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VAXft Systems Owner's Manual

EK–VXFT1–OM.004

Digital Equipment Corporation

VAXft Systems Documentation Road Map

Overview Information (VAXft Systems)

- Customer Letter
- Software Product Description
- VAXft Systems Configuration Guide

Hardware Information (VAXft Systems)

- Site Prep and Installation Guide
- Owner's Manual
- Mini–Reference Guide
- VAX Wide Area Network Device Drivers

Operating System (VMS)

- VMS Upgrade and Installation Manual
- VMS Upgrade and Installation Supplement: VAXft Systems
- Release Notes
- VMS Volume Shadowing Manual

Software Information (VAXft System Services)

- Using Factory–Installed Software with VAXft Systems
- Installation Guide
- Manager's Guide
- Release Notes
- Reference Manual
- Online Help
- Error Message Manual
- Master Index

Legend:
- = Book
- = Online
- = Tape
- = Bookreader

MR–5490–RA

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About This Manual

Intended Audience

This manual is intended for system managers, users, and operators who have system management experience and fault-tolerant VAXft system training.

Document Structure

This manual provides system and console reference information. It is made up of the following chapters and appendixes:

- **Chapter 1, VAXft System** — Introduces the base system and system with expansion, and the system architecture.

- **Chapter 2, System Components** — Describes the modular components inside the VAXft cabinets.

- **Chapter 3, Controls and Indicators** — Explains the use of the cabinet operating controls.

- **Chapter 4, Console Operations** — Describes the system console and the I/O operating modes. Provides several variations of the boot command syntax.

- **Chapter 5, CIO Mode Console Commands** — Describes the console commands available in the console I/O mode (CIO mode).

- **Chapter 6, MIO Mode Console Commands** — Describes the console commands available in the module I/O mode (MIO mode).

- **Appendix A, TF70 Tape Drive Operation** — Describes how to operate the TF70 cannister tape drive, TK70 fixed tape drvie, and TK tape cartridges.

- **Appendix B, TF857 Subsystem Operation** — Describes how to operate the TF857 tape subsystem and TK tape cartridges.

- **Appendix C, System Drive Removal and Replacement** — Describes how to remove and replace cannister and carrier drives. Explains the use of the server setup switch.

- **Appendix D, Module Handling, Removal, and Installation /Replacement Procedures** — Describes how to remove, replace, or install a logic module in the system backplane.

Related Documentation

The VAXft documentation set includes the following manuals:

*   *VAXft Systems Site Preparation and Installation Guide* (EK-VXFT1-IN) — Provides site preparation guidelines and the system specifications. Describes how to install, boot, and verify the system. Provides procedures for removing, handling, and replacing the logic modules, and for removing and replacing the system drives.

*   *VAXft Systems Owner's Manual* (EK-VXFT1-OM) — Provides a functional description of the VAXft system. Describes the system controls and indicators, console commands, bootstrap functions, and tape drive operation. Provides procedures for removing and replacing the system drives and for removing, handling, and replacing the logic modules.

*   *VAXft Systems Mini-Reference Guide* (EK-VXFT1-HR) — Provides summaries of the system controls and indicators, console operation, console commands, bootstrap functions, and system registers.

Additional Documentation

Other documents related to the VAXft system include:

*   *VAXft Systems Configuration Guide* — Describes the VAXft system and describes fault-tolerant computing.

*   *VAX Wide Area Network Device Drivers* — Describes the software utilities used in wide area network communications.

*   *VAXft System Services Installation Guide* — Provides step-by-step procedures for installing the VAXft system services software on your VAXft system.

*   *TF857 Magazine Tape Subsystem Owner's Manual* — Provides a functional description of the TF857 magazine tape subsystem. Describes operation, local programs and utilities, error conditions and problem resolutions, head cleaning procedures, and operating commands.

*   *VAXft System Services Manager's Guide* — Describes the VAXft system and the VAXft system services software. Provides information on managing a fault tolerant system that is running VAXft system services software.

*   *VAXft System Services Release Notes* — Provides information related to the current version of VAXft system services. Provides additional information for installing and maintaining your VAXft system.

- *VAXft System Services Reference Manual* — Provides reference information on VAXft system services operation. Describes the DCL commands used on a VAXft system.

- *VAXft System Services Online Help* — Provides information about using the VAXft system services specific information and the DCL commands used on a VAXft system.

- *VAXft System Services Error Message Manual* — Provides descriptions of error messages that may be encountered in using VAXft system services. Provides a reference for fault tolerant and system error messages.

- *VAXft System Services Master Index* — Provides a complete index for the software documentation set.

- *VMS Upgrade and Installation Manual* — Describes the installation and upgrade procedures for the current release of the VMS operating system. Provides information on the user environmental test package (UETP).

- *VMS Upgrade and Installation Supplement: VAXft Systems* — Supplements the *VMS Upgrade and Installation Manual* with information specific to the VAXft computer including startup, shutdown, and backup procedures.

- *VMS Release Notes* — Provides notes on various aspects of the VMS operating system.

- *VMS Volume Shadowing Manual* — Provides an in-depth discussion of volume shadowing (phase II), shadow sets, the mount utility, and DCL commands used to mount, monitor, and dismount volume shadow sets.

1
VAXft System

The VAXft system is a fault-tolerant VAX computer that provides high levels of availability and reliability for a variety of applications. Hardware redundancy and failover techniques ensure uninterrupted operation in the event of a single point of failure anywhere in the system. Modular components simplify repair and maintenance procedures, reducing the time required to bring components back into service.

The VAXft system:

- Operates as a stand-alone system or as the boot or satellite node for a local area VAXcluster configuration.

- Has expansion capabilities in the areas of main memory, input/output (I/O) devices, synchronous communications adapters, and disk storage.

This chapter introduces the VAXft system and includes:

- Fault-tolerant operation

- System offerings

- Model 110 system descriptions

- Model 310 and 410 system descriptions

- Model 610 and 612 system descriptions

- System architecture

1.1 Fault-Tolerant Operation

The VAXft system achieves fault tolerance through a combination of redundancy and failover techniques. All critical functions of the VAXft hardware are duplicated.

The VAXft system has two zones. Each of the zones contains the hardware required to execute an application. The two zones are identical in configuration, except in cases where the customer chooses not to have hardware redundancy. The zones are physically and logically connected, and simultaneously process the same instructions. When both zones operate in this synchronous manner, they perform as a single, fault-tolerant system. If a single hardware fault occurs in a component in either zone, the problem is communicated to the other zone.

Once the fault is "known" within the system, the system takes action to isolate the faulty component. This action can be:

• Disabling an I/O path

• Removing an element from service (for example, a memory module)

• Removing an entire zone from service

Despite the nature of the failure and recovery action, the system is able to remain in full operation.

A simplified representation of the two zones is shown in Figure 1–1.

Figure 1–1   Model 110 Zones/Modules

CS–8828
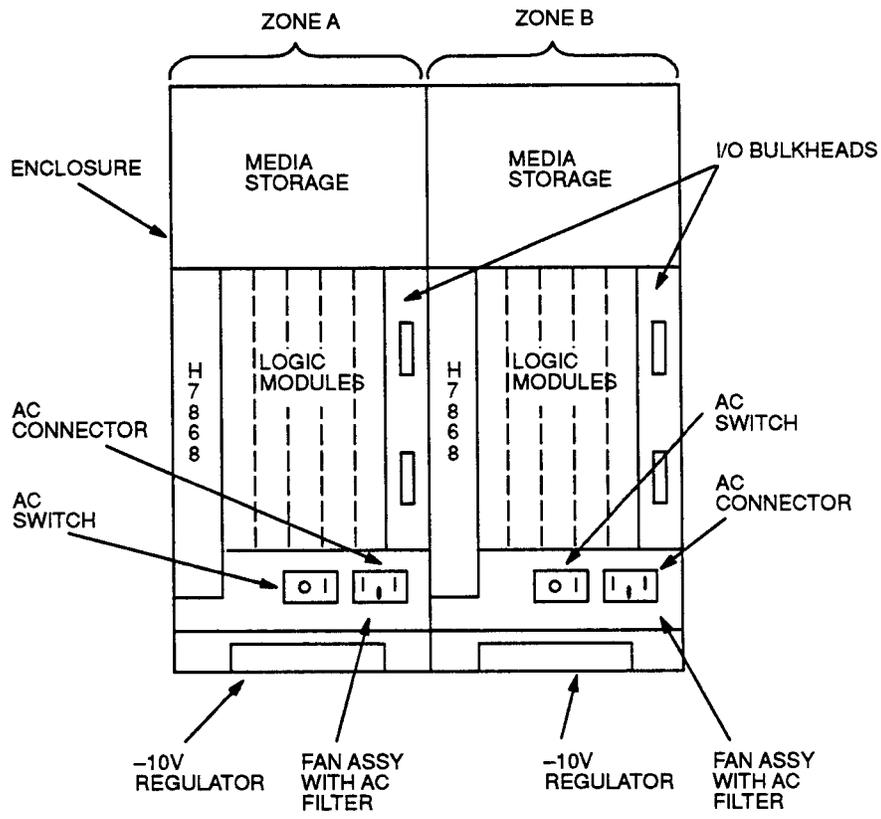
1.2   System Offerings

The VAXft systems vary in processing power and storage capability. The configurations include:

- Model 110 system

- Model 310 and 410 base systems

- Model 310 and 410 systems with expansion

- Model 610 and 612 base systems

- Model 610 and 612 systems with expansion

The VAXft model 110, 310 and 410 systems are configured as pedestal or rackmount systems.

NOTE
The system cabinet is the pedestal package.

Each pedestal is 68.6 cm (27.0 in) high by 53.3 cm (21.0 in) wide. The VAXft 110 system has two zones enclosed in one cabinet, which is similar to a BA213 cabinet.

A model 310 or 410 base system has two system cabinets. Each system cabinet includes power supplies, cooling, logic modules, and two storage slots. Thus, a model 310 or 410 base system has four storage slots. One of the four storage slots may house a TF70 tape drive.

The tape drive can be used for loading software. It can also be used as a backup device. The other three storage slots can be used for disks, or if desired, each zone can house one disk and one tape. RF-series disks are used.

A model 310 and 410 system with expansion has two system cabinets and two expander cabinets. Each system cabinet is connected to both expander cabinets.

An expander cabinet has seven storage slots, six of which can be used. One expander cabinet may house a TF70 tape drive in one of the storage slots. Each expander cabinet can house up to six fixed disk drives or five fixed disk drives and a removable tape drive or a removable disk drive.

The VAXft model 610 and 612 systems are 152.4 cm (60.0 in) cabinets. Each cabinet contains two zones (upper and lower). A model 610 base system has one cabinet. Each zone enclosure houses power supplies, cooling, logic modules, and four storage slots. A base cabinet has two additional storage slots. One of the six storage slots may house a TF-series tape drive.

Customers needing more storage space can order a model 610 system with one or two expander cabinets. Each expander cabinet contains power supplies, cooling, and more storage slots.

Also available to customers are the model 612 base system and systems with expansion. A model 612 base system has two system cabinets and one expander cabinet. A model 612 system with expansion has two system cabinets and two expander cabinets. These configurations allow more processing power and storage space than the model 610 system configurations.

1.3 Model 110 System Description

This section describes the model 110 base system.

1.3.1 Model 110 Base System

Figure 1–2 shows the front view of a base system with VT-series video terminals as the local console terminals. Terminals used in console applications may be hard copy, video, or video with printer. A variety of video terminals and printer stands are available.

The model 110 is similar to the model 310 system, but is housed in one cabinet. It has less expandability in terms of memory, disk capacity, and available module options.

The VAXft model 110 system is available as a pedestal (Figure 1–3) or rackmount (Figure 1–4) system. The rackmount system is the pedestal system without the plastic cover and casters. It can be installed in a standard 19-inch RETMA[1] rack cabinet.

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[1] RETMA rack cabinets are used by Digital and other major manufacturers of electronic equipment. The cabinet rails, mounting hole patterns, and spacing conform to international standards that allow compatibility with products manufactured by Digital and other major manufacturers.

Figure 1–2 Model 110 Base System

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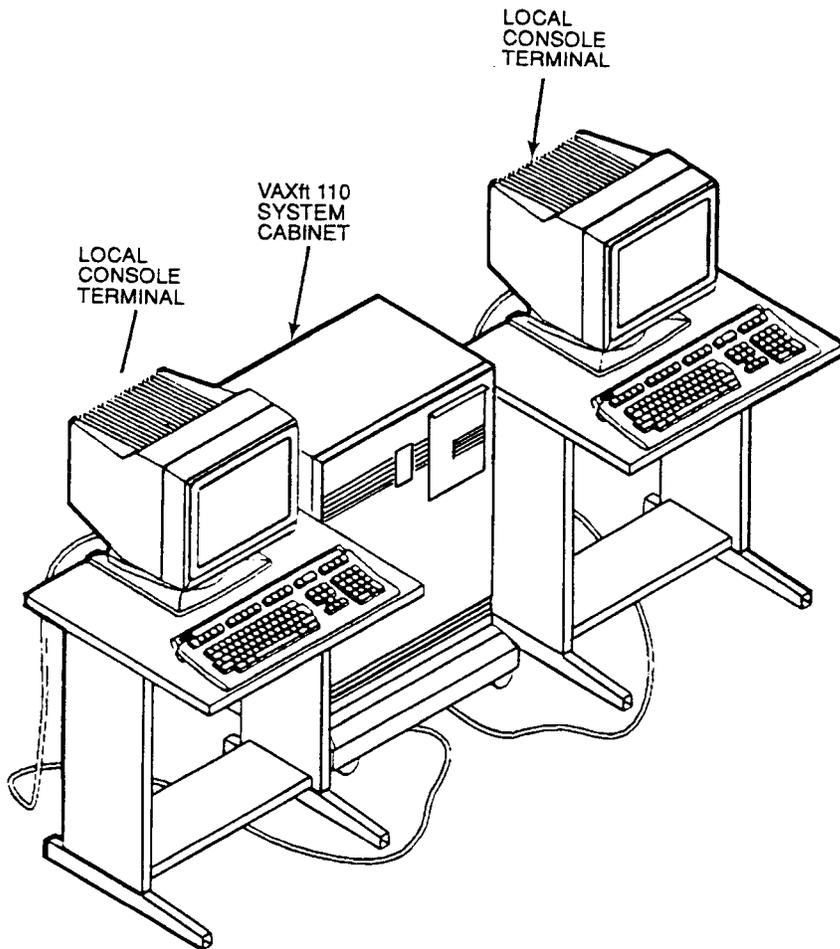
Figure 1–3   Model 110 Pedestal System
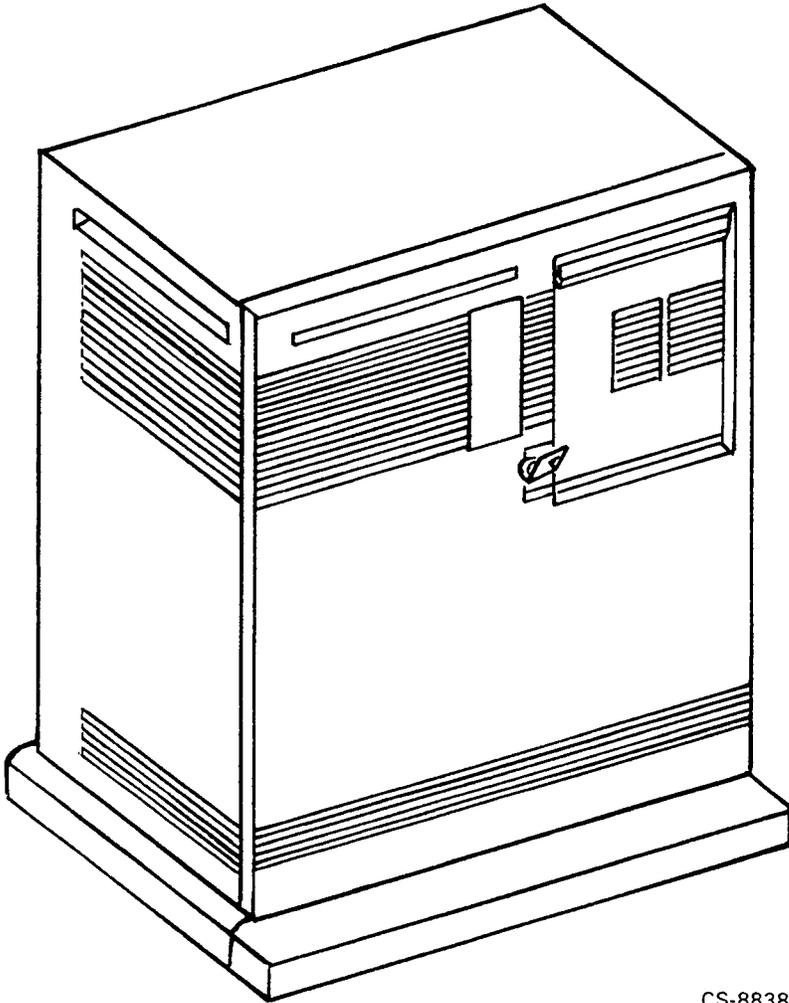
CS-8838

Figure 1–4   Model 110 Rackmount System
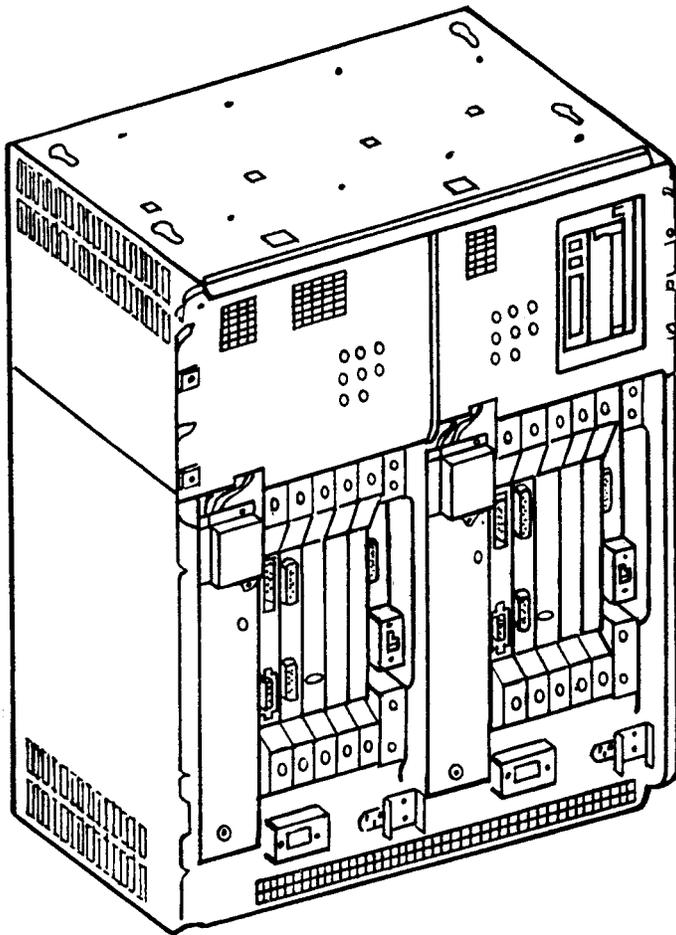
CS-8836

The media storage used in the model 110 can include the following storage devices:

- TK70 tape drive

- RF-series disk drives

The media storage in zone A can have up to two RF72 or three RF31 disk drives. The media storage in zone B can have one TK70 tape drive and either one RF72 or two RF31 disk drives. If a tape drive is not necessary in zone B, then zone B can have two RF72 or three RF31 disk drives.

For memory shadowing, each zone must have the same number of storage devices. The maximum is three storage devices in each zone.

The TK70 tape drive can serve as a system software load device as well as a backup device. The RF-series disk drives can be used as data backup, software load, or bootstrap devices.

Each zone contains a logic backplane with five slots. The following three modules are the minimum required in each backplane for system operation:

- One MS520 memory module

- One KA510 processor module

- One KFE52 system I/O controller module

Each module has a dedicated slot in the backplane.

The MS520 memory module provides 32 MB of main memory with error correction code (ECC).

