,123 DSKB
"Done
/UNLOAD<RET>
/^C
```

In the next example, the file FILEC.MAC was located on DSKB in the user's UFD [10,123] when saved on tape, but it is restored to the subfile directory SFD1 on DSKC.

```
.R BACKUP<RET>
/TAPE MTA0<RET>
/REWIND<RET>
/RESTORE DSKC:[10,123,SFD1]=DSKB:FILEC.MAC[10,123]<RET>
!10,123 DSKB
"Done
/UNLOAD<RET>
/^C
```

SAVING AND RESTORING DISK FILES WITH BACKUP

E.3.2 Operator Tasks

You (the operator) should periodically save the contents of the disk on magnetic tape. This provides a backup capability should something unforeseen happen to the disk.

E.3.2.1 Saving the Entire Disk - To save the entire contents of DSKB on magnetic tape and concurrently produce a directory listing, BACKUP is run while logged in under [1,2] as follows:

```
.R BACKUP<RET>
/TAPE MTA0<RET>
/LIST DSK:BACKUP.LOG<RET>
/SAVE DSKB:<RET>
!1,2 DSKB
 1,3
 1,4
 .
 .
 .
```

BACKUP types out each UFD as it begins to save files from that area. If the tape becomes full before the save is completed, BACKUP stops, types out the full file identification and block number of the current file being saved, unloads the magnetic tape, and displays one of the following messages:

If the tape was mounted without label recognition (BYPASS or BLP), or with USER-EOT, the following message prompts you for the next tape:

```
$BKPEOT REACHED EOT -- MOUNT NEW TAPE THEN TYPE "GO"
```

If the tape was mounted with label processing (/LABEL-TYPE:ANSI, EBCDIC, or NOLABELS), PULSAR also sends the following message to the user:

```
[BKPAMD Asking MDA for next volume]
```

E.3.2.2 Recovering from a System Crash - If the system should crash during a save, for example while BACKUP is saving files from UFD [10,456], after bringing the system up, you can instruct BACKUP to start at UFD [10,456] by using the /INITIAL switch:

```
.R BACKUP<RET>
/TAPE MTA0<RET>
/LIST DSK:BACKUP.LOG<RET>
/INITIAL DSKB:[10,456]<RET>
/SAVE DSKB:<RET>
!10,456 DSKB
 .
 .
 .
```

Note that you must reset any status parameters that were incorrect before the crash, and that you must NOT rewind the tape. Note also that BACKUP appends to the existing LIST filespec.

SAVING AND RESTORING DISK FILES WITH BACKUP

E.3.3 Saving Only Recently Created or Modified Files

To save only those files created or modified today, include the /MSINCE status-setting switch:

```
.R BACKUP<RET>
/TAPE MTA0<RET>
/LIST DSK:BACKUP.LOG<RET>
/MSINCE:YESTERDAY<RET>
/SAVE DSKB:<RET>
!1,2 DSKB
.
.
.
```

Certain files and disk areas are automatically exempted from date and time restrictions. Files with the RP.ABU bit (always backup bit) set in the .RBSTS word of the RIB and PPNs of the form [A,*] and [10,B] where A and B are less than or equal to 7 are always exempted from date and time restrictions. This causes all libraries to always be saved and restored. (The PPN exemption can be overridden by using the /NOEXEMPT status-setting command.)

E.3.4 Restoring Only Recently Accessed Files

In the following example the /ASINCE switch is used to restore from tape only those files whose access date is later than 1 June 1979:

```
.R BACKUP<RET>
/TAPE MTA1<RET>
/ASINCE:dd-mm-yy<RET>
/RESTORE<RET>
!
```

E.4 RESTORING FROM A DISTRIBUTION TAPE

BACKUP format distribution tapes are made in interchange mode, and related files are grouped together in named savesets. The user does not need to know what UFD the file was in when it was saved. Because the tapes are made in interchange mode, this information is not even included on tape. Suppose, for example, a new version of SCAN is on the current tape. The following commands to BACKUP transfer all files from only the SCAN saveset onto ersatz device DEC:

```
.R BACKUP<RET>
/TAPE MTA0<RET>
/INTERCHANGE<RET>
/REWIND<RET>
/SSNAME SCAN<RET>
/RESTORE DEC:=DSK:<RET>
```

The saveset name "ALL" can be used in place of SCAN to indicate that files from all savesets are to be copied.

SAVING AND RESTORING DISK FILES WITH BACKUP

E.5 OBTAINING DIRECTORIES OF BACKUP TAPES

The command:

```
[N]PRINT spec
```

prints a directory of the entire tape. The optional prefix N indicates a narrow listing (72 columns). The default specification is LPT:BACKUP.LOG. If a line printer is not available to the user's job, if spooling is not in effect, and if the default spec is used, an error will occur.

The following example produces a disk file directory listing named BACKUP.LOG.