The KA510 processor module executes the VAX native instruction set. Each processor module operates with a pair of synchronized processors. The processor modules in each zone are connected through a pair of cross-link cables that provide interprocessor communications.

The KFE52 system I/O controller module supports:

- An expandable DSSI bus for the system storage devices

- Two serial ports for the local and remote console terminals

- An Ethernet interface for either a ThinWire or traditional (thickwire) network interconnect (NI) link

Each backplane has two additional slots that may contain up to two additional MS520 memory modules, up to two wide area network (WAN) communications adapters, or an additional KFE52 system I/O controller module.

The WAN communications adapter provides two synchronous communications lines. These lines can be connected redundantly between two zones using external cabling and circuitry.

Figure 1–5 shows the correct placement of the logic modules in the backplane of a zone. Table 1–1 describes the logic modules. The number of memory modules must be the same in both zones.

Figure 1–5   Model 110 Logic Module Placement

PRIMARY SYSTEM I/O
CONTROLLER MODULE

PROCESSOR
MODULE

1/4–TURN
FASTENER

MEMORY MODULE 1

ASSIST
LEVER

MEMORY MODULE 2
WAN OR I/O MODULES

MEMORY MODULE 3
WAN OR I/O MODULES

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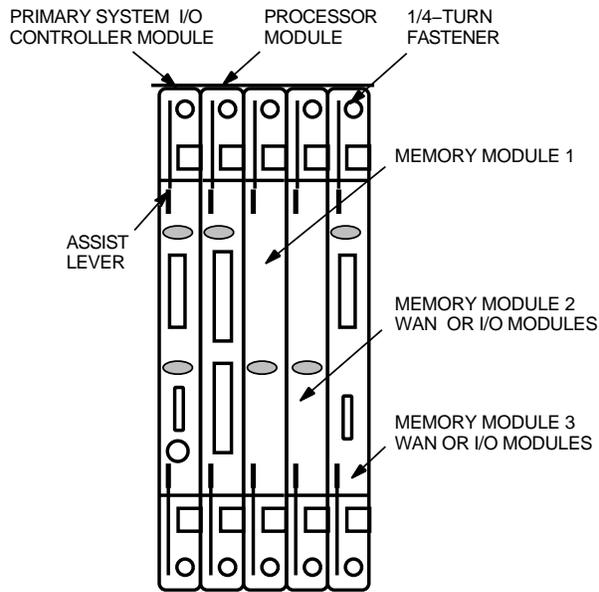
Table 1–1   Model 110 Logic Modules and Adapters

Slot	Module	Description
1	T3001[1]	Primary KFE52 system I/O controller module
2	T3005-BA[1]	KA510 processor module
3	T3003[1]	First MS520 memory module
4	T3003 or T3004	Second MS520 memory module, or WAN module (optional), or KFE52 system I/O controller module
5	T3003 or T3004	Third MS520 memory module, or WAN module (optional), or KFE52 system I/O controller module

[1]Slots 1, 2, and 3 contain the primary system I/O controller module, a processor module, and a memory module. This is the minimum required for operation.

1.4   Model 310 and 410 System Descriptions

This section describes the model 310 and 410 base systems and systems with expansion.

1.4.1   Model 310 and 410 Base System

Figure 1–6 shows the front view of a base system with VT-series video terminals as the local console terminals. Terminals used in console applications may be hard copy, video, or video with printer. A variety of video terminal and printer stands are available.

The model 310 and 410 are identical except for the processor module. The model 310 system's KA520 processor module has 3.8 VUPs of processing power. The model 410 system's KA550 processor module offers 6.0 VUPs of processing power.

Figure 1–6   Model 310 and 410 Base System

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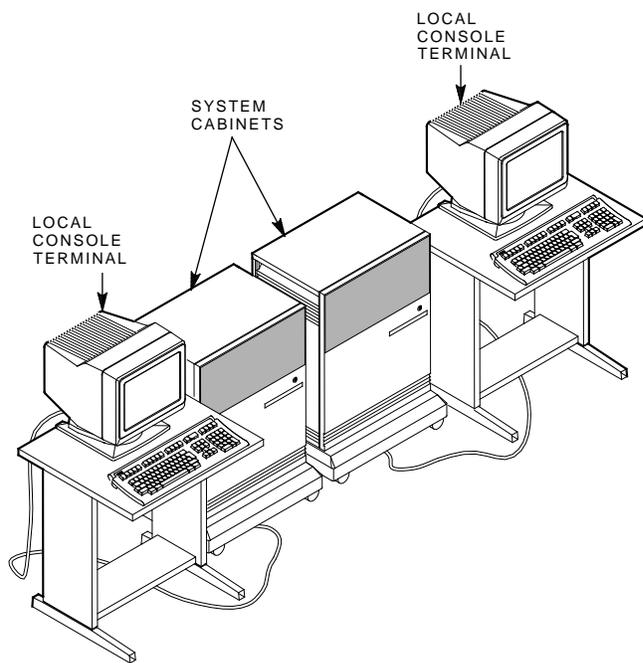
Figure 1–7 shows the layout of the modular components in the base system cabinets. It also shows the DSSI node ID numbers for the drives.

In a base system, both system cabinets contain a cannister disk drive in the right slot as the system operating media. The drive is housed in a removable cannister. All cannister drives are removable and are shock mounted for portability. Cannister disk drives may be removed and stored for backup purposes.

Appendix C describes how to remove and replace a cannister drive.

Figure 1–7   Layout of Model 310 and 410 Base System

SUMMARY PANEL   SUMMARY PANEL

	5			7
DISK OR TAPE DRIVE		DISK DRIVE		

	5			7
TAPE, DISK, OR BLANK CANNISTER MODULE		DISK DRIVE		

Left cabinet:
- DISK OR TAPE DRIVE (5)
- DISK DRIVE (7)
- BATTERY PACK
- 1 2 3 4 5 6 7
- H7233-AA DC POWER SUPPLY WITH FAN
- LOGIC MODULES
- H407-A AC POWER INPUT BOX
- FAN

Right cabinet:
- TAPE, DISK, OR BLANK CANNISTER MODULE (5)
- DISK DRIVE (7)
- BATTERY PACK
- 1 2 3 4 5 6 7
- H7233-AA DC POWER SUPPLY WITH FAN
- LOGIC MODULES
- H407-A AC POWER INPUT BOX
- FAN

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The power system for each cabinet consists of two packages: ac power input box and dc power supply. The ac power input box converts its input to unregulated dc.

The dc power supply supplies regulated dc power to the logic modules and storage elements in the system cabinet. A battery backup unit, which is comprised of batteries, can supply the system cabinet with dc power for at least 30 minutes on a full charge. Further information on the power modules can be found in Chapter 2.

Each system cabinet contains a logic backplane with seven slots. The following three modules are the minimum required in each backplane for system operation:

- One MS520 memory module

- One KA520 (model 310) or KA550 (model 410) processor module

- One KFE52 system I/O controller module

Each of the above modules has a dedicated slot in the backplane.

The MS520 **memory module** provides 32 MB or 64 MB of main memory with error correction code (ECC).

The KA520 or KA550 **processor module** executes the VAX native instruction set and incorporates an integral cache memory and floating-point accelerator. Each processor module operates with a pair of synchronized processors. The processor modules in each zone are connected through a pair of cross-link cables that provide interprocessor communications.

The KFE52 **system I/O controller module** supports:

- An expandable Digital small storage interconnect (DSSI) bus for the system storage devices

- Two serial ports for the local and remote console terminals

- An Ethernet interface for a ThinWire or traditional (thickwire) network interconnect (NI) link

Each backplane has four additional slots that in a base system may contain up to three additional MS520 memory modules, up to four wide area network (WAN) communications adapters, or an additional KFE52 system I/O controller module for connection to a second Ethernet or to support storage expansion.

The WAN communications adapter provides two synchronous communications lines. These lines can be connected redundantly between two zones using external cabling and circuitry.

Figure 1–8 shows correct placement of the logic modules in the system backplane. Table 1–2 describes the logic modules. The number of memory modules must be the same in both system cabinets.

Figure 1–8   Model 310, 410, 610, and 612 Logic Module Placement

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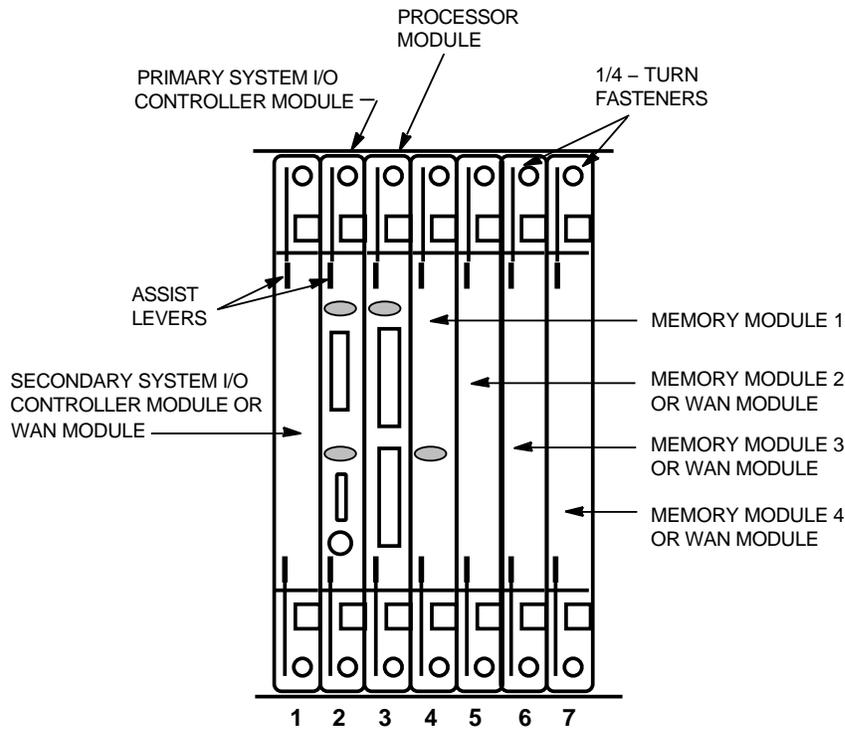
Table 1–2   Model 310, 410, 610, and 612 Logic Modules and Adapters

Slot	Module	Description
1	T3001 or T3004	Secondary KFE52 system I/O controller module or WAN module
2[1]	T3001[2]	Primary KFE52 system I/O controller module
3	T3005 or T3007[2]	KA520 or KA550 processor module, respectively
4	T3003[2]	First MS520 memory module
5	T3003 or T3004	Second MS520 memory module or (optional) WAN module
6	T3003 or T3004	Third MS520 memory module or (optional) WAN module
7	T3003 or T3004	Fourth MS520 memory module or (optional) WAN module

[1]Slot 2 contains the primary system I/O controller module, which supports console functions.

[2]Slots 1, 2, and 3 contain the primary system I/O controller module, a processor module, and a memory module. This is the minimum required for operation.

NOTE
Unused module slots require a T3999 filler module to maintain cooling airflow. The module handles also maintain ground continuity to meet FCC and FTZ regulations and provide electrostatic discharge (ESD) protection.

1.4.2 Model 310 and 410 System with Expansion

Figure 1–9 shows the front view of a system with expansion. The system cabinets are placed in the center with the expander cabinets on each end.

Figure 1–10 shows the layout of the modular components in the expander cabinets. It also shows the DSSI node ID numbers for the drives.

Figure 1–9   Model 310 and 410 System with Expansion
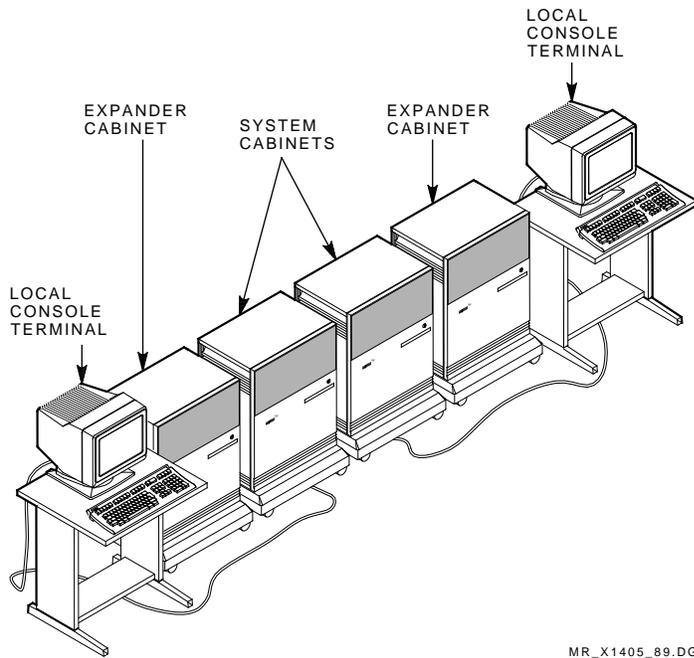
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Figure 1–10   Layout of Model 310 and 410 System with Expansion

SUMMARY PANEL   SUMMARY PANEL

5		5	4
DISK OR TAPE DRIVE	BATTERY PACK	BLANK CARRIER	DISK
		3	2
H7233-AB DC POWER SUPPLY WITH FAN		DISK	DISK
		1	0
		DISK	DISK
H407-A AC POWER INPUT BOX		FAN	

5		5	4
TAPE, DISK, OR BLANK CANNISTER MODULE	BATTERY PACK	BLANK CARRIER MODULE OR DISK	DISK
		3	2
H7233-AB DC POWER SUPPLY WITH FAN		DISK	DISK
		1	0
		DISK	DISK
H407-A AC POWER INPUT BOX		FAN	
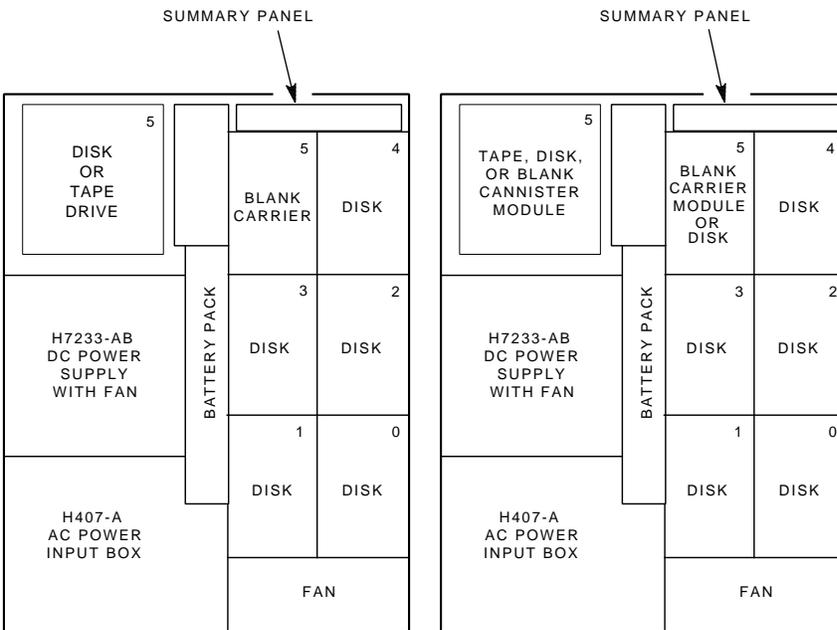
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CAUTION
To prevent a system fault, you must set the expander cabinet circuit breaker to OFF (down) whenever all the expander cabinet disks are powered off.

A system with expansion offers increased storage over a base system. The system cabinets are interconnected just as in a base system. The connections between the system cabinets and expander cabinets are made using cables between the system I/O controller modules in the system cabinets and the DSSI bus in the expander cabinets.

In a system with expansion, all drives must be mounted in the expander cabinets. The system cabinet in a system with expansion contains no disks or tapes. One to six storage devices can be housed in the expander cabinet.

One expander cabinet may contain a cannister tape drive in the cannister slot as a software installation and backup device. The other expander cabinet may contain a:

• Removable cannister tape drive in the cannister slot

• Removable cannister disk drive in the cannister slot

• Nonremovable carrier disk drive in the top left carrier slot

All cannister drives are removable and shock mounted for portability. Cannister disk drives may be removed and stored for backup purposes. An unused cannister slot requires a TM002 blank cannister module (PN 70-27929-01) to maintain cooling airflow inside the cabinet. Unused carrier slots require a TM003 blank carrier module (PN 70-27928-01).

Appendix C describes how to remove and replace a cannister or carrier drive.

The ac power input box and dc power supply in an expander cabinet perform the same functions as in the system cabinets. The system cabinets of a system with expansion must have four modules:

• One MS520 memory module

• One KA520 or KA550 processor module

• Two KFE52 system I/O controller modules

The placement of these modules in the system cabinets is shown in Figure 1–8 and described in Table 1–2.

1.5   Model 610 and 612 System Descriptions

This section describes the model 610 and 612 base systems and systems with expansion.

1.5.1   Model 610 Base System

Figure 1–11 shows the front view of a model 610 base system with video terminals. Figure 1–12 shows the layout of the modular components in a model 610 base system cabinet.

Figure 1–11   Model 610 Base System

LOCAL
CONSOLE
TERMINAL

SYSTEM
CABINET

LOCAL
CONSOLE
TERMINAL

MR-0424-91DG
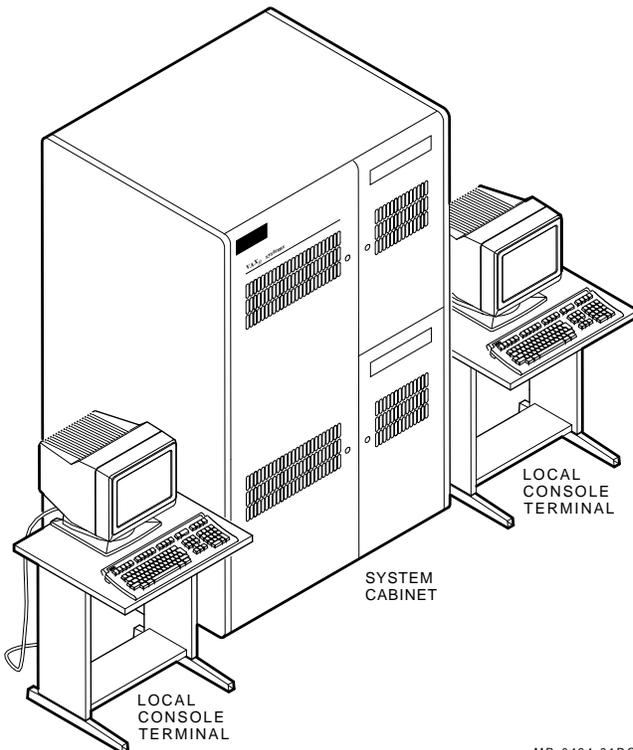
Figure 1–12 Layout of Model 610 Base System

MR–0472–91RAGS
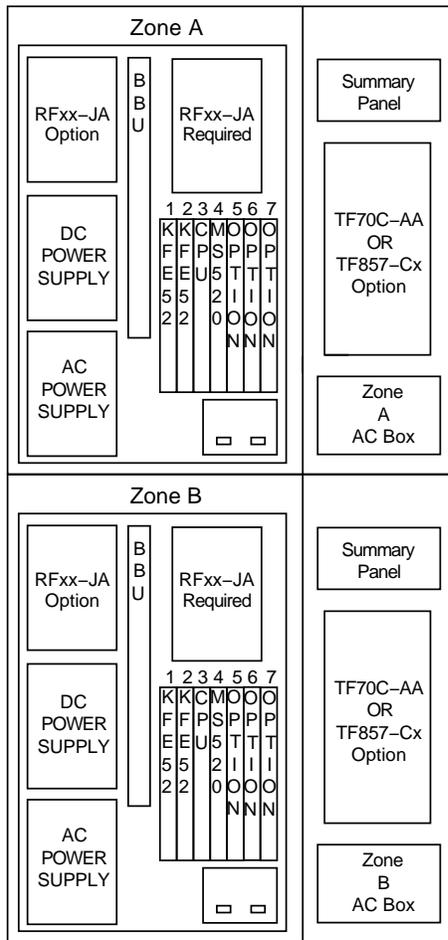
The base system includes two zones in a single cabinet. Each zone has a
seven-slot backplane and mass storage devices. The base system supports
a maximum of six DSSI devices (three per zone). The mass storage
devices can be configured as follows:

- Four RF-series disks

- Four RF-series disks and 1 TF70 or TF857 tape loader

- Four RF-series disks and 2 TF70 or TF857 tape loaders

The placement of the logic modules is shown in Figure 1–8 and described
in Table 1–2.