```
.R BACKUP<RET>
/REWIND<RET>
/PRINT DSK:<RET>
!
```

This is an example of the output:

```
.TYPE BACKUP.LOG<RET>
```

```
Start of save set SCAN on MTA401
```

```
System      R5200  SYS #40/2 TOPS-10 monitor 602(13053) APR#40
1600 BPI 9 track dd-mmm-yy hh:mm:ss BACKUP 2(155) format 1
```

SCAN	REL	58	<055>	dd-mmm-yy	DSKB: [10,4077]
SCAN	RNO	8	<055>	dd-mmm-yy	
SCAN	MAC	304	<055>	dd-mmm-yy	
SCN7B	REL	59	<055>	dd-mmm-yy	
SCN7B	DO	101	<055>	dd-mmm-yy	
SCN7B	RNO	97	<055>	dd-mmm-yy	
SCN7B	CTL	3	<055>	dd-mmm-yy	
SCN7B	MAC	309	<055>	dd-mmm-yy	
SCAN	MEM	11	<055>	dd-mmm-yy	

```
End of save set SCAN on MTA401
```

```
System      R5200  SYS #40/2 TOPS-10 monitor 602(13053) APR#40
1600 BPI 9 track dd-mmm-yy hh:mm:ss BACKUP 2(155) format 1
```

```
Start of save set BACKUP on MTA401
```

```
System      R5200  sys #40/2 TOPS-10 monitor 602(13053) APR#40
1600 BPI 9 track dd-mmm-yy hh:mm:ss BACKUP 2(155) format 1
```

BACKUP	REL	22	<055>	dd-mmm-yy	DSKB: [10,4077]
BACKRS	REL	52	<055>	dd-mmm-yy	
BACKUP	SHR	55	<055>	dd-mmm-yy	
BACKUP	LOW	34	<055>	dd-mmm-yy	
BACKUP	MAC	118	<055>	dd-mmm-yy	
BACKRS	MAC	270	<055>	dd-mmm-yy	
BACKUP	MAC	19	<055>	dd-mmm-yy	
BACKUP	HLP	20	<055>	dd-mmm-yy	
BACKUP	RNO	4	<055>	dd-mmm-yy	
BACKUP	DOC	4	<055>	dd-mmm-yy	
BACKUP	CTL	2	<055>	dd-mmm-yy	

```
End of save set BACKUP on MTA401
```

```
System      R5200  SYS #40/2 TOPS-10 monitor 602(13053) APR#40
1600 BPI 9 track dd-mmm-yy hh:mm:ss BACKUP 2(155) format 1
```

SAVING AND RESTORING DISK FILES WITH BACKUP

E.6 COMPARING TAPE AND DISK FILES

The command:

```
CHECK spec-list
```

verifies that the tape and disk agree. BACKUP compares the tape files specified for input to the disk files specified for output, word for word.

The following example saves all the user's COBOL files on tape and then verifies that the saved tape files are identical to the disk files.

```
.R BACKUP<RET>
/TAPE MTA0:<RET>
/REWIND<RET>
/SAVE *.CBL<RET>
/REWIND<RET>
/CHECK<RET>
!
/
```

To restore all SHR and LOW files from a tape and then verify that the files were restored correctly, type:

```
/REWIND<RET>
/SSNAME ALL<RET>
/RESTORE *.SHR,*.LOW<RET>
!
/REWIND<RET>
/CHECK *.SHR,*.LOW<RET>
!
/
```

E.7 CHECKPOINTING LARGE FILES

Installations that maintain exceptionally large files (over 5000 blocks) will want to include the /CPOINT status-setting switch when saving and restoring files. This switch extends BACKUP's system crash recovery capability to the file-block level. During a checkpoint save, the timeout level is set to type the file names and checkpoints as they are passed. To continue from the last checkpoint after a crash, the /INITIAL switch is used to indicate the file specification and the /RESUME switch to declare the checkpoint block number. For example:

```
.R BACKUP<RET>
/TAPE MTA0<RET>
/INITIAL DSKB:[40,577]DATBAS.DBS<RET>
/RESUME 6000<RET>
/SAVE<RET>
!40,577 DSKB
  DATBAS DBS
  RESUMING AT CHECKPOINT 6000
  7000
  8000
  .
  .
  .
```

Note that you should not rewind the tape to continue a checkpoint save.

SAVING AND RESTORING DISK FILES WITH BACKUP

During a checkpoint restore, the disk output file is closed at every checkpoint and then appended to. The procedure for continuing after a crash is the same as that for the checkpoint save, with the exception that you must first rewind the tape.

The default for checkpoints is 1000 blocks.

E.8 BACKUP MESSAGES

E.8.1 Informational Messages

[BKPAMD Asking MDA for next volume]

This message is sent to the user when the tape was mounted with /LABEL-TYPE:USER-EOT. This message indicates that the end-of-volume was reached for a multi-volume tape set, and the operator has been requested to mount the next tape.

E.8.2 Operator Messages

\$BKPEOT Reached EOT -- mount new tape then type "GO"

The tape is full. Mount a new one and then type GO to continue.

\$BKPICG Invalid command, please make sure that tape is ready then respond GO

The operator receives this error message if he replies to the \$BKPEOT or the \$BKPTWL message with any response other than GO. The operator should make sure that the next tape has been mounted correctly and then respond with GO.

\$BKPTGC errors may occur type "GO to continue..

This message allows you to continue or abort the RESTORE operation.

\$BKPTWL Tape write locked -- add write ring then type "GO"

The tape is write-locked. Insert a write ring and then type GO to continue.

SAVING AND RESTORING DISK FILES WITH BACKUP

E.8.3 Fatal Error Messages

?BKPABC Ambiguous command

You have given a command abbreviation that is not unique.

?BKPCDU Cannot do USAGE Accounting from this PPN

The [NO]USAGE command is an operator-only function. Do not attempt to enable/disable USAGE accounting for BACKUP unless you are the system operator.

?BKPCGT Can't get next tape

The mount request for the next volume in a multi-reel set failed. This message is always followed by the ?BKPDVF, the ?BKPINS, or the ?BKPOPA error message, which will describe the failure in more detail.

?BKPCOL Can't OPEN listing device

The device specified for the LIST command cannot be selected for output.

?BKPCOM Can't OPEN magtape

The tape device specified cannot be selected for output.

?BKPCSA Can't SAVE with saveset name "ALL"

"ALL" is reserved to mean all savesets on tape; therefore, it cannot be used to name an individual saveset when saving.

?BKPDND Device not a disk

The input device specified for a save is not a disk.

?BKPDNM Device not a magtape

The device specified for the TAPE command or a tape-positioning command is not a magnetic tape drive.

?BKPDVF DEVOP. failed with error code [code]

This message may follow either the ?BKPTLE or ?BKPCGT error message and indicates that the DEVOP. monitor call (.DFRES function) to retrieve device status has failed. The code returned indicates the reason for failure and is described in the TOPS-10 Monitor Calls Manual. After this message has been printed, BACKUP exits to monitor level CONTINUES are not allowed. BACKUP must be restarted.

SAVING AND RESTORING DISK FILES WITH BACKUP

?BKPFSL File specification data lost

During the processing of a file specification list, a consistency check determined that data was lost. If this error occurs, please send an SPR.

?BKPHSG Cannot get high segment back

BACKUP releases its high-segment command scanner when performing I/O to eliminate most of the memory while running. The attempt to restore the high segment after completing the I/O operation has failed.

?BKPINS Insufficient number of reels specified

The user did not specify enough reels in the MOUNT request. This error can only occur during a read operation, and is always preceded by a ?BKPCGT error message. After this message has been printed, BACKUP exits to monitor level. The user should submit another MOUNT request specifying all the appropriate volumes.

?BKPIRC Invalid run-time command

You typed an illegal runtime command. Type KILL to abort the run and return to command level. Type HELP to get a list of valid runtime commands.

?BKPKDM Keys don't match -- please try again

BACKUP asks for the encryption key twice, and compares the keys for verification. This indicates that the comparison failed.

?BKPLFE Listing file ENTER error

After opening the listing I/O channel, no entry could be made for the listing file.

?BKPLSI Listing specification incorrectly formatted

You used incorrect formatting or a wildcard in specifying the LIST file. No list specification is created.

?BKPNTS No tape specified

While searching for the last tape specification given, BACKUP could not find one.

?BKPNZC Negative and zero checkpoints illegal

You specified a negative or zero argument with the RESUME command.

?BKPNZT Negative and zero tape numbers illegal

The argument you gave to the TPNUMB command was not a positive decimal integer.

SAVING AND RESTORING DISK FILES WITH BACKUP

?BKPOPA [error message] operation aborted

This message follows either the ?BKPTLE or ?BKPCGT error message and provides one of several error messages specifying the label error that occurred. The error message corresponds to the device status code returned by the .DFRES function of the DEVOP. monitor call, which is described in the TOPS-10 Monitor Calls Manual. After this message has been printed, BACKUP exits to monitor level. CONTINUEs are not allowed. You must restart BACKUP.

?BKPRES Reached EOT on a single reel save