1.5.2 Model 610 System with One Expander Cabinet

Figure 1–13 shows the front view of a model 610 system with one
expander cabinet and video terminals. Figure 1–14 shows the layout
of the modular components in a model 610 system with one expander
cabinet.

CAUTION
**To prevent a system fault, you must set the expander cabinet
circuit breaker to OFF (down) whenever all the expander cabinet
disks are powered off.**

In this configuration, the system cabinet is the same as in a base cabinet,
but contains no disks. The system cabinet can house one or two TF70 or
TF857 tape loaders. The system cabinet may have four modules in each
seven-slot backplane:

- One MS520 memory module

- One KA550 processor module

- Two KFE52 system I/O controller modules

The placement of the logic modules is shown in Figure 1–8 and described
in Table 1–2.

In this configuration, a maximum of 12 DSSI devices (6 per zone) are housed in the expander cabinet:

- Up to 12 RF-series disks

- 10 or 11 RF-series disks and 1 or 2 TF70 or TF857 tape loaders

- 11 RF-series disks and 1 or 2 RF-series removable disks

Figure 1–13   Model 610 System with One Expander Cabinet

LOCAL
CONSOLE
TERMINAL

SYSTEM
CABINETS

LOCAL
CONSOLE
TERMINAL

MR-0425-91DG
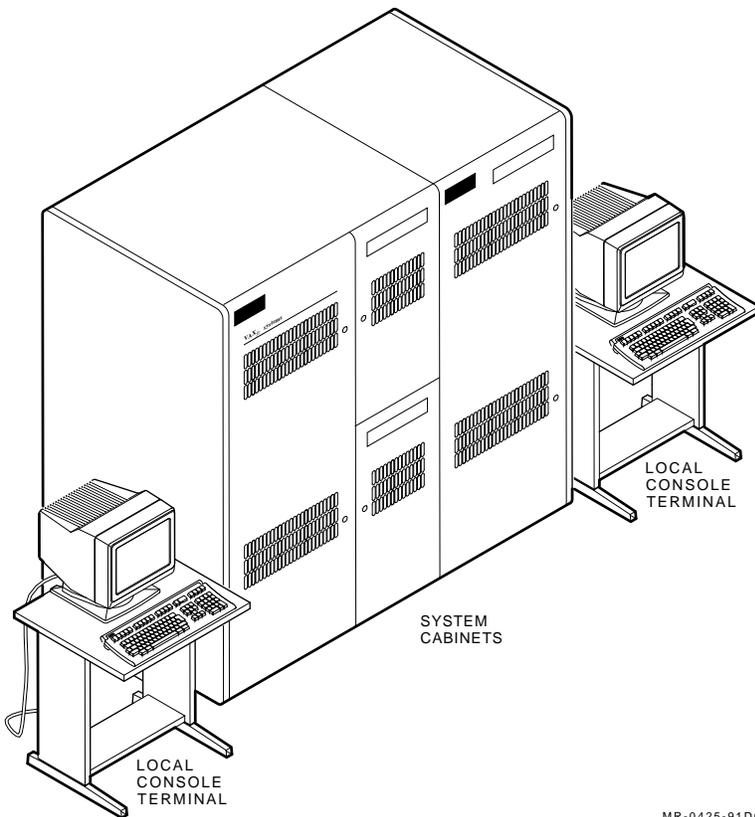
Figure 1–14   Layout of Model 610 System with One Expander Cabinet

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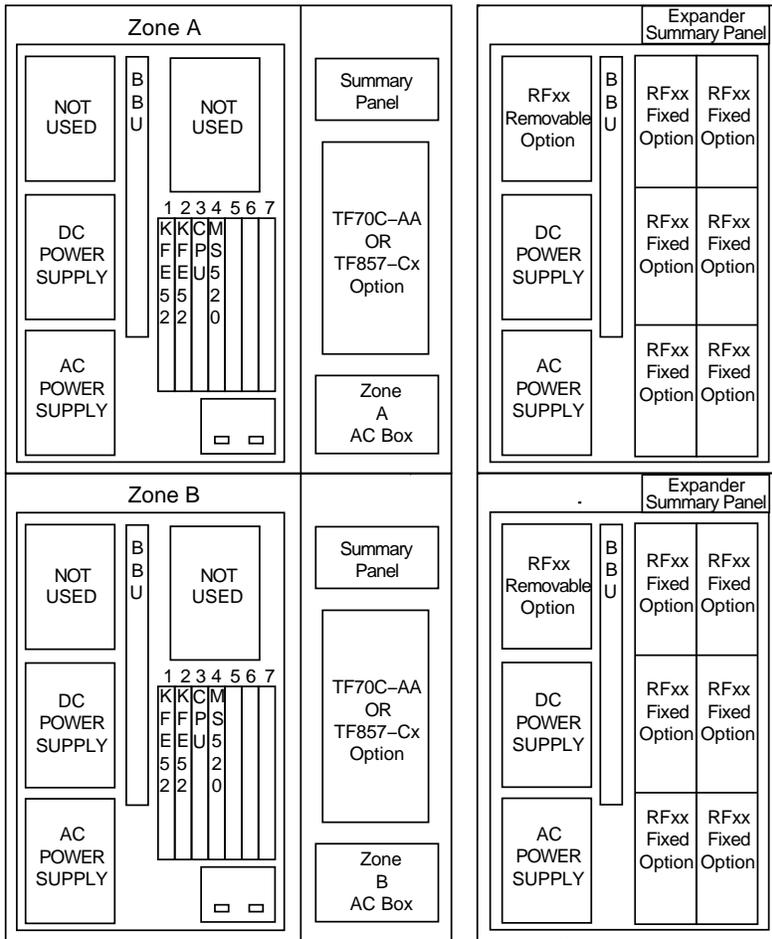
1.5.3 Model 610 System with Two Expander Cabinets

Figure 1–15 shows the front view of a model 610 system with two expander cabinets and video terminals. Figure 1–16 shows the layout of the modular components in a model 610 system with two expander cabinets.

CAUTION

To prevent a system fault, you must set the expander cabinet circuit breaker to OFF (down) whenever all the expander cabinet disks are powered off.

In this configuration, the system cabinet is the same as in a base cabinet, but contains no disks. The system cabinet can house one or two TF70 or TF857 tape loaders. The system cabinet may have seven modules in each seven-slot backplane:

- One MS520 memory module

- One KA550 processor module

- Four KFE52 system I/O controller modules

The placement of the logic modules is shown in Figure 1–8 and described in Table 1–2.

In this configuration, a maximum of 24 DSSI devices (12 per zone) are housed in the expander cabinets in the following combinations:

- Up to 24 RF-series disks

- 22 or 23 RF-series disks and 1 or 2 TF70 or TF857 tape loaders

- 22 or 23 RF-series disks and 1 or 2 RF-series removable disks

Four RF-series carrier disks are the minimum requirement for mass storage in this configuration.

Figure 1–15   Model 610 System with Two Expander Cabinets

LOCAL
CONSOLE
TERMINAL

SYSTEM
CABINETS

LOCAL
CONSOLE
TERMINAL

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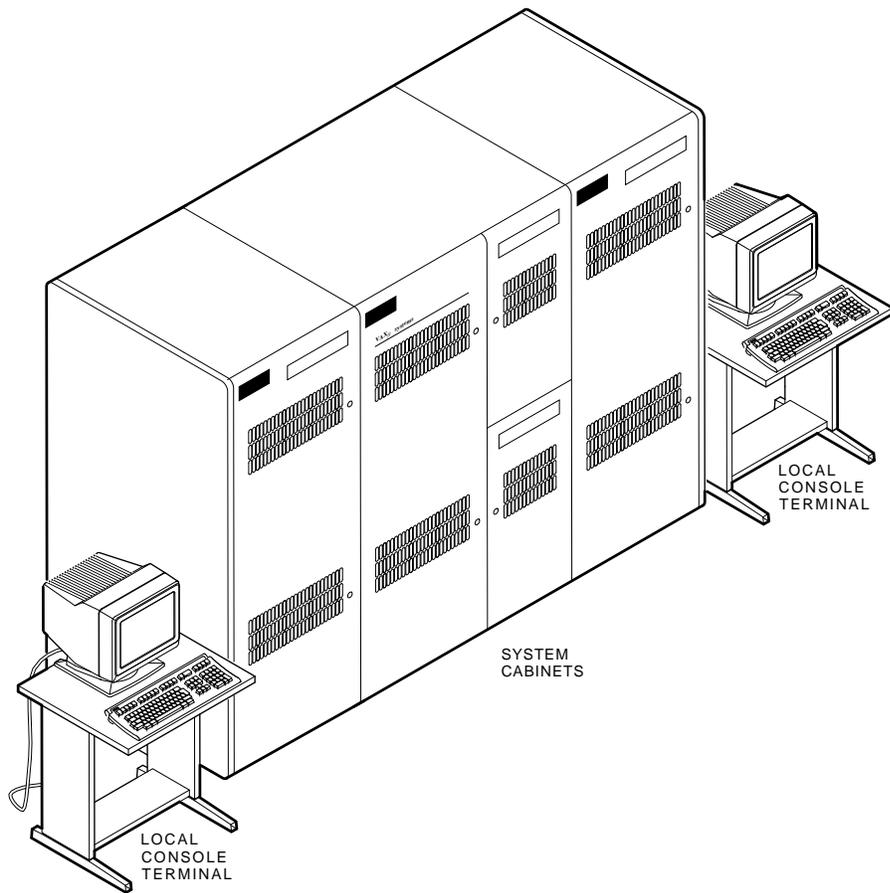
Figure 1–16   Layout of Model 610 System with Two Expander Cabinets

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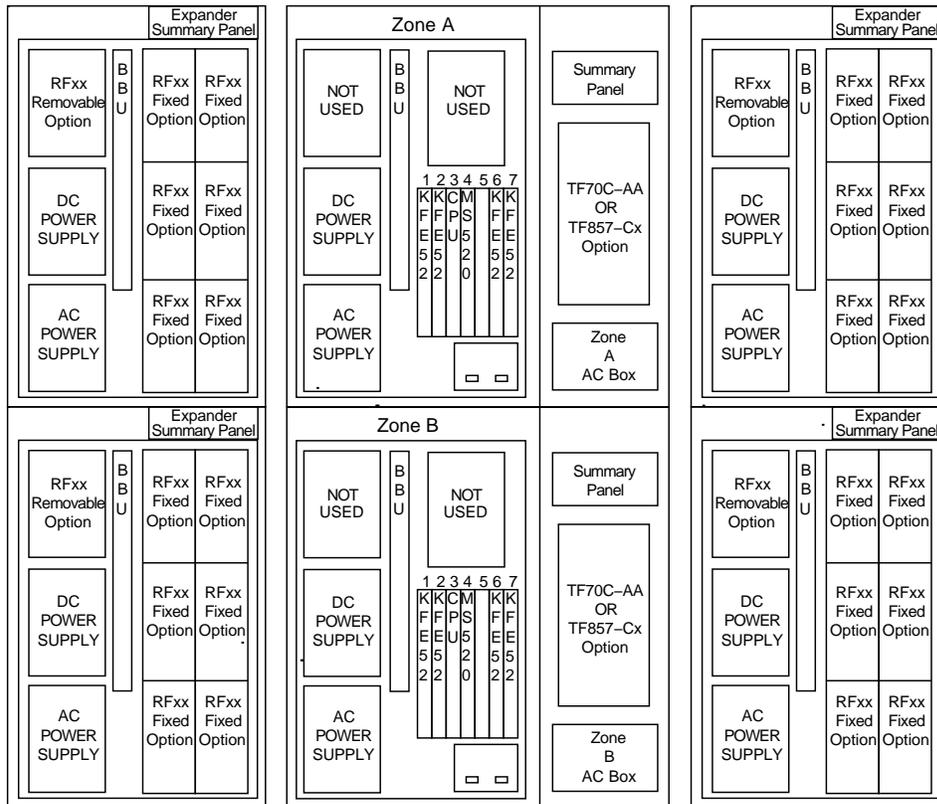
1.5.4 Model 612 Base System

Figure 1–17 shows the front view of a model 612 base system with video terminals. Figure 1–18 shows the layout of the modular components in a model 612 base system.

CAUTION
To prevent a system fault, you must set the expander cabinet circuit breaker to OFF (down) whenever all the expander cabinet disks are powered off.

This configuration includes two model 610 system cabinets and one expander cabinet. Each system cabinet can house one or two TF70 or TF857 tape loaders. Each system cabinet may have four modules in each seven-slot backplane:

- One MS520 memory module

- One KA550 processor module

- Two KFE52 system I/O controller modules

The placement of the logic modules is shown in Figure 1–8 and described in Table 1–2.

In this configuration, a maximum of 12 DSSI devices (6 per zone) are housed in the expander cabinet in the following combinations:

- 12 RF-series disks

- 10 RF-series disks and 1 or 2 TF70 or TF857 tape loaders, or 11 RF-series disks and 1 TF70 or TF857 tape loader

- 10 RF-series disks and 1 or 2 RF-series removable disks, or 11 RF-series disks and 1 RF-series removable disk

- 8 or 9 RF-series carrier disks, 1 or 2 RF-series removable disks, and 1 or 2 TF70 or TF857 tape loaders

A minimum of two RF-series carrier disks are required for this configuration.

Figure 1–17   Model 612 Base System

LOCAL
CONSOLE
TERMINAL

SYSTEM
CABINETS

LOCAL
CONSOLE
TERMINAL

MR-0426-91DG
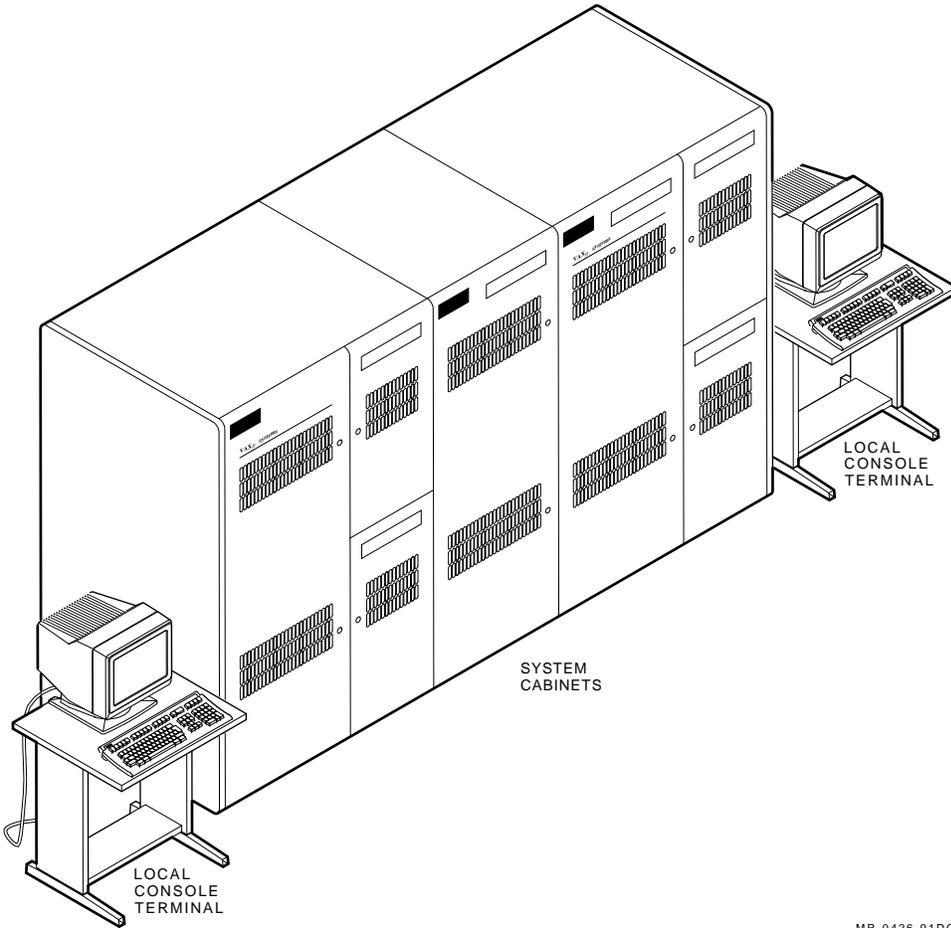
Figure 1–18 Layout of Model 612 Base System
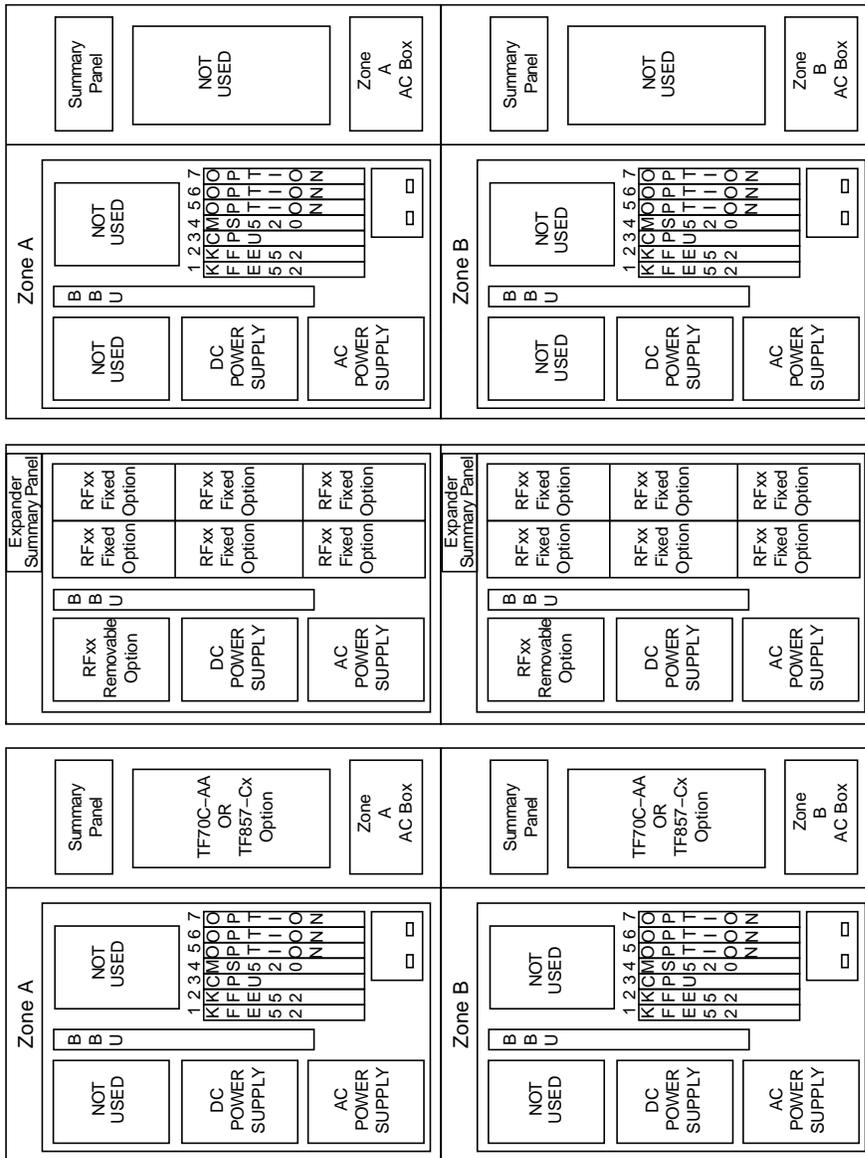
MR-0476-91RAGS

1.5.5 Model 612 System with Expansion

Figure 1–19 shows the front view of a model 612 system with expansion with video terminals. Figure 1–20 shows the layout of the modular components in a model 612 system with expansion.

CAUTION
To prevent a system fault, you must set the expander cabinet circuit breaker to OFF (down) whenever all the expander cabinet disks are powered off.

This configuration includes two model 610 system cabinets and two expander cabinets. Each system cabinet can house one or two TF70 or TF857 tape loaders. Each system cabinet has four modules in each seven-slot backplane:

- One MS520 memory module

- One KA550 processor module

- Four KFE52 system I/O controller modules

The placement of the logic modules is shown in Figure 1–8 and described in Table 1–2.

In this configuration, a maximum of 24 DSSI devices (12 per zone) are housed in each expander cabinet in the following combinations:

- Up to 24 RF-series disks

- 22 or 23 RF-series disks and 1 or 2 TF70 or TF857 tape loaders

- 22 or 23 RF-series disks and 1 or 2 RF-series removable disks

A minimum of four RF-series carrier disks are required for this configuration.

Figure 1–19   Model 612 System with Expansion

LOCAL
CONSOLE
TERMINAL

SYSTEM
CABINETS

LOCAL
CONSOLE
TERMINAL

MR-0427-91DG

Figure 1–20   Layout of Model 612 System with Expansion

MR–0475–91RAGS
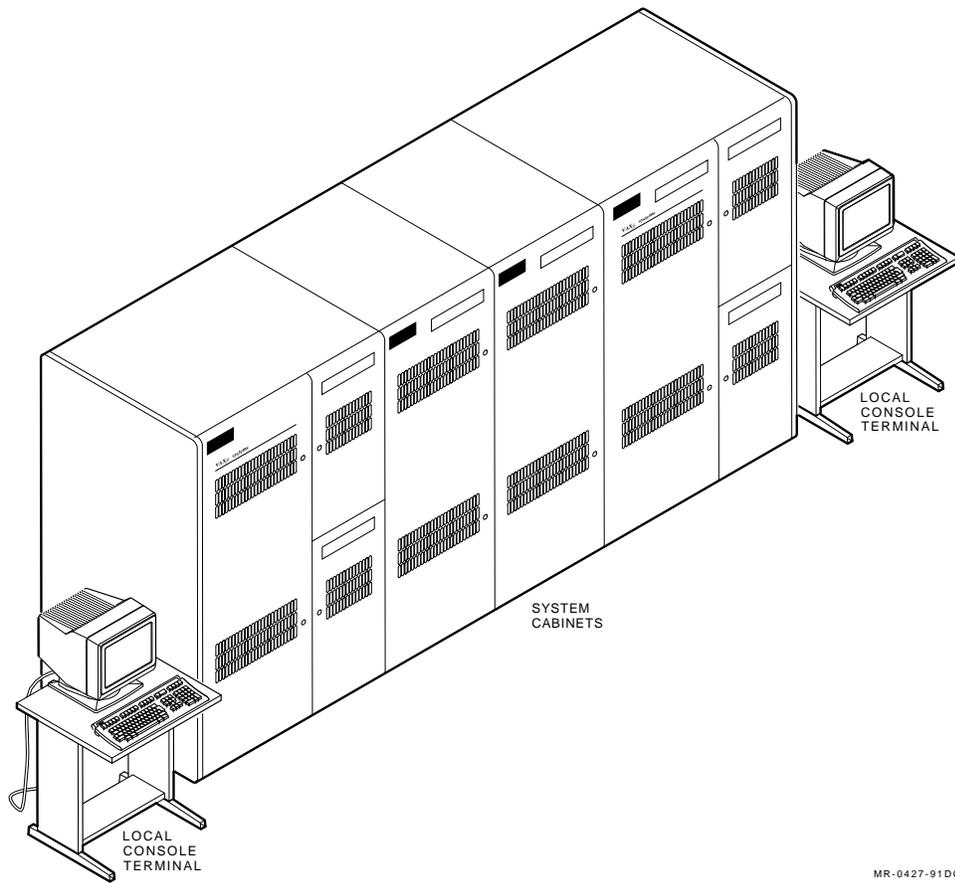
1.6 System Architecture

All the memory, processing, and I/O facilities shown in Figure 1–21 are provided in two interconnected system cabinets in a base system.

During normal operation, both zones operate in lockstep. While operating in lockstep, there is no single point of hardware failure. An error in one zone will not disable the VAXft system.

When a solid hardware failure occurs, the zone with the failing component is brought off-line for repair. When the repair is completed, the zone is powered on and the VAXft system automatically resynchronizes with the operating zone, restoring redundancy. This process is transparent to applications running on the VAXft system.

Figure 1–21   VAXft System Architecture

MR–0206–90.RAGS
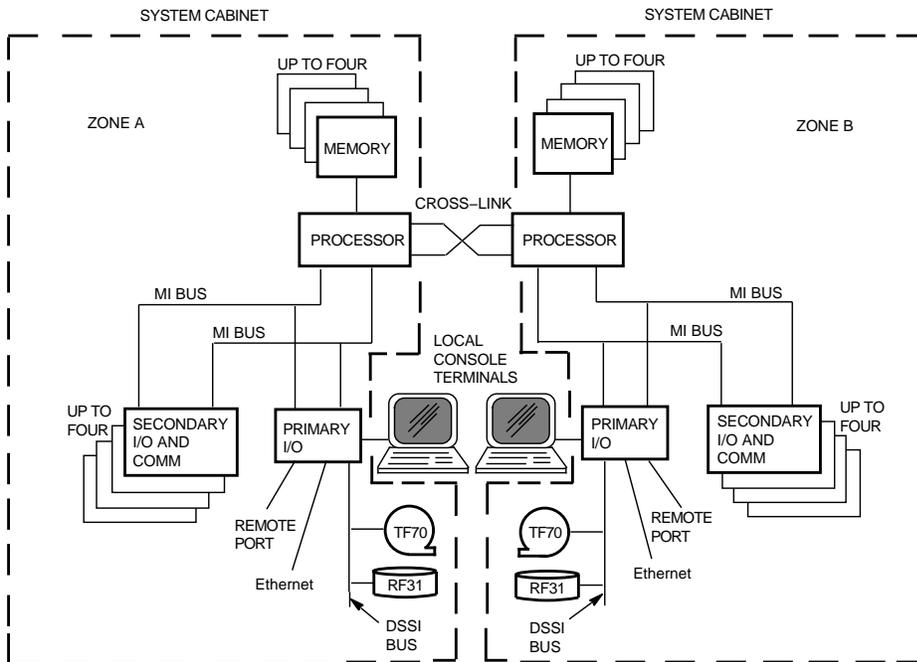
2
System Components

This chapter describes the system components and storage devices housed in the VAXft cabinets. This chapter includes:

- TK70 fixed tape drive

- TF70 cannister tape drive

- TF857 tape subsystem

- RF-series fixed disk drive

- RF-series cannister disk drive

- RF-series carrier disk drive

- Power modules

- Logic modules and connectors

- Cabinet cooling system

CAUTION
Installation and maintenance procedures may be performed only by qualified personnel. They must be familiar with the electrostatic discharge (ESD) procedures and power procedures for the VAXft system. Excessive shock or incorrect handling can damage the logic modules.

2.1 TK70 Fixed Tape Drive

Figure 2–1 shows a front view of the TK70 tape drive.

The tape drive is fixed with its associated controller behind the I/O bulkhead.

The TK70 tape drive may be used for:

• Installing or updating the operating software

• Installing or updating the user software

• Storage and retrieval of archived information

For more information on the TK70 fixed tape drive, see Appendix A.

Figure 2–1   TK70 Tape Drive

CS-8840
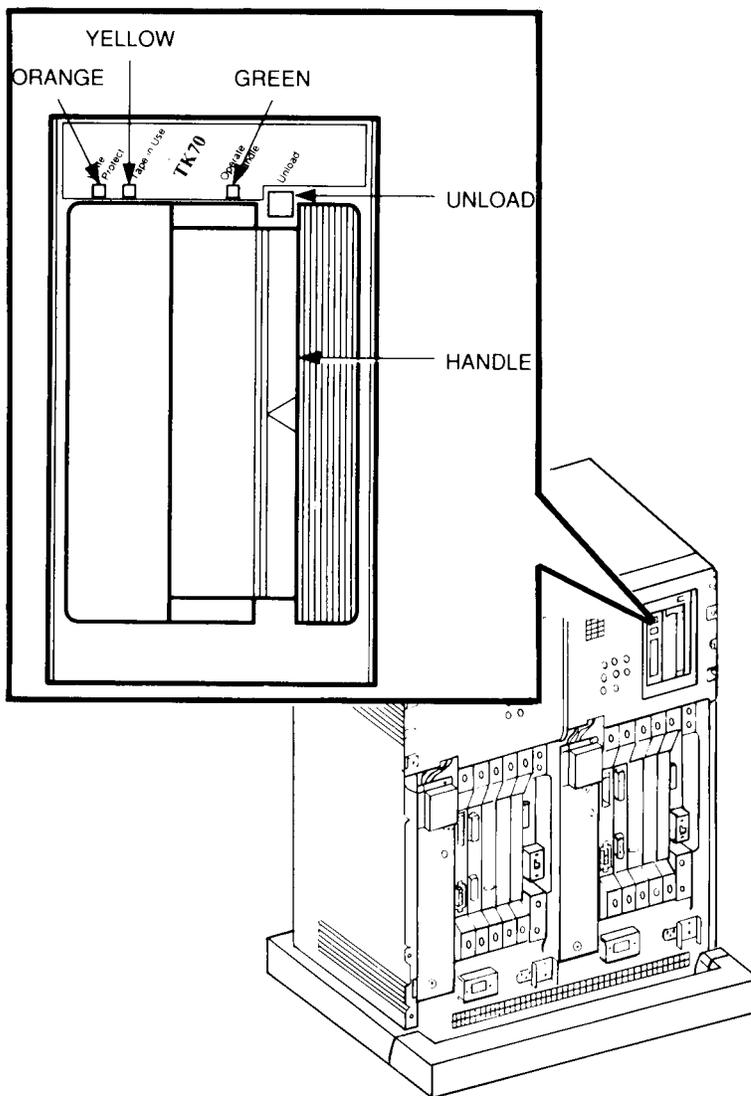
2.2   TF70 Cannister Tape Drive

Figure 2–2 shows a front view of the TF70 cannister tape drive.

Figure 2–2   TF70 Cannister Tape Drive

MR-0186-90.DG
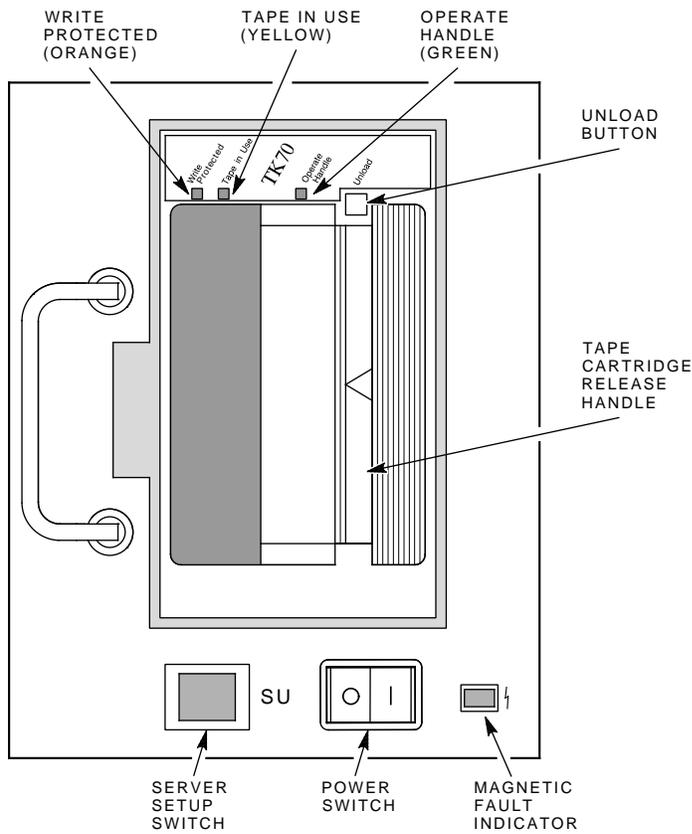
The tape drive unit is mounted with its associated controller inside a removable cannister module.

The TF70 cannister tape drive may be used for:

• Installing or updating the operating system

• Installing or updating user software

• Storage and retrieval of archived information

Two switches are located on the TF70 cannister, the power switch and the server setup (SU) switch.

• The power switch controls power to the drive. The switch must be set to off (0) before you remove the cannister from the system. It must also be set to off (0) when you insert the cannister in the system.

• The server setup (SU) switch allows you to set the DSSI parameters for a drive you are installing in a running VAXft system. It has no effect when the system is halted.

  The server setup switch must be pressed in and held while you power on: a new drive or a drive you are returning to the system after repair. The switch has no other function; use of the switch at any other time has no effect. After setting DSSI parameters under the DUP facility, power off the drive; then power on the drive without using the server setup switch. For further information on drive DSSI parameters and the DUP facility, refer to the BOOT command syntax (Section 4.4), BOOT command description (Section 5.2), and the RBD command description (Section 6.8).

A magnetic fault indicator (MFI) is located on the cannister. This indicator shows yellow when a failure is detected in the tape drive. A fault may be detected at power-on or during operation. Upon successful completion of the power-on diagnostics, the indicator is blank (not yellow).

For more information on the TF70 cannister tape drive, see Appendix A. Removal and replacement procedures and the use of the server setup switch are covered in Appendix C.

2.3 TF857 Tape Subsystem

Figure 2–3 shows a front view of the TF857 tape subsystem.

The tape unit is mounted with its associated controller inside a removable module.

The TF857 tape subsystem can be used for:

- Installing or updating the operating software
- Installing or updating the user software
- Storage and retrieval of archived information

The Mode Select key (Figure 2–3) can lock the loader transfer assembly into the enclosure, as well as lock the receiver closed. It has four modes:

- OCP Disabled
- Automatic
- Manual
- Service

The OCP Disabled, Automatic, and Manual modes are for operational use; the Service mode is for head cleaning and servicing procedures. See Appendix B for more information on the Mode Select key and its function.

The TF857 operator control panel (OCP) has 3 OCP pushbuttons and 16 indicators that are used with the Mode Select key. See Appendix B for more details on button and indicator operations.

Figure 2–3   TF857 Tape Subsystem

SHR_X1025B_89
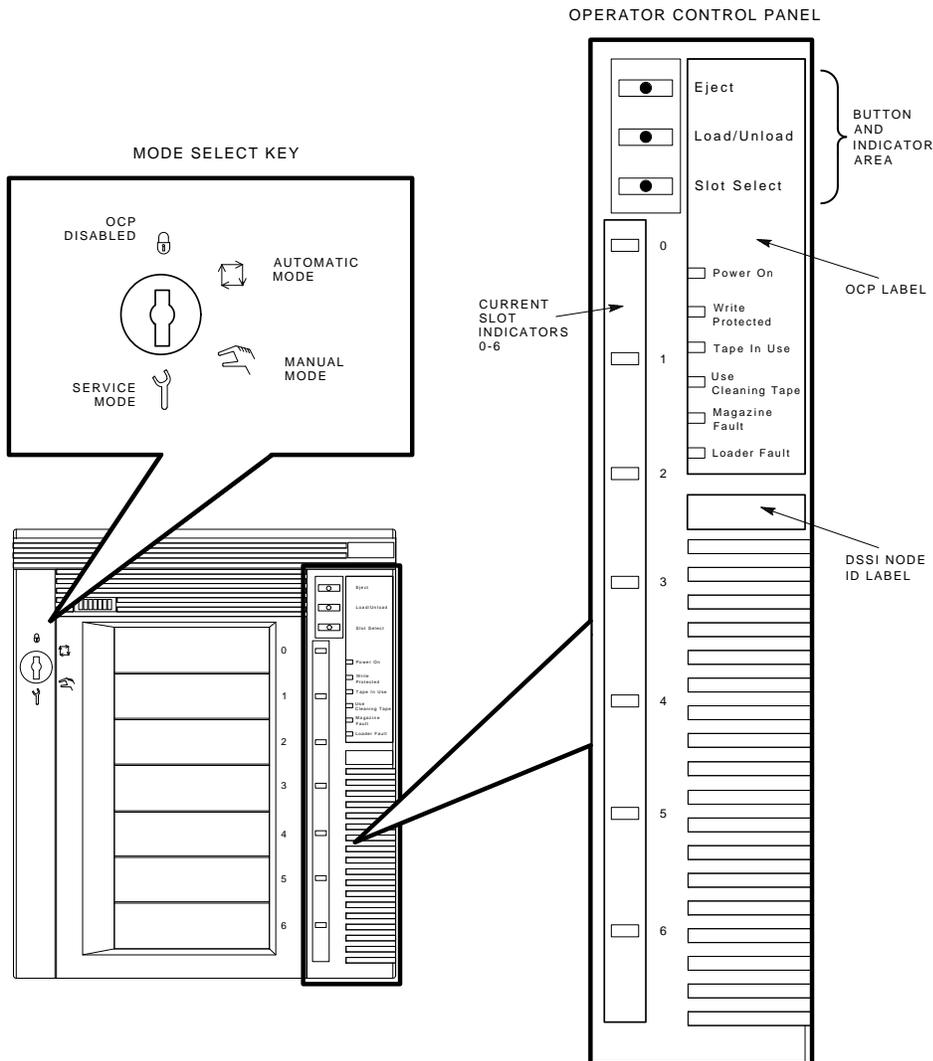
2.4   RF-Series Fixed Disk Drive

Figure 2–4 shows a front view of the RF-series fixed disk drive.

The RF-series disk drive and its associated controller is fixed inside the I/O bulkhead.

The RF-series disk drive may be used as:

- Data backup, software load, or bootstrap device
- Operating media

For more information on the RF-series disk drive, see Appendix A.

Figure 2–4   RF-Series Fixed Disk Drive Controls and Indicators

CS-8841
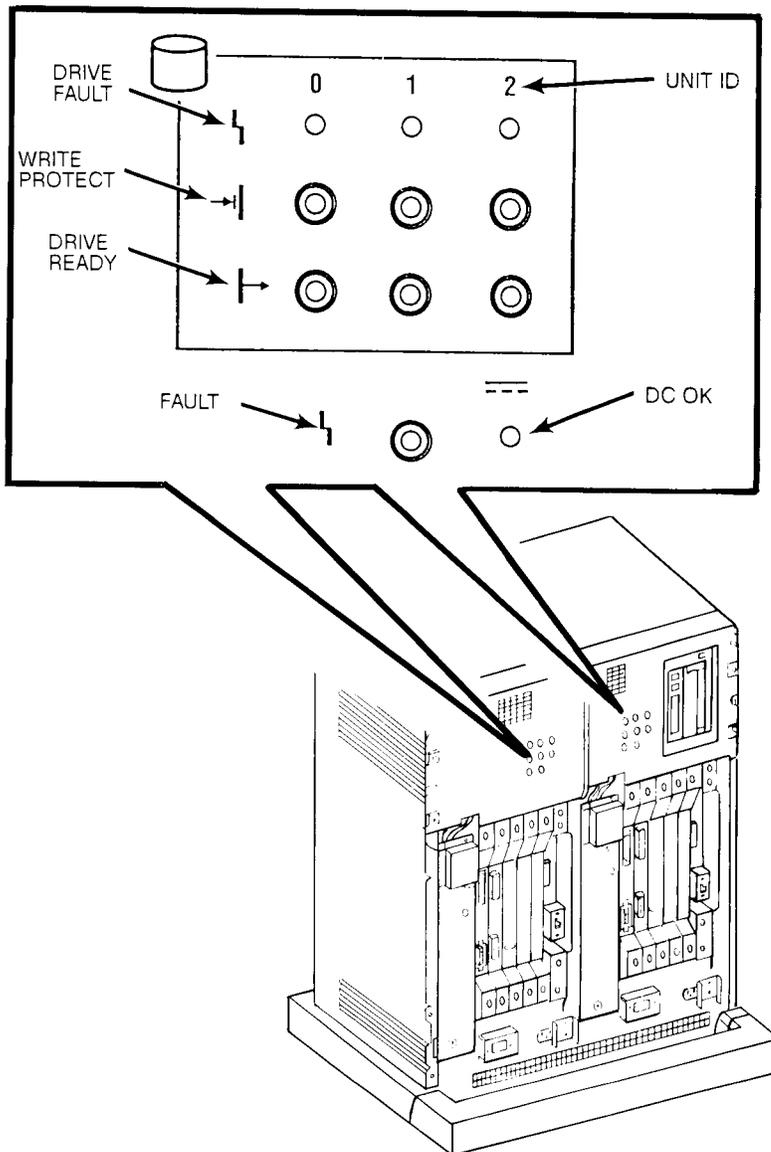
2.5   RF-Series Cannister Disk Drive

Figure 2–5 shows a front view of the RF-series cannister disk drive.