This message is issued when the end of the tape is reached and you have specified the /NOMULTIREEL command.

?BKPRTE Reached tape error maximum

BACKUP will abort the execution of an action command and return to command level when a large number of tape I/O errors have occurred. Currently, the error maximum is set to 10. (This is an assembly parameter.)

?BKPSKF SKIP failed, tape position error

The SKIP operation failed. If you fail to position the tape correctly, BACKUP may overwrite existing files or read files from the wrong saveset.

?BKPTLE Error detected by tape label handler

This message from PULSAR indicates an error while BACKUP was performing an operation (SAVE, RESTORE, and so forth). The wrong tape may be mounted, to which you do not have access. This message is always followed by either the ?BKPOPA or ?BKPDVF message.

?BKPTMI Insufficient core for command

The routine for allocating space for file specifications could not expand core enough to store the specification.

?BKPTSI Tape specification incorrectly formatted

The user has used incorrect formatting or a wildcard in specifying the tape device.

?BKPWPI Wild PPN illegal in INTERCHANGE mode

When doing a RESTORE in INTERCHANGE mode, it is illegal to use wildcards for only the project or only the programmer number. You must use wildcards for both or neither.

SAVING AND RESTORING DISK FILES WITH BACKUP

E.8.4 Warning Messages

%BKPABT ABORT spec

The transfer of the specified file from tape to disk has been aborted.

?BKPAMD Asking MDA for next volume

A mount request has been sent to the operator, for the next volume in a multi-reel tape volume set.

%BKPBMT Block missed on tape, expected [spec] (block = [n])

The block number of the current block is greater than that of the block expected; data may be missing. This message is always followed by the %BKPFLC message.

%BKPBTL Block too large reading [spec] (block = [n])

The current record being read from tape exceeds the buffer size. The record will be skipped.

%BKPCCM Cannot COPY MFD for structure

The program cannot get enough memory to copy the retrieval information block for the indicated directory. Files for the UFD/SFD will not be saved, and the program will skip to the next UFD/SFD.

%BKPCCU Copy UFD/SFD for [spec]

The program cannot get enough memory to copy the indicated UFD or SFD. Files for this UFD or SFD will not be saved, and the program will skip to the next UFD/SFD.

%BKPCDF Cannot delete file [error bits] ([code]) [spec]

The specified file could not be deleted. The error bits and code returned are listed in the TOPS-10 Monitor Calls Manual.

%BKPCDS CHECK disk file shorter [spec]

During a check operation, an end-of-file occurred for the indicated disk file, even though there is more file data on tape.

%BKPCFD CHECK files are different [spec]

The check operation determined that the disk and tape versions of the indicated file are different.

%BKPCHK Checksum inconsistency reading [spec] (block = [n])

During a read, the computed checksum of the current tape record did not agree with the checksum stored when the record was written.

SAVING AND RESTORING DISK FILES WITH BACKUP

%BKPCNF CHECK file not on disk [spec]

The indicated file could not be found on disk during a check operation.

%BKPCOD Cannot OPEN "[file structure]"

The file structure indicated cannot be selected for I/O. The transfer of files for this structure will be aborted.

%BKPCRH Cannot read HOME block for structure "[file structure]"

While doing independent super I/O, BACKUP could not read the HOME BLOCK. This error can occur only if the FT\$IND assembly switch is on. (FT\$IND is unsupported.)

%BKPCTS CHECK tape file shorter [spec]

During a check operation, an end-of-file occurred for the indicated tape file, even though there is more file data on disk.

%BKPDFE Disk file had errors when SAVED [spec]

The specified file being restored or checked had disk errors when it was saved. The data may be corrupted.

%BKPDIE disk input error [error bits] (block = n) during [spec]

A disk input error occurred during the attempt to save the specified file. The error bits are those returned by the GETSTS monitor call. The block number is the block where the error occurred. It may contain corrupted data when the file is restored.

%BKPDLT Tape being read [label-type] was written [label-type]

The existing label on a RESTORE operation did not match the label-type that the user specified. This message is always followed by the \$BKPTGC message.

%BKPDOE Disk output error [error bits] during [spec]

A disk output error occurred during the attempt to write the specified file. The error bits are those returned by the GETSTS monitor call. The transfer of this file will be aborted.

%BKPDSE Disk save error (block - [n]) [spec]

The specified file being restored or checked had a disk error when the indicated block was saved. That block may contain unreliable information. This warning is always followed by the %BKPDFE message when the restore or check operation is completed.

SAVING AND RESTORING DISK FILES WITH BACKUP

%BKPFEE ENTER [error-code] [spec]

File-enter error for the indicated file. The error code included is that returned by the monitor, and the error code abbreviation is listed in the TOPS-10 Monitor Calls Manual.

%BKPFLC File continuing with [spec] (block = [n])

This message immediately follows the %BKPBMT error message. The block number is the number of the next block read after the occurrence of the %BKPBMT message.

%BKPFLE LOOKUP [error-code] [spec]

File-lookup error for the indicated file. The error code included is that returned by the monitor, and the error code abbreviation is listed in the TOPS-10 Monitor Calls Manual.

%BKPFRE File RENAME error [error bits] ([code]) [spec]

File rename error for the indicated file. The error code included is that returned by the monitor, and is listed in the TOPS-10 Monitor Calls Manual. This warning occurs at the end of a restore operation on a file when an improper protection code and size estimate are given to the file using a RENAME UUU.

%BKPFRS FRS tapes not supported

On reading a tape, if the tape format seems to correspond to an FRS tape rather than a BACKUP tape, this message is issued and BACKUP continues scanning the tape for records in a format that it understands.

%BKPHSI Header file spec inconsistency

During a restore operation, a consistency check determined that the end-of-file record for the current file was missed, and the current record belongs to another file. The transfer will be aborted for this file.

%BKPIBL Incorrect block length

During a read, the program encountered a tape record of the wrong size. The record will be skipped.

%BKPLF Listing file error [error bits] ([code]) [spec]

The listing file is closed and appended to after the processing of each UFD, so that it will be preserved through a system crash and recovery procedure. If either the LOOKUP or ENTER monitor call for appending to the listing file fails, this message prints and no further output is done to the listing file. The error bits and code returned are listed in the TOPS-10 Monitor Calls Manual.

SAVING AND RESTORING DISK FILES WITH BACKUP

%BKPNBF Not BACKUP format

The current tape record is not in BACKUP format, and the program will skip to the next tape record.

%BKPNCU Not enough Core for Usage accounting

The CORE UO failed while trying to get more memory so that Usage accounting could be performed. The SAVE operation is aborted.

%BKPNEC Not enough core

The program cannot get enough core. If this occurs during a restore, the restore will be aborted. During a save, the program will skip to the next structure or UFD and attempt to continue.

%BKPNFF No files found to match [spec]

No files were found to match the given file specification.

%BKPPBR Prior block repeated rereading/rewriting from [spec] (block = [n])

An out-of-sequence record was found. This record will be used in place of the prior corresponding record.

%BKPPUD Please use .DISMOUNT monitor command instead of UNLOAD

The UNLOAD command can only be used when BYPASS label processing is in effect. You must use the monitor command DISMOUNT to unload the tape.

%BKPRIC RESUME at invalid checkpoint attempted

This message indicates that the user instructed BACKUP to continue saving or checking a file a checkpoint that was larger than the actual number of blocks in the file.

%BKPROD RESTORE output device is not a disk

The output device specified for a restore is not a disk.

%BKPSCE Size copy error [spec]

This error will occur after a file has been transferred from tape to disk. It occurs when the file on disk is not the same size as the size recorded in the file's RIB when it was originally transferred from disk to tape. This error can occur when restoring a BACKUP listing file. If this error occurs for any other unexplained files (for example, the file was not active when it was transferred from disk to tape), please send an SPR.

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%BKPSDI Specified density incorrect, density used is code [density code]

You have specified an illegal density. This message returns the code of the density that will be used. This code may be interpreted by referring to the .TFDEN function of the TAPOP. monitor call in the TOPS-10 Monitor Calls Manual.

%BKPSLE SFD level exceeded

While attempting to save needed SFDS, the SFD level was exceeded.

%BKPSNF SAVE SET NOT FOUND name

This message may occur during a RESTORE or CHECK operation and indicates that the saveset named with the last /SSNAME command could not be found.

%BKPTHE TAPE HARDWARE ERROR READING/WRITING spec (BLOCK = n)

A hardware error occurred. The transferred file may contain unreliable data.

%BKPTPE TAPE PARITY ERROR READING/WRITING spec (BLOCK = n)

The hardware detected a parity error. The transferred file may contain unreliable data.

%BKPUOE UNTRACEABLE OUTPUT ERROR

An error was encountered while trying to move data from disk to tape.

%BKPURT UNKNOWN RECORD TYPE

While reading the tape, BACKUP found that the type number of the current tape record is not within the defined range. The program will skip to the next tape record.

E.9 BACKUP TAPE FORMAT

BACKUP is designed for two primary functions: performing system backup and transferring files between systems. For the latter function, BACKUP provides an interchange switch that causes system-dependent data to be ignored and only critical file information to be written on tape. A restore operation in interchange mode also ignores system-dependent data, allowing the operating system to supply defaults where necessary. Items not included in interchange mode are noted in Sections E.9.1 through E.9.7.

SAVING AND RESTORING DISK FILES WITH BACKUP

E.9.1 Tape Record Types

BACKUP tapes are made up of a series of tape records of various types. Each record is self-identifying. All records on the tape are written at the standard length of 544(10) words. Each record is made up of a 32(10)-word header and a 512(10)-word data area. Even if the data area is not needed, or is only partially needed, it is fully written. All undefined or unused words are written with zeroes and ignored on read. This maximizes the probability of reading old tapes. In any case, the tape format is included in the labels and the saveset headers.