Figure 2–5   RF-Series Cannister Disk Drive

SU

SERVER
SETUP
SWITCH

POWER
SWITCH

MAGNETIC
FAULT
INDICATOR

MR-0187-90.DG
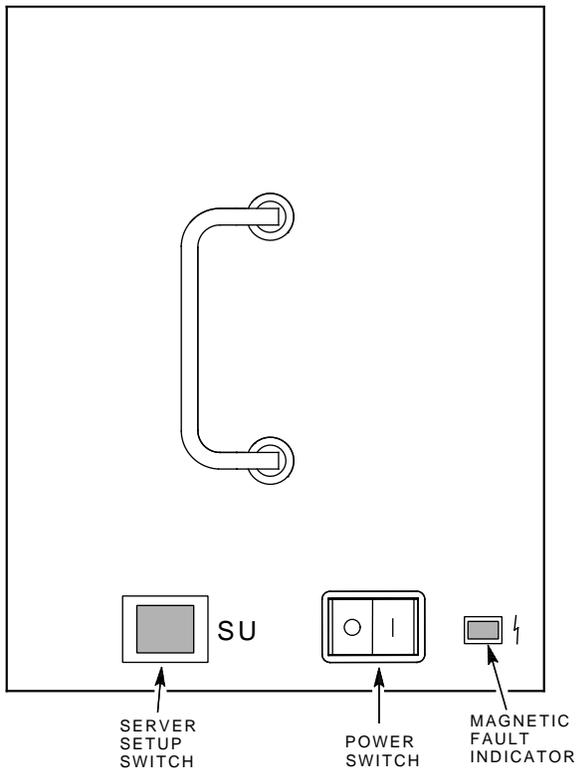
The Winchester disk drive unit is shock mounted with its associated controller inside a removable cannister module.

The RF-series cannister disk drive may be used as the:

- Data backup, software load, or bootstrap device

- Operating media in an entry-level system

Two switches are located on the RF-series cannister, the power switch and the server setup (SU) switch.

- The power switch controls power to the drive. The switch must be set to off (0) before you remove the cannister from the system. It must also be set to off (0) when you insert the cannister in the system.

- The server setup (SU) switch allows you to set the DSSI parameters for a drive you are installing in a running VAXft system. It has no effect when the system is halted.

  The server setup switch must be pressed in and held while you power on: a new drive or a drive you are returning to the system after repair. The switch has no other function; use of the switch at any other time has no effect. After setting DSSI parameters under the DUP facility, power off the drive; then power on the drive without using the server setup switch. For further information on drive DSSI parameters and the DUP facility, refer to the BOOT command syntax (Section 4.4), BOOT command description (Section 5.2), and to the RBD command description (Section 6.8).

A magnetic fault indicator (MFI) is located on the cannister. This indicator shows yellow when a failure is detected in the tape drive. A fault may be detected at power-on or during operation. Upon successful completion of the power-on diagnostics, the indicator is blank (not yellow).

2.6   RF-Series Carrier Disk Drive

Figure 2–6 shows a front view of the RF-series carrier disk drive.

The Winchester disk drive unit is mounted with its associated controller inside a fixed carrier module.

The two switches and magnetic fault indicator on the RF-series carrier disk drive have the same functions as on the RF-series cannister disk drive.

Removal and replacement procedures for the carrier drives are covered in Appendix C. RF-series carrier disk drives are used as the system operating media in the expander cabinets. The drives should not be removed, except by qualified maintenance personnel.

Figure 2–6   RF-Series Carrier Disk Drive

MAGNETIC
FAULT
INDICATOR

SERVER
SETUP
SWITCH

SU

POWER
SWITCH

CAPTIVE
THUMB
SCREW
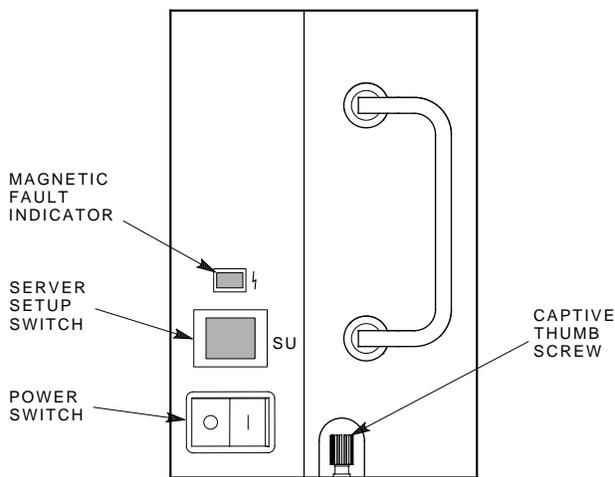
MR-0184-90.DG

2.7 Power Modules

Figure 2–7 shows a front view of the power modules located in the model 110 cabinet. Figure 2–8 shows a front view of the power modules located in each model 310 and 410 cabinet. Figure 2–9 shows a front view of the power modules located in each model 610 and 612 cabinet.

The VAXft power system consists of the following modules:

- AC power supply (model 110 only)

- AC power input box

- DC power supply

- Battery pack

- AC distribution box (model 610 and 612 only)

The H7868 ac power supply provides unregulated direct voltage to the internal power bus. The ac power input box accepts 115 Vac (nominal) or 230 Vac (nominal) at 47 to 63 Hz from the cabinet line cord.

The H407-A ac power input box provides an unregulated direct voltage of 48 Vdc to the internal power bus. The ac power input box accepts 115 Vac (nominal) or 230 Vac (nominal) at 47 to 63 Hz from the cabinet line cord. An input voltage selector switch located on the ac power transformer selects one of the voltage ranges. The *VAXft Systems Site Preparation and Installation Guide* (EK-VXFT1-IN) provides the procedures needed to check or change the switch position. The power breaker switch for the cabinet is located on the front of the ac power input box. The magnetic fault indicator (MFI) on the front of the box shows yellow when a fault is detected. One of the following faults is most likely:

- Main bulk regulator

- Battery switch circuit

- Charger circuit

Figure 2–7   Model 110 Power Modules

ZONE A   ZONE B

DC OK
LED

POWER
RESET
SWITCH

AC POWER
CORD
RECEPTACLE

DC OK
LED

POWER
RESET
SWITCH

POWER
ON/OFF
SWITCH

H7868
AC POWER
SUPPLY

CIRCUIT
BREAKER

POWER
ON/OFF
SWITCH

AC POWER
CORD
RECEPTACLE

CIRCUIT
BREAKER
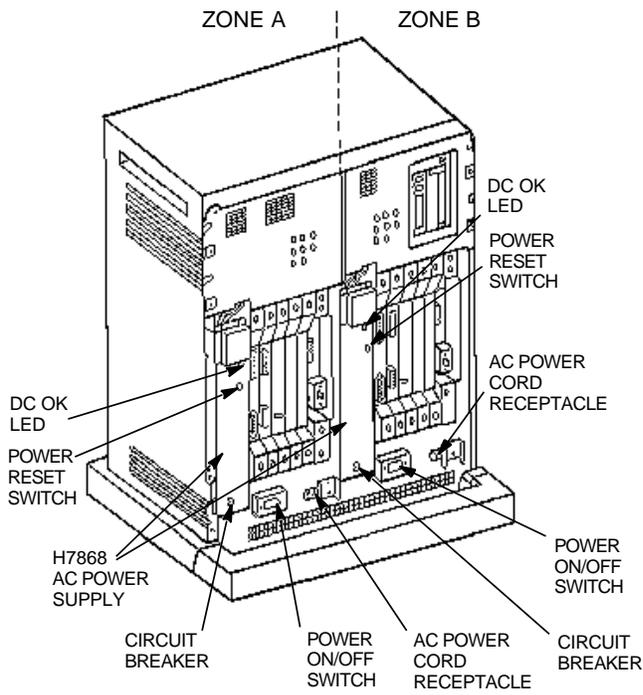
MR−0642091−RAGS_IMG

Figure 2–8   Model 310 and 410 Power Modules

BATTERY
PACK

DC POWER
SUPPLY
WITH FAN

AC POWER
INPUT BOX

AC CIRCUIT
BREAKER

AC POWER
TRANSFORMER

FAN
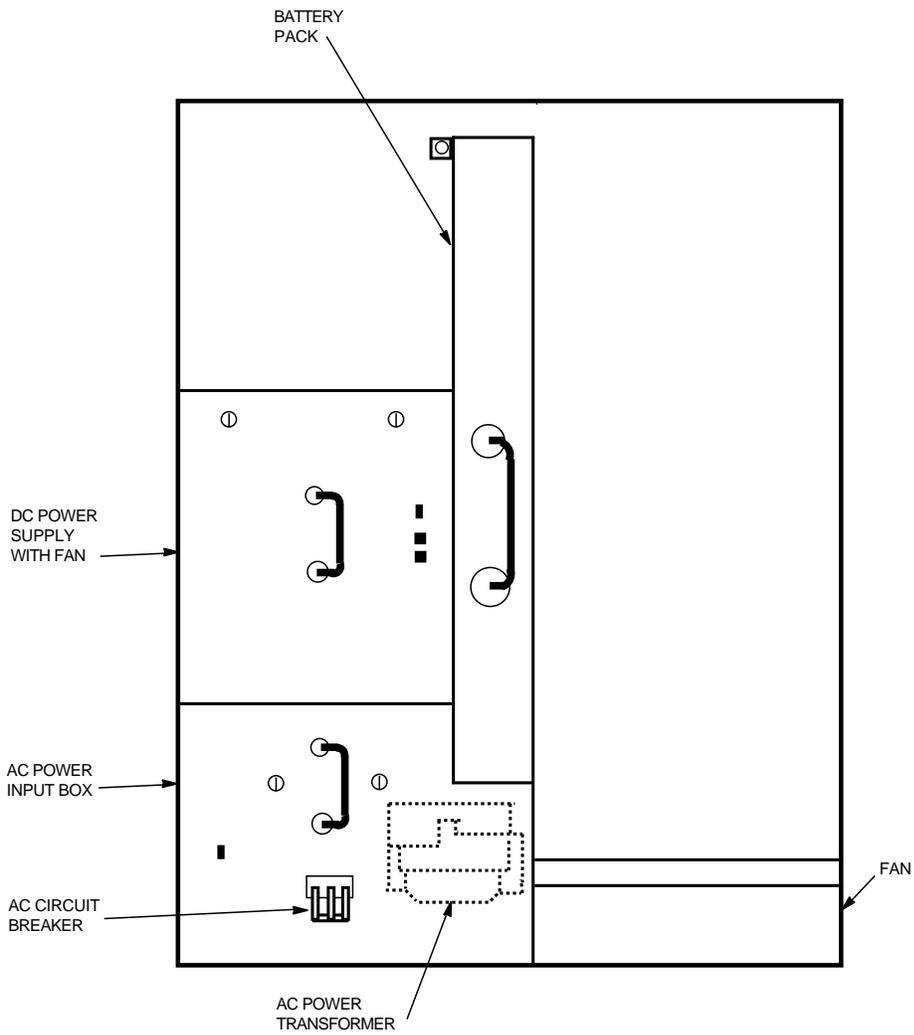
MR–0208–90.RAGS

Figure 2–9   Model 610 and 612 Power Modules

MR–0477–91RAGS
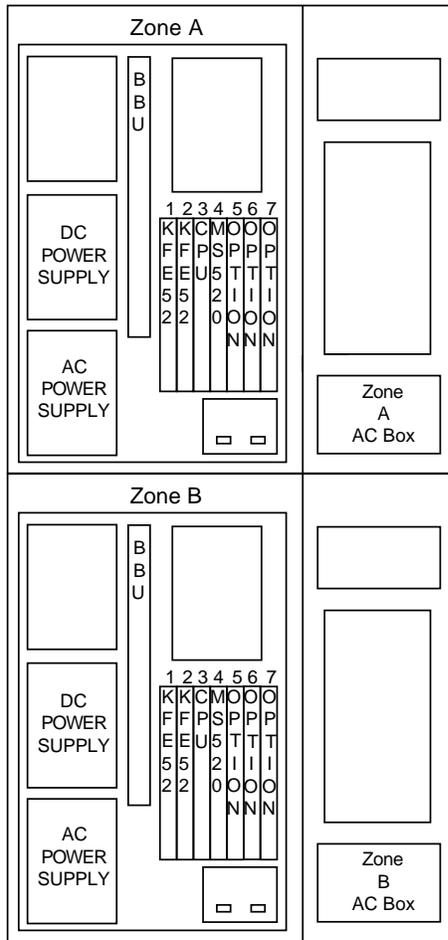
The H7233 dc power supply converts the 48 Vdc unregulated power to
regulated voltages used within the VAXft cabinets. Table 2–1 lists the
dc voltages required by the VAXft components. The H7233-AA dc power
supply is used in the system cabinet. The H7233-AB dc power supply is
used in the expander cabinet. The system dc power supply regulates the
voltages required for the system logic, storage, and cooling elements. The
dc power supply has a magnetic fault indicator (MFI) on the front of the
box. The magnetic fault indicator shows yellow when a fault is detected.
One of the following faults is most likely:

- PCIM logic

- Logic regulator

- Disk regulator

- Cooling fan

Within the dc power supply is a power and cooling intelligence module
(PCIM). It monitors the power system and cooling system inside the
cabinet and communicates with the operating system. When a power or
cooling problem occurs, the operating system is informed, so it can take
appropriate action.

Each of the VAXft cabinets has a battery pack that typically provides
about ½ hour of power to the cabinet during ac power outages. Thus,
during a power outage, the VAXft system can be shut down after
completion of all outstanding transactions and processes. The PCIM
also tracks the operation of the battery and notifies the operating system
when the battery is:

- Active due to ac power outage

- Charging

The dc power supplies used in the VAXft system contain a right and a left
regulator that supply two separate sections of the cabinet. Table 2–1 lists
the dc power available to the internal system cabinet components from
the H7233-AA dc power supply. One regulator supplies the logic power.
The other regulator supplies power to the disk drives and fans. In the
expander cabinets, each of the two regulators in the H7233-AB dc power
supply provides power to the disk drives and fans.

Table 2–1   VAXft System DC Power Characteristics

DC Voltage	Regulation	Maximum Current
Logic power:		
+5 V	+4.95 to +5.25 Vdc	40.0 A
+12 V	+11.64 to +12.36 Vdc	2.0 A
-10 V	-9.5 to -10.5 Vdc	1.5 A
Disk power:		
+12 V	+11.6 to +12.6 Vdc	15.0 A
+5 V	+4.95 to +5.25 Vdc	10.0 A
Fan power:		
+26 V	+24.0 to +28.0 Vdc	3.0 A

2.8   Logic Modules and Connectors

Figure 2–10 shows a typical module complement in a five-slot backplane
(model 110). Figure 2–11 shows a typical module complement in a seven-
slot backplane.

Figure 2–10 and Figure 2–11 also identify:

- Cable connectors on the module handles

- Console terminal connectors on the chassis under the backplane

- Magnetic fault indicators (MFIs)

- LED indicators

CAUTION
**Excessive shock or incorrect handling can damage the logic
modules.**

Figure 2–10   Logic Modules and Connectors in a Five-Slot Backplane
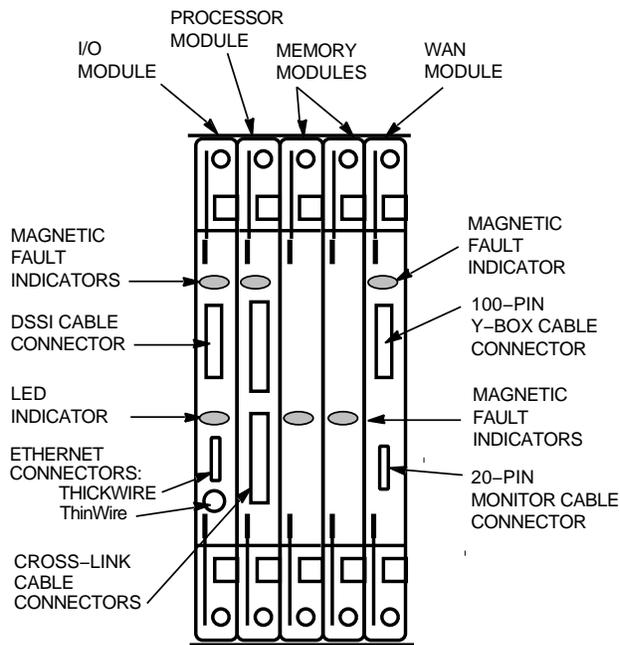
MR–0641–91RAGS

Figure 2–11 Logic Modules and Connectors in a Seven-Slot Backplane

MR−0209−90.RAGS
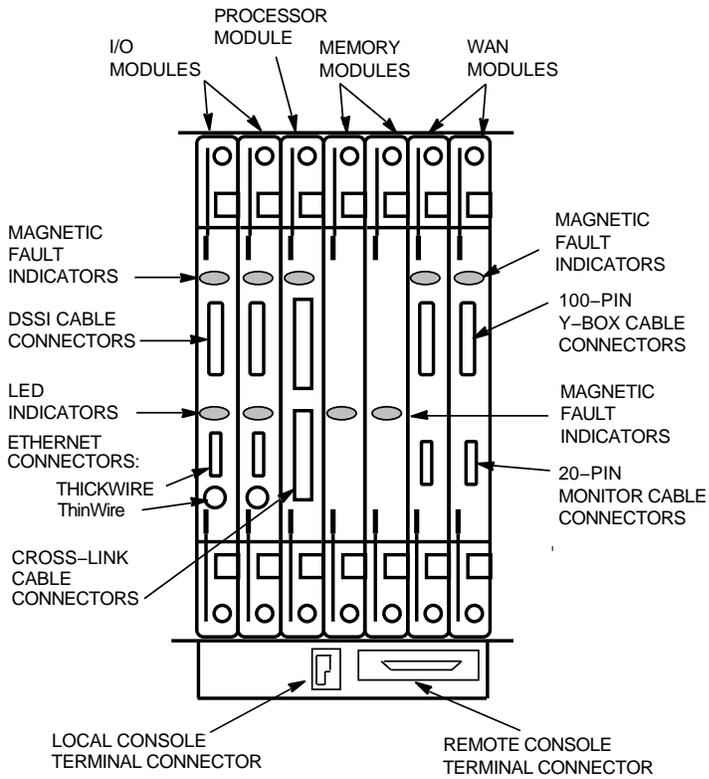
2.9   Cabinet Cooling System

Figure 2–12 shows the airflow pattern for the model 110 cabinet. Figure 2–13 shows the airflow pattern for each of the cabinets in the model 310 and 410 system. Figure 2–14 shows the airflow pattern for each of the cabinets in the model 610 and 612 system.

The cabinets are continuously cooled by two variable-speed dc fans, one in the left side and one in the right side of each cabinet (Figure 2–8). The speed of the fans is based on the ambient temperature of the cabinet as determined by thermal sensors. The thermal sensor output is issued to the PCIMs, which control the speed of the fans.

When the magnetic fault indicator on the cooling fan panel shows yellow, one of the following conditions is likely:

- Cooling fan is stopped.

- Cooling fan is running at less than 20% of the speed of the fan located in the dc power supply.

The fans direct the airflow in the cabinet. The system must rest on a firm surface to maintain cooling airflow.