The record types are:

1. T\$LBL -- tape label used to identify reel-id and destruction date/time. This record is optional, but if present must be at the start of the tape.
2. T\$BEG -- beginning of a saveset used to identify when the saveset was written and on what device of what system. It also includes the saveset name. This record is mandatory and must be the first record of the saveset.
3. T\$END -- end of a saveset. This is identical to the T\$BEG record except that it appears at the end.
4. T\$FIL -- this is the actual data that has been saved. It is the only type of record that is encrypted. It is self-identifying as to the position within the file, but contains only part of the full-path name of the file.
5. T\$UFD -- contains the information for each directory. It gives all information necessary to recreate the directory (not written in interchange mode).
6. T\$EOV -- indicates end of volume (future).
7. T\$COM -- comment (ignored).
8. T\$CON -- continuation of saveset. This is identical to T\$BEG except that it indicates the continuation of the saveset at the start of a new volume. This ensures that each volume is completely self-identifying.

E.9.2 Standard Record Format

Every tape record has the same general format. This consists of a 32(10)-word record header followed by 1 page of data (512(10) words). All record headers start with the same first 12 words. The first seven words are:

1. G\$TYPE -- record type as described in Section E.9.1. This is a small positive integer.
2. G\$SEQ -- record sequence number. This is incremented by 1 for each record on the tape. If a record is repeated because of a tape write error, the number of the repeated record is the same as that of the original.
3. G\$RTNM -- relative tape number. This is incremented by 1 for each volume.

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4. G\$FLAG -- flag bits:
 - a. GF\$EOF -- this flag is set if this is the last tape record for this disk file. On short files, this can even be set on the first record of the file.
 - b. GF\$RPT -- this flag is set if this tape record is a repeat of the previous record. This is set whenever the record is rewritten because of a tape write error.
 - c. FG\$NCH -- this flag is set if no checksum has been computed for the tape record.
 - d. GF\$SOF -- this flag is set if this is the first tape record for this disk file.
5. G\$CHK -- checksum of the tape record.
6. G\$SIZ -- number of words used for data in this tape record.
7. G\$LND -- number of words to skip before the data starts.

The next four words are reserved for future expansion. The twelfth (last) word in the general section of the record header is reserved for customer use. The remaining 20 words in the record header vary for each record type, with the last word of each record header reserved for customer use. In interchange mode, customer-reserved words will be written as zero on a save and ignored on a read.

E.9.3 Non-data Blocks

The data portion of a tape record is primarily for storing file data, but may be used for saving some overhead information. Any non-data information written in the data area of a tape record is prefaced with a control word of the form:

LH = type, RH = length in words including this word

More than one overhead region can appear. In this case, they follow each other with no intervening space. The currently defined types for overhead blocks are:

1. O\$NAME -- gives the full-path identification of the file without punctuation. The path components are treated as if the user gave a quoted representation in "DIGITAL Integrated Command Language." This block consists of sub-blocks in the standard order: device, directories (top down), file name, extension, version, generation. Sub-blocks corresponding to missing fields in the path specification are omitted. Each sub-block is in the format:

WORDØ: LH = type, RH = length in words including this word

The rest of the sub-block is the path field in ASCIIZ without leading or embedded nulls, terminated by at least one null. Omitted fields will be defaulted. In interchange mode, only the name, extension, and version are written. In interchange restore, only name, extension, and version are used.

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Sub-block type codes are:

- 1 = device
- 2 = name
- 3 = extension
- 4 = version
- 5 = generation
- 40 = directory (lower directories are 41, 42, ...)

2. O\$FILE -- a block containing file attributes. The first section of this block is a fixed-length header area containing in fixed locations either single-word attributes or byte pointers to ASCIZ string attributes located in the remaining section. All dates and times are in universal date/time format. In interchange mode, only the critical attributes (starred) will be written, and the rest of this block will contain zeros. In the description that follows, the symbols in brackets represent the RIB data from which the attribute values will be converted. (If none is given, the location will be zero.)

- a. A\$FHLN (*) -- fixed-header length in words
- b. A\$FLGS -- flags:
 - 1. B\$PERM -- permanent (not deletable) [RP.NDL]
 - 2. B\$TEMP -- temporary
 - 3. B\$DELE -- already deleted
 - 4. B\$DLRA -- do not delete for lack of recent access [RP.ABU]
 - 5. B\$NOCF -- not quota checked [RP.NQC]
 - 6. B\$NOCS -- does not have valid checksums [RP.ABC]
 - 7. B\$CSER -- has checksum error [RP.FCE]
 - 8. B\$WRER -- has disk write error [RP.FWE]
 - 9. B\$MRER -- had BACKUP read error on RESTORE [RP.BFA]
 - 10. B\$DAER -- declared bad by damage assessment [RP.BDA]