Figure 2–12   Model 110 Cabinet Airflow Pattern

INTAKE AIRFLOW

EXHAUST AIRFLOW

MR-0640-91DG
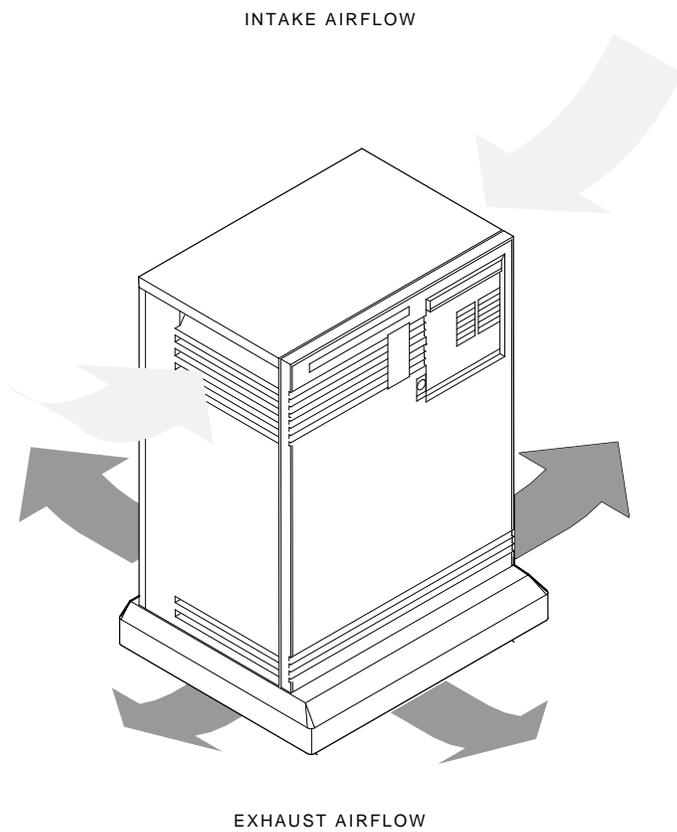
Figure 2–13   Model 310 and 410 Cabinet Airflow Pattern

INTAKE AIRFLOW

EXHAUST AIRFLOW

MR_X1407_89.DG
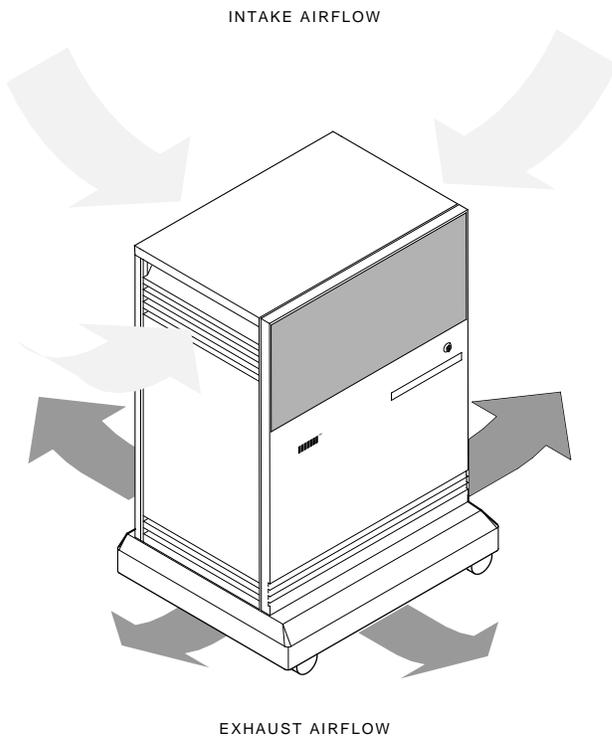
Figure 2–14   Model 610 and 612 Cabinet Airflow Pattern

INTAKE AIRFLOW
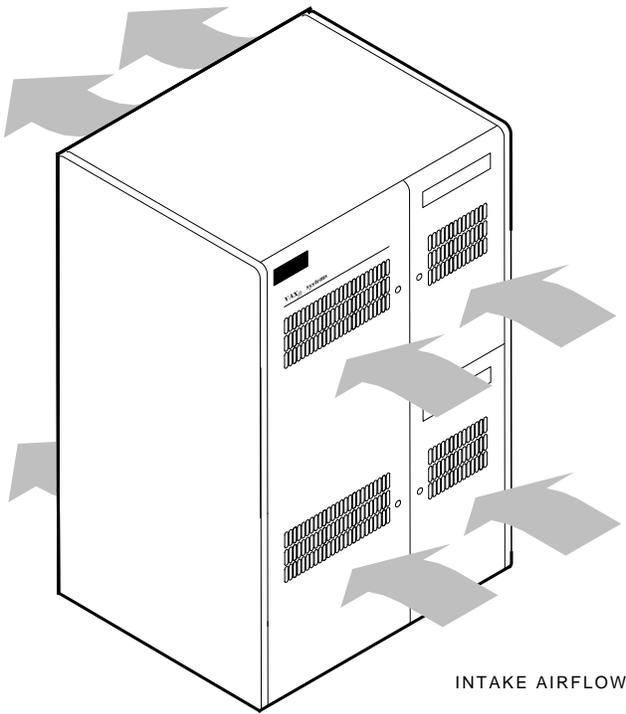
ZKO-050-000079-18-DG

3
Controls and Indicators

This chapter explains the use of the controls and indicators on the cabinet summary panels. This chapter includes:

- Cabinet access

- System cabinet summary panel

- Expander cabinet summary panel

3.1 Cabinet Access

All operating access takes place from the front of the system.

3.1.1 Model 110 System

Figure 3–1 identifies the front door on a model 110 cabinet.

Figure 3–1 also shows the release latch and its function. An antistatic key (supplied with each cabinet) must be used to turn the latch.

Figure 3–1   Model 110 System Cabinet, Front View

CS-8847
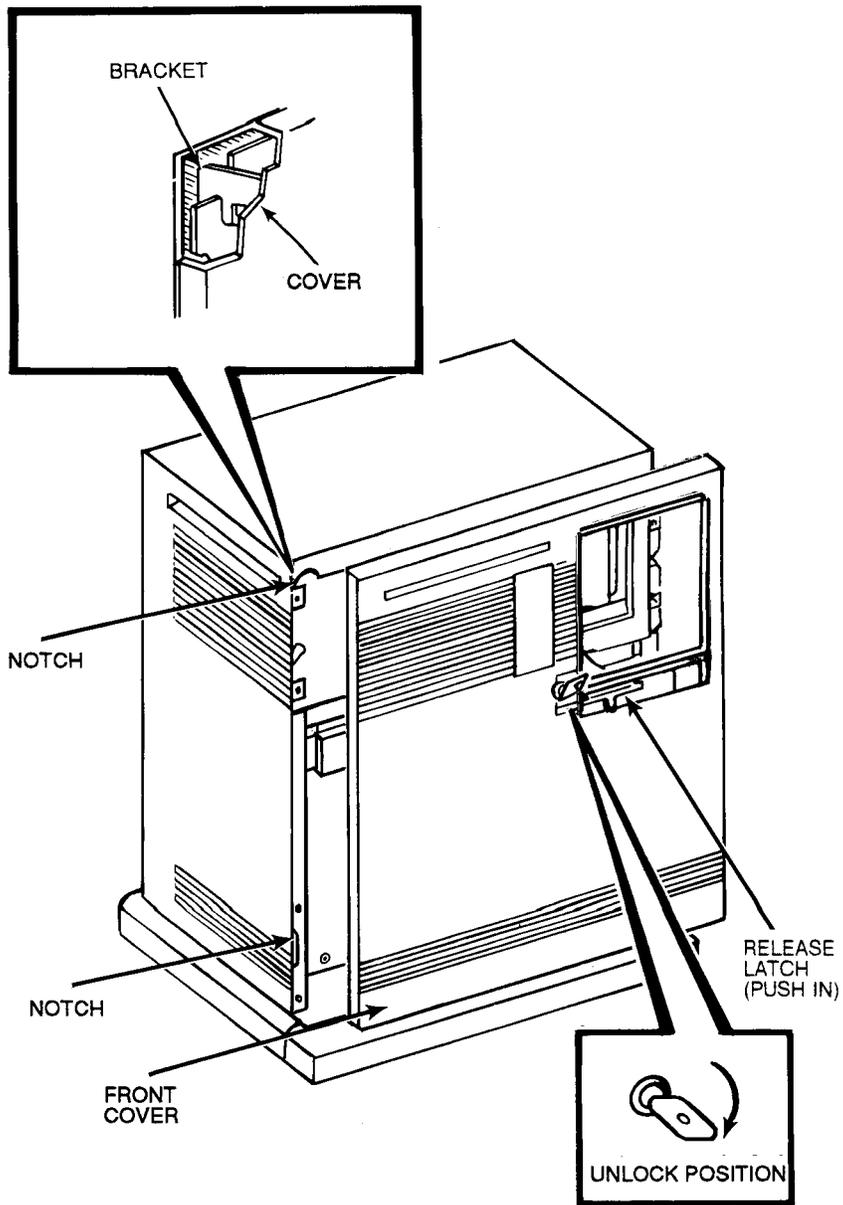
3.1.2 Model 310 and 410 Systems

Figure 3–2 identifies the front doors and base cap on the computer cabinets.

Figure 3–2   Model 310 or 410 System Cabinet, Front View

UPPER
DOOR

OPEN UPPER DOOR

DOORS LOCKED

OPEN BOTH DOORS

VAXft systems

LOWER
DOOR

BASE
CAP

MR_X1414_89.DG
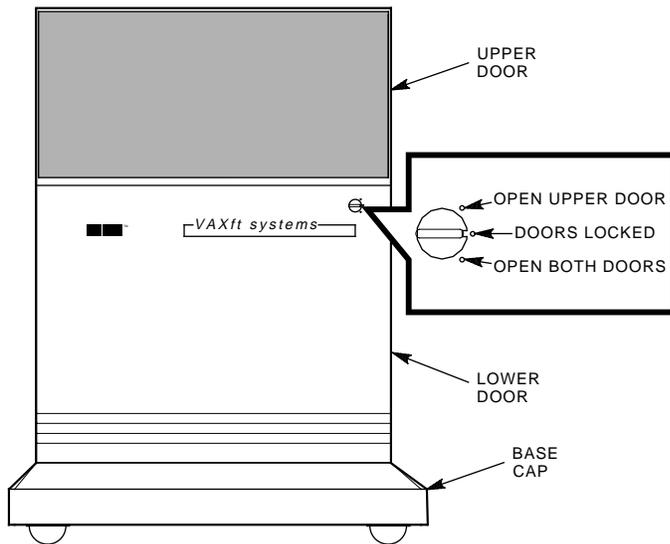
Figure 3–2 also shows the front panel latch and its functions. (The upper door may be opened by itself or both doors may be opened together.) A key (supplied with each cabinet) must be used to turn the latch.

- The upper door provides access to the summary panel and cannister drives.

- The lower door is opened only for maintenance purposes. The lower door provides access to the cables and main circuit breaker in each cabinet, logic modules in the system cabinets, and carrier disk drives in the expander cabinets.

CAUTION
Installation and maintenance procedures may be performed only by qualified personnel. They must be familiar with the electrostatic discharge (ESD) procedures and power procedures for the VAXft system.

- The base cap provides additional access for routing and installing cables.

WARNING
A cabinet may weigh as much as 118 kg (260 lb) and is too heavy to be handled by one person. At least two people are required to move a cabinet.

3.1.3 Model 610 and 612 Systems

Figure 3–3 identifies the front doors on the computer cabinets.

Figure 3–3   Model 610 or 612 System Cabinet, Front View

MR-0423-91DG
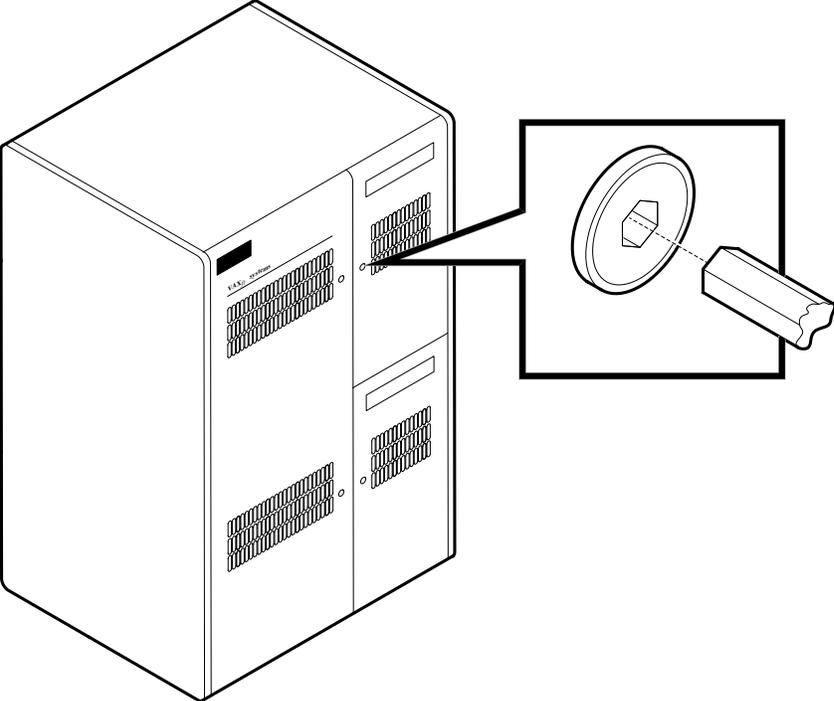
Figure 3–3 also shows the key (supplied with the system) used to turn the latch.

- The upper door provides access to zone A of the system or expander cabinet.

- The lower door provides access to zone B of the system or expander cabinet.

CAUTION
Installation and maintenance procedures may be performed only by qualified personnel. They must be familiar with the electrostatic discharge (ESD) procedures and power procedures for the VAXft system.

WARNING
A cabinet may weigh as much as 433 kg (956 lb) and is too heavy to be handled by one person. At least two people are required to move a cabinet.

3.2   RF-Series Disk Drives

Figure 3–4 shows the layout of the RF-series disk drive summary panel on a model 110 cabinet. Table 3–1 describes the functions of the summary panel elements.

Figure 3–4   RF-Series Disk Drive Summary Panel

CS-8841
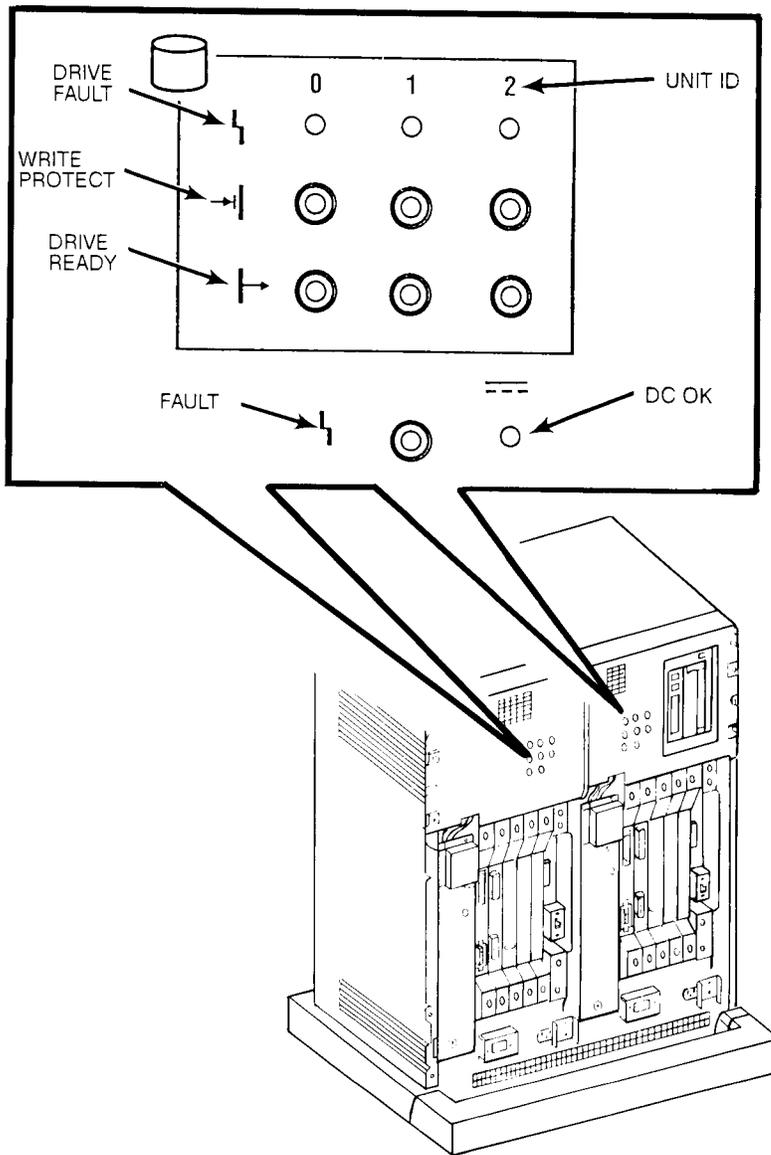
Table 3–1   RF-Series Disk Drive Summary Panel Elements

Element	Setting	Function
Unit ID	Fixed	Each unit ID sets the DSSI address to the number specified (0, 1, 2).
	Removed	DSSI address undefined. If drive is present, drive fault LED is on (lit).
Drive fault (Red) LED	On	Indicates a faulty drive or an undefined DSSI address.
	Off	Drive functioning correctly and DSSI address defined (normal operating position).
Write protect LEDs	Out, LED off	System can read from and write to the disk (normal operating position).
	In, LED on	System cannot write to the disk, but can read from the disk.
Drive ready LEDs	Out, LED on	Disk is on-line (normal operating position). System can read from and write to the disk.
	In, LED off	Disk is off-line. System cannot read from or write to the disk.
Fault (Red) LED	On	Indicates a system fault.
	Off	Normal state. CPU can run system software.
DC OK (Green) LED	On	DC voltage within tolerance.
	Off	DC voltage not present or not within tolerance.

3.3   System Cabinet Summary Panel

Figure 3–5 shows the layout of the summary panel in the system cabinets. Each switch is labeled as left or right to indicate the disk drive it controls. (The switches have no effect on a TF-series tape drive.)

Figure 3–5   System Cabinet Summary Panel

MODEL 310 OR 410

MODEL 610 OR 612

VAX System Indicators

Local Console Disable

OS Running/Battery

Fault

Write Protect

Drive on Left

Drive on Right

Ready/Online

Drive on Left

Drive on Right

SU Server Setup Switch

Fault

Console Communication

Modem

MR−0469−91RAGS
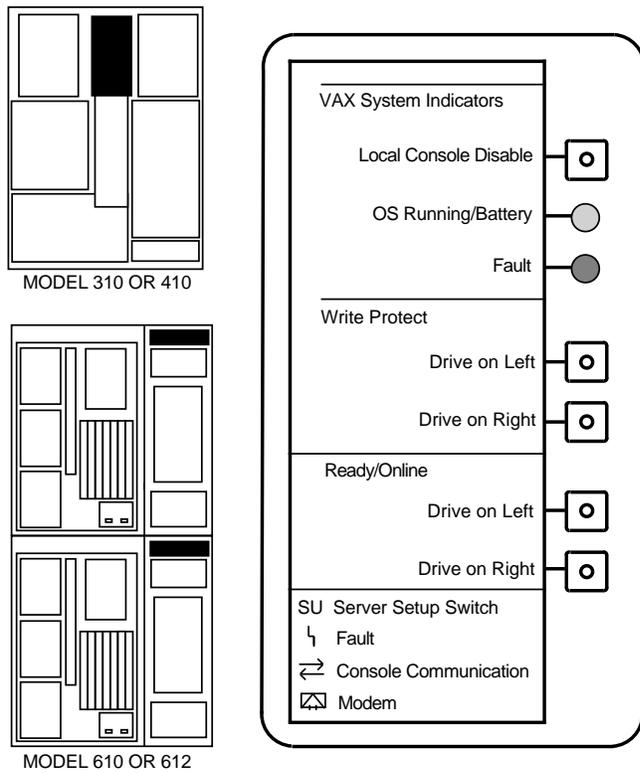
Table 3–2 describes the functions of the system cabinet summary panel elements.