- c. A\$WRIT (*) -- date/time of last write [RB.CRD and RB.CRT]
- d. A\$ALLS (*) -- allocated size in words [.RBALC]
- e. A\$MODE (*) -- mode of last write [RB.MOD]
- f. A\$LENG (*) -- length in bytes (1B0 if $> 2^{35}-1$) [.RBSIZ]
- g. A\$BSIZ (*) -- byte size (7 or 366)
- h. A\$VERS (*) -- version identification (.JBVER format) [.RBVER]

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- i. A\$PROT -- protection [RB.PRV]. The protection for directories appears in the directory attribute block (O\$DIRT). For files, the protection word is defined as four fields of eight bits each with a "5" stored in the leftmost three bits to distinguish it from a byte pointer:

Bits 0-2	"5"
Bit 3	reserved for future
Bits 4-11	future access
Bits 12-19	owner access
Bits 20-27	affinity group access
Bits 28-35	"world" access

Each file access field is subdivided into bytes that describe the attribute, write, and read protections associated with the file. A description of the "world" access field follows, with the associated TOPS-10 protection given in parentheses, if applicable. The owner and affinity group (project) fields are similarly defined.

1. PR\$SPC (Bit 28) -- reserved for special checking. The rest of the field is special if this bit is set.
2. PR\$ATR (Bits 29-31) -- the attribute subfield is a 3-bit byte interpreted as follows:
 - 0 -- file is completely hidden
 - 1 -- file name is visible (7-6)
 - 2 -- file attributes are visible (5-2)
 - 3 -- can change unprotected attributes
 - 4 -- (future)
 - 5 -- (future)
 - 6 -- can change protection (0)
 - 7 -- can delete the file (1)
3. PR\$WRT (Bits 32-33) -- the write access subfield is defined as:
 - 0 -- no write access (7-5)
 - 1 -- append (4)
 - 2 -- write (3)
 - 3 -- superseding generation (2-0)

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4. PR\$RED (Bits 34-35) -- the read access subfield is defined as:

- 0 -- no read access (7)
- 1 -- execute only (6)
- 2 -- can read the file (5-0)
- 3 -- (future)

- j. A\$ACCT -- byte pointer to account string
- k. A\$NOTE -- byte pointer to annotation string [.RBSPL]
- l. A\$CRET -- creation date and time of this generation
- m. A\$REDT -- last read date and time of this generation [RB.ACD]
- n. A\$MODT -- monitor set last write date and time [.RBTIM]
- o. A\$ESTS -- estimated size in words [.RBEST]
- p. A\$RADR -- requested disk address [.RBPOS]
- q. A\$FSIZ -- maximum file size in words
- r. A\$MUSR -- byte pointer to identification of last modifier
- s. A\$CUSR -- byte pointer to identification of creator [.RBAUT]
- t. A\$BKID -- byte pointer to identification of previous BACKUP [.RBMTA]
- u. A\$BKDT -- date and time of last BACKUP
- v. A\$NGRT -- number of generations to retain
- w. A\$NRDS -- number of opens for read this generation
- x. A\$NWRT -- number of opens for write this generation
- y. A\$USRW -- undefined user word [.RBNCA]
- z. A\$PCAW -- privileged customer word [.RBBCA]

The remainder of this block is reserved for future expansion.

SAVING AND RESTORING DISK FILES WITH BACKUP

3. O\$DIRT -- a block containing directory attributes (not written in interchange mode). The first section of this block is a fixed-length header area containing either directory attributes or pointers to attributes located in the remaining section. The symbols in brackets represent the RIB data used for conversion (the location is zero if none is given). The directory protection word appears in this block rather than in the O\$FILE block (A\$PROT is zero for directories).
- a. D\$FHLN -- fixed-header length in words
 - b. D\$FLGS -- directory flags:
 - 1. DF\$FOD -- file-only directory
 - 2. DF\$AAL -- alpha accounts are legal
 - 3. DF\$RLM -- repeat login messages
 - c. D\$ACCT -- account number or ASCII byte pointer to account string
 - d. D\$PROT -- directory protection [RB.PRV]. The directory protection word is divided into the same access fields as the file protection word, A\$PROT, but each directory access field has bits as follows (RIB bits given in parentheses):
 - Bit 28 -- reserved for special checking; the rest of the field is special if this bit is set
 - Bits 29-31 -- (future)
 - Bit 32 -- connect allowed
 - Bit 33 -- can open files (4)
 - Bit 34 -- can create generations (2)
 - Bit 35 -- directory can be read (1)
 - e. D\$FPRT -- default file protection
 - f. D\$LOGT -- date/time of last login in TOPS-10 universal format [RB.CRD and RB.CRT]
 - g. D\$GENR -- default number of generations to keep
 - h. D\$QTF -- first-come, first-served logged-in quota in words [.RBQTF]
 - i. D\$QTO -- logged-out quota in words [.RBQTO]
 - j. D\$ACSL -- list of groups that can access this directory (see below)
 - k. D\$USRL -- list of groups that this user is in (see below)
 - l. D\$PRVL -- privilege list (see below)
 - m. D\$PSWD -- ASCII byte pointer to password

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The list-attribute words given above (D\$ACSL, D\$USRL, D\$PRVL) may be in any one of the following formats:

- a. an ASCII string pointer
- b. 5B2 + group (or 5B2 + privilege for D\$PRVL)
- c. -N,,relative location of start of list

if in format (c) each word of the list is 5B2 + group (5B2 + privilege for D\$PRVL).

4. O\$SYSN -- a block containing the system header line in ASCII.
5. O\$SSNM -- a block containing the user-supplied saveset name in ASCII (maximum of 30 characters). This block is omitted if not saveset name was specified.

E.9.4 Locations in T\$LBL Record

This record has no contents in the "data" region. The remaining locations in the record header are defined as follows:

1. L\$DATE -- date/time of labeling in TOPS-10 universal format (that is, LH = days since 17-November-1858, RH = fraction of day)