Table 3–2   System Cabinet Summary Panel Elements

Element	Function
Local Console Disable	Two-position switch with amber indicator. Enables or disables the Break key function for the local console terminal. (The switch has no effect on the remote console terminal. Full access privileges for the remote operator are set by the local operator.)
	When the switch is released (OFF, button out), the Break key function is enabled and the indicator is dark (unlit). The local operator may leave program I/O (PIO) mode and enter console I/O (CIO) mode by pressing the Break key. The console returns the >>> prompt.
	When the switch is pressed in (ON), the Break key function is disabled and the indicator is amber (lit). If the Break key is pressed, the Break character is passed to the operating software.
OS Running/Battery	Green indicator. When the indicator is green (lit), the operating software is running. When the indicator is dark (unlit), the operating software is not running (the processor may be running the console firmware). When the indicator is blinking, the system cabinet is running on battery power.
Fault	Red indicator. The normal state of the indicator is dark (unlit). When the indicator is blinking quickly, a logic problem is present. When the indicator is blinking slowly, a power system problem is present.
	The MFI of the faulty device may also indicate the fault. The normal state of an MFI is dark (reset).

Table 3–2   (Continued)   System Cabinet Summary Panel Elements

Element	Function
Write Protect[1]	Two-position switches with amber indicators. The switches enable or disable the associated drives for writes by the software. When pressed in, a switch disables writes to the drive and the indicator is amber (lit). When released (button out), a switch enables writes to the drive and the indicator is dark (unlit).
Ready/On Line[1]	Two-position switches with green indicators. The switches enable or disable the associated drives for acceptance of commands from software. When the switch is released (button out), the drive is enabled. When it is pressed in, the drive is disabled. When the indicator is green (lit), the associated drive is up to speed. When it is dark (unlit), the drive is not up to speed or does not have power applied.

[1]The Write Protect and On Line switches control the RF-series disk drives and have no effect on a TF-series tape drive. TF-series protection is set by a write-protect switch on the TK tape cartridge.

3.4 Expander Cabinet Summary Panel

Figure 3–6 shows the layout of the summary panel in the expander cabinets. The upper and lower switches are labeled from left to right as X through 5 to indicate the disk drives they control. (The switches have no effect on a TF-series tape drive.)

Figure 3–6   Expander Cabinet Summary Panel
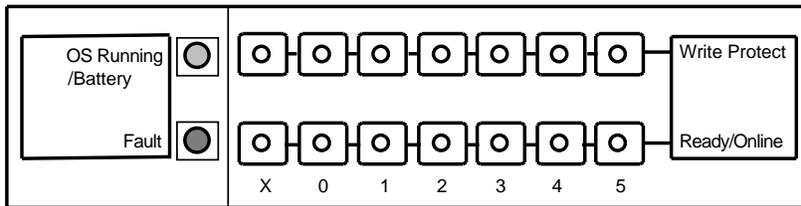
NOTE: THE SWITCHES AND INDICATORS
        CONTROL THE FOLLOWING DRIVES.

MODEL 310 OR 410

MODEL 610 OR 612

MR–0470–91RAGS
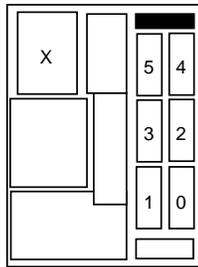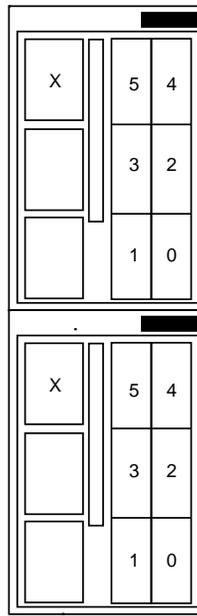
Table 3–3 describes the functions of the expander cabinet summary panel elements.

Table 3–3   Expander Cabinet Summary Panel Elements

Element	Function
OS Running/Battery	Green indicator. When the indicator is green (lit), the cabinet is running on ac power. When the indicator is blinking, the system cabinet is running on battery power.
Fault	Red indicator. The normal state of the indicator is dark (unlit). When the indicator is blinking, a fault is present.
	The MFI of the faulty device may also indicate the fault. The normal state of an MFI is dark (reset).
Write Protect[1]	Two-position switches with amber indicators. The switches enable or disable the associated drives for writes by the software. When pressed in, a switch disables writes to the drive and the indicator is amber (lit). When released (button out), a switch enables writes to the drive and the indicator is dark (unlit).
Ready/On Line[1]	Two-position switches with green indicators. The switches enable or disable the associated drives for acceptance of commands from software. When the switch is released (button out), the drive is enabled. When it is pressed in, the drive is disabled. When the indicator is green (lit), the associated drive is up to speed. When it is dark (unlit), the drive is not up to speed or does not have power applied.

[1]The Write Protect and On Line switches control the RF-series disk drives and have no effect on a TF-series tape drive. TF-series protection is set by a write-protect switch on the TK tape cartridge.

4
Console Operations

This chapter describes the VAXft console and the console operating modes. It also provides information on booting the system. This chapter includes:

- Console description

- Console operating modes

- Console control characters

- Console command language syntax

- Bootstrap procedures

- BOOT command syntax

- Boot devices and module expansion

NOTE
The focus of this chapter is model 310, 410, 610, and 612 systems. If you own a model 110 system, keep in mind the following:

- **An expanded system is always a model 310, 410, 610, or 612 system.**

- **A dual cabinet system is always a model 310, 410, 610, or 612 system. In a model 110 system, the two zones are housed in a single cabinet.**

- **The Local Console Disable switch is present on model 310, 410, 610, and 612 systems. In a model 110 system, the consoles are always enabled.**

4.1 Console Description

The VAXft system supports a local console terminal in each zone as shown in Figure 4–1. Console firmware (console programs located in ROM) resides on the primary system I/O controller module and on the processor module in each system cabinet.

Figure 4–1   VAXft Console Architecture

MR–0212–90.RAGS
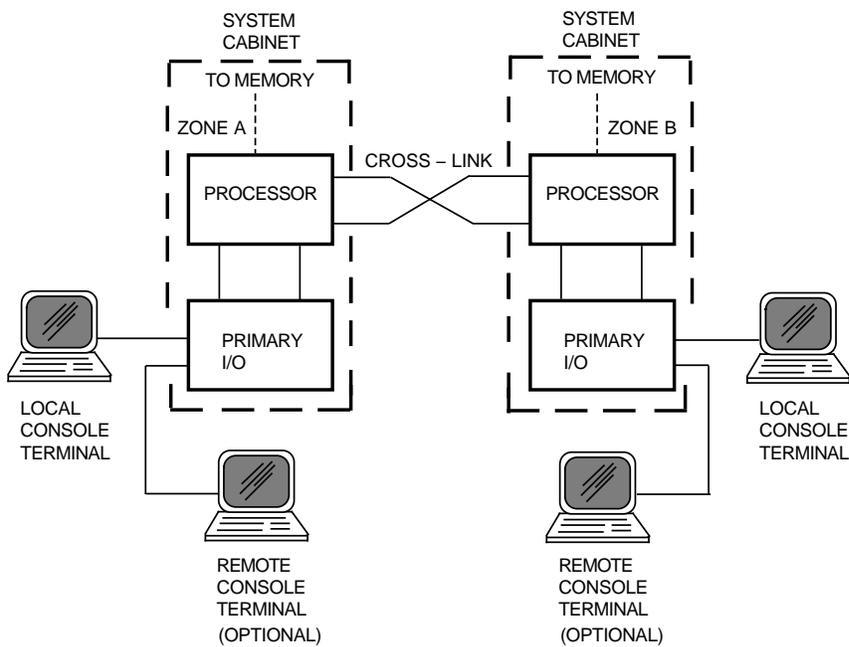
An optional remote console terminal may be connected to each zone. The remote console terminal and the local console terminal are connected to the zone through the primary system I/O controller module. The primary system I/O controller module is located in slot 2 of the module card cage in model 310, 410, 610, and 612 systems. The primary system I/O controller module is located in slot 1 in each zone of the model 110 system.

Table 4–1 describes the function of each component of the VAXft console.

Table 4–1   VAXft Console Parts

Part	Function
Local console terminal	Terminal located with the system that is used for console input and display output.
Remote console port	One remote port is available in each zone. The port may be connected to a remote console terminal through a modem. The remote console port provides the same functions as the local console port.
	If connected through a modem, the remote port may serve as a dial-in port for the user or as a dial-out port for the autonotification process.
Console firmware	The VAXft console firmware resides on the primary system I/O controller module and on the processor module.

It is best to use only one of the four possible console terminals for input commands at any given time. All of the console terminals echo the response of the system to a console command.

When the VAXft system is operating with only a single zone, the local or remote console terminals connected to the operational zone are used as the input devices.

4.2 Console Operating Modes

Console operators communicate with the system in one of the three input/output (I/O) operating modes shown in Figure 4–2.

Figure 4–2 Console Operating Modes

```
   ┌──────────┐
   │ PIO MODE │ ◄─────┐        –PROGRAM I/O (PIO) MODE
   └──────────┘       │
      │    ▲          │
 BREAK │    │ PIO      │
 KEY   │    │ COMMAND  │
      ▼    │          │
   ┌──────────┐       │
   │ CIO MODE │       │        –CONSOLE I/O (CIO) MODE
   └──────────┘       │
      │    ▲       PIO │
 MIO   │    │ CIO  COMMAND
COMMAND│    │ COMMAND  │
      ▼    │          │
   ┌──────────┐       │
   │ MIO MODE │───────┘        –MODULE I/O (MIO) MODE
   └──────────┘
```

MR–0214–90.PSART
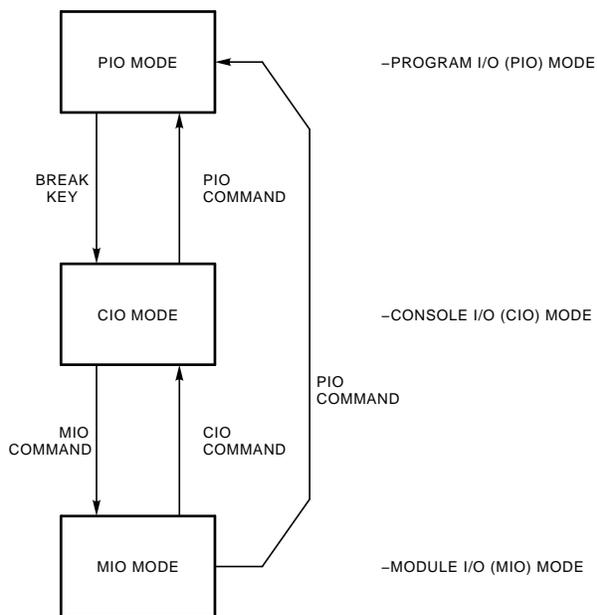
The three console operating modes are:

• Program I/O mode (PIO mode)

• Console I/O mode (CIO mode)

• Module I/O mode (MIO mode)

Normal operation takes place in the PIO mode. The CIO and MIO modes are used by system managers to control the system and to set the operating parameters.

PIO mode allows the operator to use the console terminal. Specifically, in PIO mode the operator can use the VAXft console terminal to log in, use the mail facility, create and edit files, and do other types of work typically done from a user terminal.

PIO mode can be entered from either of the two other console operating modes. To transition the console into PIO mode, use one of these console commands: SET TERMINAL PROGRAM or PIO.

CIO mode allows the operator to execute the VAXft console commands. These commands are a subset of the VAX–11 console command language and include the VAXft specific commands. The CIO commands are described in Chapter 5 of this manual.

To transition from PIO mode to CIO mode, be sure the Local Console Disable switch on the summary panel is released (button out). Then press the Break key on the console terminal once. Be sure you press the Break key once **only**. By pressing the key more than once, you will enable baud-rate cycling (Section 5.11.2, SET PORT).

MIO mode is used to set or change console parameters involving the primary system I/O controller module. The only way to enter MIO mode is by using the MIO command from CIO mode. While in MIO mode, the VAXft operating system may be running or halted. A complete listing of the MIO commands is provided in Chapter 6 of this manual. The CIO or PIO mode can then be entered from MIO mode using the CIO or PIO command.

4.3 Console Control Characters

The ASCII control characters and function keys listed in Table 4–2 have
special meanings when typed on a console terminal running in CIO or
MIO mode.

Table 4–2   Console Control Characters and Function Keys

Character/Key	Function
Break	Causes the console to exit PIO mode and enter CIO mode. First, be sure the Local Console Disable switch on the summary panel is released (button out). Then press the Break key on the console terminal.
Ctrl/C	Echoes ^C and causes the console to abort processing of a command.
Ctrl/O	Alternately enables and disables console output to the terminal.
Ctrl/R	Echoes ^R and retypes the command line.
Ctrl/S	Stops console transmission to the terminal until Ctrl/Q is typed.
Ctrl/Q	Resumes console output previously suspended by Ctrl/S.
Ctrl/U	Echoes ^U and erases the command line.
Esc or Ctrl/[	Disables the meaning of the next character you type. This function is keyboard dependent. Refer to your terminal owner's manual.
Ctrl/P	Exits the z mode and returns to the CIO mode.
Return	Terminates a command line and executes the command.
<x (delete)	Deletes the character to the left of the cursor. On a hard-copy terminal, use the rubout key. Refer to your terminal owner's manual.
Break Break	Enables autobaud.

In PIO mode, the [Break] key causes the console to exit PIO mode and enter CIO mode (if the Local Console Disable switch is not enabled). In CIO or MIO mode, [Break] is the equivalent of [Ctrl/C] and is echoed as ^C. If issued from a remote console terminal without full privileges, the break character is passed to the operating software like any other character. (For a remote operator to use CIO mode, full privileges must be set by the local operator.)

[Ctrl/C] echoes ^C and aborts the processing of a command in progress. To ensure the abort, you may need to press [Ctrl/C] twice.

[Ctrl/O] alternately enables and disables console output to the terminal. When the output is disabled, the console echoes ^O and ignores further software transmissions. Console output may also be reenabled using the [Break] key or [Ctrl/C].

[Ctrl/R] echoes ^R and retypes the command line. This feature is useful when editing a command line on a hard-copy terminal.

[Ctrl/S] stops console transmission to the terminal. [Ctrl/Q] resumes a console transmission previously stopped by [Ctrl/S].

[Ctrl/U] echoes ^U and erases all characters previously typed on the command line.

The [Esc] (Escape) key or a [Ctrl/[] (control/left bracket) disables the meaning of the next character typed, allowing a control character or special character to be included in the command line. Refer to your terminal owner's manual.

[Ctrl/P] changes the console from the z mode to the CIO mode.

The [Return] key terminates a command line. Pressing [Return] enters the command line and invokes the command function. By typing [Ctrl/U] or [Ctrl/C] before you press [Return], you cancel the command and erase the command line.

The [<x] (delete) key deletes the last character typed. On a hard-copy terminal, the rubout key functions the same way. Refer to your terminal owner's manual.

4.4 Console Command Language Syntax

The console commands accept qualifiers. A qualifier is used to specify a numerical value or to select an option from a list of options. Command elements may be abbreviated and any extra tabs or spaces are ignored. Unless otherwise noted, numerical values must be given in hexadecimal (hex) notation. The command length may not exceed 80 characters.

Table 4–3 lists the console command language syntax rules. The console commands available for the VAXft system are listed in Chapter 5 and Chapter 6. The console command language syntax rules are valid for the commands listed in those chapters.

Table 4–3   Console Command Language Syntax

Command Element	Rule
Abbreviations	A command verb or argument may be abbreviated to the extent that it remains unique.
Multiple adjacent spaces and tabs	Are treated as a single space.
Qualifiers	May appear after a command verb, option, or symbol. They must be preceded by a slash (/).
Numbers	Must be hexadecimal (hex).
No characters	Are treated as a null command. No action is taken.

Commands, qualifiers, and options may be shortened. However a minimum number of characters (enough to uniquely identify the command keyword) must be entered. At the beginning of Chapters 5 and 6 of this manual, console abbreviations are shown in bold capital letters.

Qualifiers may be used after the command keyword or after any symbol or number in the command. Each qualifier must be preceded by a slash (/). Spaces are allowed before a slash, but no spaces are allowed between a slash and the qualifier.

Comments are allowed on a command line. Comments, or characters following an exclamation point (!), are ignored by the console when the Return key is pressed. This feature is useful when you document a console session on a hard-copy terminal.

Uppercase or lowercase characters may be used for the command input.

A command line with no characters is a null command. If you press the Return key, the console takes no action.

4.5 Bootstrap Procedures

The BOOT command initializes the system and then loads and starts the
virtual memory bootstrap (VMB) program from read-only memory (ROM).
The VMB program, in turn, loads and starts the operating system from
the specified boot device. Figure 4–3 and Table 4–4 show the steps in the
boot procedure.

Figure 4–3   Boot Procedure

```
┌─────────────────────┐
│ ENTER BOOT COMMAND  │
│ AT THE >>>          │
│ CONSOLE PROMPT      │
└─────────┬───────────┘
          │
          ▼
┌─────────────────────┐
│  BOOT PROCEDURE     │
│  INITIALIZES        │
│  THE SYSTEM         │
└─────────┬───────────┘
          │
          ▼
┌─────────────────────┐
│ BOOT PROCEDURE      │
│ LOADS VMB INTO      │
│ MAIN MEMORY         │
└─────────┬───────────┘
          │
          ▼
┌─────────────────────┐
│ VMB LOADS THE       │
│ OPERATING SYSTEM    │
└─────────────────────┘
```

MR–0213–90 .RAGS
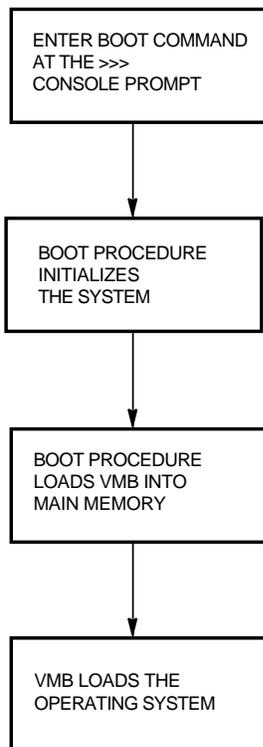
Table 4–4   Boot Procedure

Step	Procedure
1	The operator enters the BOOT command at the console terminal, which is in CIO mode. The operator may use device specifiers with the BOOT command to select one or more boot devices of the same type.
2	The system enters a reset procedure that initializes all system components.
3	The BOOT command loads and starts the VMB program from the specified boot source.
4	VMB loads and starts the operating system.

Boot Devices

The VAXft system may be booted from the following types of boot devices:

- TF-series tape drives
- RF-series disk drives
- Boot sources available over an Ethernet

CAUTION

You cannot boot the system from the remote console. The KFE52 I/O module is reset when the system boots, and this reset disconnects the modem.

VMB

The VMB program is the primary bootstrap program. It is stored in ROM in the VAXft system.

4.6 BOOT Command Syntax

The operating system may be booted using the syntax shown in
Figure 4–4.

Figure 4–4 BOOT Command Syntax

```
                          >>> BOOT  /R5:n ddan or name

    CONSOLE COMMAND THAT
 INVOKES BOOT PROCEDURE

    REGISTER 5 = HEX NUMBER OF
        OPTIONAL VMB PARAMETERS

        SELECTS BOOT DEVICE TYPE

        SELECTS BOOT I/O MODULE

          SELECTS DECIMAL UNIT
        NUMBER OF BOOT DEVICE

              SELECTS NAME OF
          STORED BOOT COMMAND

                        MR-0390-90.PSART
```

Additionally, the operating system may be booted using one of the
following syntax variations.

Variations

```
1. >>> BOOT ddan      ! Boots directly from one device.

2. >>> BOOT ddan, ddan, ddan, ddan

                      ! Boots from up to four paths to
                      ! the same type of device.

3. >>> BOOT name      ! Boots from one of ten stored boot
                      ! commands with symbolic names. (See
                      ! Section 5.11.1, SET BOOT.)

4. >>> BOOT           ! Boots from the default boot specifier.
                      ! (See Section 5.11.1, SET BOOT.)
```

NOTE
**The BOOT name command can be used only after the operator
has established a boot name using the SET BOOT name command.**

4.7   Boot Devices and Module Expansion

For a complete description of the commands to determine the configuration of the disks in the system, see Section 6.8, RBD.