2. L\$FMT -- BACKUP tape format (constant = 1)
3. L\$BVER -- version of BACKUP writing label in standard .JBVER format
4. L\$MON -- monitor type (%CNMNT)
5. L\$SVER -- system version (%CNDVN)
6. L\$APR -- APR processor serial number on which this label was written (integer)
7. L\$DEV -- physical device on which the tape was written in SIXBIT
8. L\$MTCH -- byte (31) 0 (1) 7-track (1) 0 (3) density; density is:

1	=	200
2	=	556
3	=	800
4	=	1600
5	=	6250
9. L\$RLNM -- reel ID in SIXBIT
10. L\$DSTR -- date/time before which the tape cannot be scratched; before this time, the only valid operation is to append

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E.9.5 Locations in T\$BEG, T\$END, T\$CON Records

These saveset records all have the same format and are distinguished by their record types and their location on the tape. All items are filled in at the time of writing. The data area contains two nondata blocks, types O\$SYSN and O\$SSNM. Record header locations following the first standard 12 words are defined as follows:

1. S\$DATE -- date/time of writing this record in universal format
2. S\$FMT -- BACKUP tape format (constant = 1)
3. S\$BVER -- BACKUP version in .JBVER format
4. S\$MON -- monitor type (%CNMNT)
5. S\$SVER -- system version (%CNDVN)
6. S\$APR -- apr serial number on which written
7. S\$DEV -- physical name of device on which written in SIXBIT
8. S\$MTCH -- byte (31) 0 (1) 7-track (1) 0 (3) density. Density is:

1	=	200
2	=	556
3	=	800
4	=	1600
5	=	6250

E.9.6 Locations in T\$UFD Record

This record is not written in interchange mode. When written, the data portion contains two or three nondata blocks: types O\$NAME, O\$FILE (optional), and O\$DIRT. Remaining locations in the header record contain:

1. D\$PCHK -- checksum of the O\$NAME full-path file name block
2. D\$LVL -- directory level: 0 = UFD; 1 = first SFD; and so forth.
3. D\$STR -- file structure name stored in the following format: byte (7) data type, length in words, ASCII. (Data types are defined in the T\$FIL section.)

SAVING AND RESTORING DISK FILES WITH BACKUP

E.9.7 Locations in T\$FIL Record

The first tape record for a file contains two nondata blocks, types O\$NAME and O\$FILE. There is room for two blocks of file data in the first tape record, and if the file will completely fit in one tape record, these will be used. If the file is longer than two blocks, the file will be started in the second tape record, so its pages will be lined up with tape records. Each tape record identifies the logical disk word with which it starts. Remaining locations in the record header are:

1. F\$PCHK -- checksum of the full-path file name block (O\$NAME). This is just a consistency check for consecutive records of the file
2. F\$RDW -- relative data word of file of the first data word in this tape record
3. F\$PTH -- a 12-word block used to store information suitable for a restoration of the file. This area is large enough to hold the entire path to a TOPS-10 file in a UFD and two SFDs. The path information will be stored in the standard order of device, UFD, first SFD, file name, and extension, with missing fields omitted. The path information will be stored in the format:

BYTE (7) data type, length in words, ASCII

where data types are defined as:

device = 001

file name = 002

extension = 003

directory = 040

(lower directories = 041, 042, ...)

APPENDIX F

FAMILIARIZING YOURSELF WITH TGHA (1091 SYSTEMS ONLY)

The Great Heuristic Algorithm (TGHA) is the program that manages and maintains Metal Oxide Semiconductor (MOS) memory in MF20s.

TGHA stores data in a history file (TGHAV2.DAT) and a trace file (TGHA.TRA). The history file records what modules are on or off line, whether error reporting is turned on, and if any errors have occurred that TGHA can correct.

The trace file records any corrective actions and the time that TGHA took each action. If the history file is corrupted, TGHA uses the information recorded in the trace file to reconstruct the history file.

TGHA also records all of the errors that it corrected for SYSERR.

Usually, you do not need to know anything about TGHA.

F.1 SYSTEM STARTUP

At system startup, the monitor runs TGHA. TGHA then either builds the history file if one does not already exist, or verifies that it knows about all of the on-line MF20 hardware. If the history file exists and new MF20 hardware appears, TGHA adds this new hardware to its history file.

To start TGHA, place the following commands in the OPR.ATO file after DAEMON is started:

```
:SLOG
:DEF TGHA=
R TGHA
```

TGHA prints the following message on the CTY to indicate that it is running for the first time since the monitor was reloaded:

```
TGHA 2(3) RUNNING FIRST TIME
```

Then, TGHA looks for MF20 errors that have occurred since system startup.

FAMILIARIZING YOURSELF WITH TGHA (1091 SYSTEMS ONLY)

F.2 RUNNING TGHA MANUALLY

To run TGHA manually, type everything that is in **BOLD PRINT** in the following dialog:

```
.R TGHA<RET>           Run TGHA.  
TGHA>command<RET>    Type one of the TGHA commands and  
                        press RETURN to tell TGHA what to  
                        do.
```

The TGHA commands are:

Command	Explanation
EXIT	Exits from TGHA.
HISTORY	Dumps the history file.
TRACE	Dumps the trace file.

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Did you find this manual understandable, usable, and well organized? Please make suggestions for improvement.

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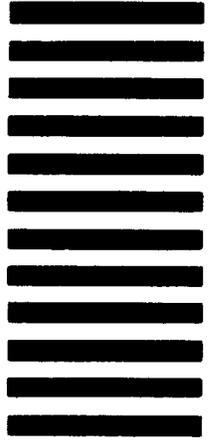
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