The device specifier shown in Figure 4–4 takes the form *ddan* where:

* *dd* specifies the device type

  MI is a TF-series tape drive
  DI is an RF-series disk drive
  EP is an Ethernet port

* *a* specifies the zone and slot of the primary or secondary system I/O controller module. Figure 4–5 shows this for the model 110 system. Figure 4–6 shows this for the model 310, 410, 610, and 612 systems. Figure 4–6 also lists the correct module expansion sequence.

* *n* specifies the decimal unit number of the boot device. If FORCEUNI is set to 1 on a particular system drive, *n* specifies the DSSI node ID number selected by the backplane.

If the FORCEUNI parameter is set to 0 in all system drives, the device specifier *ddan* must specify the device unit number stored in the drive. The RBD command description in Chapter 6 provides information on setting the drive parameters.

You may specify as many as four paths to one or more of the same type of device (see variation 2). The boot procedure then tries one or more of the specified boot paths. Remember, the specifiers must be separated by commas.

Chapter 5 provides more information on the BOOT command. Section 5.2 provides the BOOT command parameters and VMB program flags. Section 5.11.1 explains how to store up to ten boot commands with symbolic names.

Figure 4–5   Primary System I/O Controller Module Zone/Slot Specifiers for Model 110 System

MODULE SLOTS IN SYSTEM BACKPLANE

	1	2	3	4	5	
	I/O	CPU	MEM			
I/O RBD PROMPT	1	–	–	5	4	BOTH ZONES
ZONE A	A	–	–	E	D	ZONE SLOT IDENTIFIERS FOR
ZONE B	F	–	–	J	I	BOOT PROCEDURE
ZONE A SLOT ID	–	–	–	5	4	USED WITH
ZONE B SLOT ID	–	–	–	A	9	Z COMMAND
MEMORY	–	–	1	2	3	
I/O	1	–	–	–	–	MODULE EXPANSION SEQUENCE
WAN	–	–	–	4	2	

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Figure 4–6   Primary System I/O Controller Module Zone/Slot Specifiers and Module Expansion Sequence for Model 310, 410, 610, and 612 Systems

MODULE SLOTS IN SYSTEM BACKPLANE

	1	2	3	4	5	6	7	
		I/O	CPU	MEM				
I/O RBD PROMPT	2	1	–	–	5	4	3	BOTH ZONES
ZONE A	B	A	–	–	E	D	C	ZONE SLOT IDENTIFIERS FOR BOOT PROCEDURE
ZONE B	G	F	–	–	J	I	H	
ZONE A SLOT ID	2	–	–	–	5	4	3	USED WITH Z COMMAND
ZONE B SLOT ID	7	–	–	–	A	9	8	
MEMORY	–	–	–	1	2	3	4	MODULE EXPANSION SEQUENCE
I/O	2	1	–	–	–	–	–	
WAN	1	–	–	–	4	2	2	

MR–0468–91RAGS

5
CIO Mode Console Commands

This chapter describes the console commands available when the console is in the console I/O (CIO) mode.

To recognize and process most CIO commands, the operating software must be halted and the processor must be running the console firmware. Certain CIO commands may be executed when the operating software is not halted. These commands are: MIO, PIO, SET PORT, SET TERMINAL, and SHOW PORT. This chapter includes:

- Entering CIO mode

- CIO mode console commands:

Boot	**P**io	**SH**ow **CO**nfiguration
Continue	**R**epeat	**SH**ow **CP**u
Deposit	**SE**t **B**oot	**SH**ow **E**thernet
Examine	**SE**t **P**ort	**SH**ow **P**ort
Halt	**SE**t **T**erminal **P**rogram	**S**tart
Initialize	**SE**t **Z**one	**T**est
Mio	**SH**ow **B**oot	**Z**
NEW CPU		

NOTE
The shortest possible command abbreviations are shown in bold capital letters.

NOTE
The focus of this chapter is model 310, 410, 610, and 612 systems.
If you own a model 110 system, keep in mind the following:

- **An expanded system is always a model 310, 410, 610, or 612**
  system.

- **A dual cabinet system is always a model 310, 410, 610, or 612**
  system. In a model 110 system, the two zones are housed in a
  single cabinet.

- **The Local Console Disable switch is present on model 310, 410,**
  610, and 612 systems. In a model 110 system, the consoles are
  always enabled.

5.1 Entering CIO Mode

Using the example as a guide, follow the numbered steps to enter CIO
mode. A remote operator can use CIO mode only when full access
privileges for the remote console have been set at the local console.

Example

```
$                      ! From PIO mode, release the Local Console
$    Break             ! Disable switch (button out). Press the
>>> HALT               ! Break  key. Halt the processor. Be sure
?002 External halt     ! you press the  Break  key once only.
PC = 01E01473          !
>>>                    ! Begin your console session in CIO mode.
                                          .
                                          .
                                          .
>>> CONTINUE           ! After completing your console session,
>>> PIO                ! you may continue, start, or boot the
$                      ! system. If you continue, entering the
                       ! PIO command returns you to PIO mode and
                       ! issues the DCL $ prompt.
```

Comments are allowed on a command line. Comments, or characters
following an exclamation point (!), are ignored by the console when the
Return key is pressed. This feature is useful when you document a console
session on a hard-copy terminal. The terminal mode change commands
are listed in Table 5–6.

To enter and use CIO mode:

1. Your console terminal is connected to a system cabinet. While still in PIO mode, check the summary panel on that system cabinet. Make sure the Local Console Disable switch on the summary panel is released (button out, LED not lit).

2. Press the Break key to leave PIO mode. When the console enters CIO mode it returns the >>> prompt.

3. Enter the HALT command before using the CIO mode commands. If you do not halt the processor, the console returns an error message.

4. To return to PIO mode, enter one of these commands: SET TERMINAL PROGRAM or PIO.

Chapter 4 provides more information on use of the various console operating modes.

Some commands controlling the terminal ports on the primary system I/O controller module (SET PORT and SET TERMINAL PROGRAM) are recognized in CIO and MIO modes. MIO commands may be used with the processor running or halted and are described in Chapter 6.

5.2 BOOT

The BOOT command initializes the system and then loads and starts the
virtual memory bootstrap (VMB) program from ROM. The VMB program,
in turn, loads and starts the VMS operating system.

CAUTION

**You cannot boot the system from the remote console. The
KFE52 I/O module is reset when the system boots, and this reset
disconnects the modem.**

Examples

```
1.  >>> BOOT MIA5       ! Zone A boots from TF70 tape drive
                        ! unit 5 through the primary system
                        ! I/O controller module.

2.  >>> BOOT DIA0       ! Zone B boots from RF-series disk drive
                        ! unit 0 through the primary system
                        ! I/O controller module.

3.  >>> BOOT TAPE       ! Boots from the stored boot command
                        ! called TAPE that was created by the
                        ! SET BOOT command.

4.  >>> BOOT            ! Boots from the stored boot command
                        ! called DEFAULT that was created by
                        ! the SET BOOT command.

5.  >>> BOOT DIA0, DIG0, DIB6, DIF6

                        ! Boots from the first RF-series disk
                        ! drive found in zone A or B.

6.  >>> BOOT EPA0, EPF0

                        ! Boots from the first responding
                        ! Ethernet device requested by
                        ! zone A or zone B.
```

The BOOT command syntax is:

```
    B[OOT] [/qualifier] [device list] [/qualifier]
```

or

```
    B[OOT] [name]
```

Specification of the boot device is optional. The boot device is used to identify the path(s) to the boot device(s). Specify as many as four paths to one or more of the same type of device. Commas are used to separate these device specifiers.

The boot device takes the form *ddan* where:

dd specifies the device type, which could be one of the following:

> MI is a TF-series tape drive
> DI is an RF-series disk drive
> EP is an Ethernet port

The usage of *a* and *n* depends on the system DSSI configuration and storage device settings. Sections 4.6 and 4.7 explain the boot device specifier usage when the FORCEUNI value is 1 in all storage devices. Section 6.8 explains the boot device specifier usage when the FORCEUNI value is 0 in all storage devices.

The qualifier field is optional and may be used before or after the boot device(s). Table 5–1 describes the /R5:n qualifier and Table 5–2 lists the VMB program control flag values for n.

The switch R5 is used to pass boot parameters to the VMB program. If the BOOT command is used without arguments, the stored boot command is used. Section 5.11.1 explains how to name and store boot commands with preset values.

The name specifier is used by itself to invoke a stored boot command. **It must be a 1- to 4-character symbolic name.**

Table 5–1   BOOT Command Qualifier

Qualifier	Function
/R5:n	Register 5 parameter, where n is the hex value of a binary bit mask that selects one of the VMB program bootstrap options listed in Table 5–2. If /R5:n is omitted, the default value is 0.

Table 5–2   VMB Program Control Flags for /R5:n

Bit Position	Hex Value (n)	Flag Name/Function When Bit is Set
<0>	1	Conversational Boot — Returns the SYSBOOT> prompt. From this prompt, the console operator may enter SYSGEN parameters.
<1>	2	Debug — The operating system maps the XDELTA debugger into its system page tables.
<2>	4	Initial Breakpoint — The operating system executes a breakpoint (BPT) instruction after turning on memory management.
<5>	20	Bootstrap Breakpoint — The VMB and secondary bootstrap programs execute BPT instructions to transfer control to the XDELTA program.
<8>	100	Solicit File Name — The VMB bootstrap program prompts the console terminal for the secondary bootstrap procedure.
<31:28>	(0-F)000000	Specify the top-level directory number for a system disk with multiple system roots.

5.3 CONTINUE

The CONTINUE command resumes execution from the point where the
system halted.

Example

```
>>> CONTINUE          ! Resumes execution of the system.
```

The CONTINUE command syntax is:

```
C[ONTINUE]
```

When the CONTINUE command is issued, the console reloads the context
saved by the HALT process (PC, PSL, GPRs, and memory management).
The processor resumes program execution at the address held by the PC.
The console terminal remains in CIO mode.

5.4   DEPOSIT and EXAMINE

The DEPOSIT command stores the specified data in the specified address.

The EXAMINE command displays the data stored in the specified address.

Examples

```
1.  >>> D /L /P 27 0    ! Deposits a longword value of 0 in
    CTB0: D /L /P 27 0  ! physical address 27.

2.  >>> E /L /P 27      ! Displays the longword value stored
    CTB0: E /L /P 27    ! in physical address 27.
    P 00000027 00000000
```

The DEPOSIT command syntax is:

```
    D[EPOSIT] [/qualifier] address data [/qualifier]
```

The EXAMINE command syntax is:

```
    E[XAMINE] [/qualifier] address [/qualifier]
```

A qualifier may be placed before or after the address and data specifier. Tables 5–3 and 5–4 describe qualifiers used with the DEPOSIT and EXAMINE commands.

The address specifier identifies either the physical or virtual hex memory address for a DEPOSIT or EXAMINE.

The data specifier identifies the hex data to be stored by a DEPOSIT.

When the system is initialized, or when any transition from a running to a halted state occurs, the default physical address space (0) and data size (longword) are used.

Table 5–3   DEPOSIT and EXAMINE Command Data Size Qualifiers

Qualifier	Function
/B	Sets the data size to byte.
/W	Sets the data size to word.
/L	Sets the data size to longword.

Table 5–4   DEPOSIT and EXAMINE Command Address Space Qualifiers

Qualifier	Function
/P	Sets physical address space.
/V	Sets virtual address space. An EXAMINE to virtual memory returns the translated physical address. A DEPOSIT to virtual memory sets the PTE <M> bit.
/I	Sets internal processor register (IPR) address space accessed by the MTPR and MFPR instructions.
/G	Sets general register address space R0 through PC.
/N:*count*	Sets the range of addresses to be accessed. The console begins at the specified address and then accesses the number of ascending addresses specified by *count*, even if the symbolic address - (minus) is used. The console continually accesses the range of addresses until Ctrl/C is typed. (See the REPEAT command description.)

The address specifier may be a 1- to 8-character hex address or may specify one of the following symbolic addresses:

- PSL — processor status longword. The address space qualifier is not allowed when PSL is used as the symbolic address.

- PC — program counter.

- SP — stack pointer.

- FP — frame pointer.

- AP — argument pointer.

- R*n* — general register number *n* in decimal notation. Valid only for R0 through R11 with the KA510 abd KA520 processor modules. Valid for R0 through R15 with the KA550 processor module.

- + (plus) — location following the last location accessed by an EXAMINE or DEPOSIT. For references to physical or virtual memory address space, the accessed location is the last address *plus* the size of the last reference. For all the other addresses, the location is the last address plus 1.

- - (minus) — location preceding the last location accessed by an EXAMINE or DEPOSIT. For references to physical or virtual memory address space, the accessed location is the last address *minus* the size of the last reference. For all the other addresses, the location is the last address minus 1.

- * (asterisk) — last location referenced by an EXAMINE or DEPOSIT.

5.5 HALT

The HALT command suspends execution and causes the processor module to invoke the processor console firmware.

Example

```
>>> HALT                ! Halts the system.
```

The HALT command syntax is:

```
    H[ALT]
```

The HALT command sends a request to the processor to halt program execution. The HALT process stops execution, invokes the console firmware, and saves the current processor context (PC, PSL, GPRs, and memory management).

CAUTION

System operation may be jeopardized when you use this command.

5.6 INITIALIZE

The INITIALIZE command initializes the system to its power-on state.

Example

```
>>> INIT                ! Initializes the system.
```

The INITIALIZE command syntax is:

```
    I[NITIALIZE]
```

The INITIALIZE command sets selected system registers to power-on states by performing a hard reset to the processor module and the primary system I/O controller module.

The zone executing the INITIALIZE command is forced into a simplex console mode. Rhe console must be in a simplex mode before executing most diagnostic commands.

5.7 MIO

The MIO command changes the console mode from CIO to MIO.

Example

```
>>> MIO                ! Changes the console to MIO mode
MIO>                   ! and issues the MIO> prompt.
```

The MIO command syntax is:

```
    M[IO]
```

The MIO command changes the console mode from CIO to MIO to allow
use of MIO mode console commands (Chapter 6). You do not need to
halt the operating software to use the MIO mode commands, but some
commands are used for maintenance only. **Maintenance commands
should be executed only from a halted system**. For a remote operator
to use MIO mode, full access privileges must be set by the local operator.

For more information on terminal mode change commands, see Table 5–6.

5.8 NEW CPU

The NEW CPU command updates a new processor module with system
information from the processor module located in the partner zone.

Example

```
>>> NEW CPU            ! The new processor module copies
                       ! EEPROM data from the other zone.

>>> I[NITIALIZE]       ! Initializes the system.
```

The NEW CPU command syntax is:

```
    NEW CPU
```

CAUTION

**The NEW CPU command is executed only by qualified
maintenance personnel.**

5.9 PIO

The PIO command changes the console mode from CIO to PIO.

Example

```
>>> PIO                ! Changes the console to PIO mode.
```

The PIO command syntax is:

```
    P[IO]
```

The PIO command has the same function as the SET TERMINAL
PROGRAM command. In PIO mode, all keyboard characters are passed
to the operating software.

For more information on terminal mode change commands, see Table 5–6.

5.10 REPEAT

The REPEAT command continuously executes the specified console
command.

Examples

```
>>> REPEAT E 27        ! Continuously examines location
                       ! 27 (hex) until  Ctrl/C  is typed.
```

The REPEAT command syntax is:

```
    R[EPEAT] command
```

The command may be any CIO mode command except TEST Z (KA550
only), REPEAT, CIO, PIO, MIO, HALT, SHOW, or SET. Execution
continues until the operator types Ctrl/C from the keyboard. A command
must be supplied.

CAUTION
**The REPEAT command is used only during maintenance
procedures.**

5.11 SET

Follow these rules whenever you issue the SET commands from CIO mode:

1. Issue the INITIALIZE command from CIO mode to make sure the zones are in SIMPLEX mode.

2. Be sure to issue identical SET commands to both zones. Failure to do so may result in an EEPROM CHECKSUM message each time the zones attempt to synchronize.

3. A SET BOOT command issued to provide single-fault protection during boot should include the bootpath designation for both zones and both members of the system disk shadowset. This ensures that both zones boot using the same boot command string.

   A typical boot command for a model 610 with expansion might be:

   ```
   >>> SET BOOT DEFAULT /R5:70000000 DIA0, DIG1, DIB10, DIF10
   ```

   When both zones have booted, the software boots to root 7 on system disk DIA0 (zone A) or DIG0 (zone B). If the disk is inaccessible, the shadowset partner provides backup access to the system disk through the other zone.

5.11.1 SET BOOT

The SET BOOT command names and stores a boot command.

Examples

```
1.  >>> SET BOOT DISK /R5:5 DIA0

                    ! Creates an RF-series boot command called
                    ! DISK and stores it in EEPROM.

2.  >>> SET BOOT ENET EPF0

                    ! Creates an Ethernet boot command
                    ! called ENET and stores it in EEPROM.

3.  >>> SET BOOT DEFAULT DIA0

                    ! Creates the default boot specifier
                    ! and stores it in EEPROM.
```

The SET BOOT command syntax is:

```
    SE[T] B[OOT] name [/qualifier] [device list] [/qualifier]
```

The name specifier must be a 1- to 4-character symbolic name for the stored boot command. Use of symbolic names that are the same as the device specifiers is *not* recommended. A qualifier may be included before or after the device specifier. The syntax is the same as for the BOOT command.

Example 1 creates a command to boot from an RF-series disk and stores it in EEPROM. When the command BOOT DISK is given, general register R5 passes a hex value of 5 to the VMB bootstrap program, and the boot uses disk unit 0 on the primary system I/O controller module in zone A.

Example 2 creates a command to boot from Ethernet and stores it in EEPROM. When the command BOOT ENET is given, the boot uses the Ethernet port on the primary system I/O controller module in zone B.

Example 3 creates a default boot specifier and stores it in EEPROM. The default boot specifier is used during autoboot or when no device list is used with the BOOT command. The word DEFAULT must be spelled out. It is *not* a symbolic name.

Use the following console command sequence to define a default boot specifier:

```
>>> INIT                    ! Initializes the system.
>>> SET BOOT DEFAULT name   ! Creates the default boot specifier.
                            ! (You must use this command for
                            ! both zones.)
>>> SHOW BOOT               ! Displays all stored boot commands.
                            ! (You must verify that the default
                            ! is the same for both zones.)
```

If the BOOT command is issued without arguments, the process uses the saved boot specification called the default.

If you issue the SET BOOT name command without a device specifier and press Return, the stored boot location is cleared:

```
>>> SE[T] B[OOT] [name]
>>>
```

5.11.2 SET PORT

The SET PORT command sets the operating parameters for the terminal port issuing the command.

Example

```
>>> SET PORT /SPEED=9600

                       ! Sets terminal port input and output
                       ! rate to 9600 baud.
```

The SET PORT command syntax is:

```
SE[T] [/P[ermanent]] P[ORT] /qualifier(s)
```

The qualifiers are listed in Table 5–5. At least one qualifier *must* be supplied.

The SET PORT command affects *only* the terminal port connected to the terminal issuing the command. It may be issued from the local console terminal or the remote console terminal (with full access privileges). It uses the same qualifiers that are used with the SET LOCAL and SET REMOTE commands.

Table 5–5   SET PORT Command Qualifiers

Qualifier	Function
/B[reak], /NOB[reak]	/BREAK enables baud-rate cycling for the port after the port receives two consecutive Break characters from the terminal. /NOBREAK disables the baud-rate cycling for the port.
/U[pper], /L[ower]	/UPPER changes the received character to uppercase before it is interpreted by the console. (Has no effect in PIO mode.) /LOWER inhibits changes to uppercase; all characters are accepted and interpreted as received.
/H[ardcopy], /NOH[ardcopy]	/HARDCOPY sets the console for hard-copy terminal operation. /NOHARDCOPY sets the console for video terminal operation. (These qualifiers have the same effect as /NOSCOPE and /SCOPE.)
/SC[ope], /NOS[cope]	/SCOPE sets the console for video terminal operation. /NOSCOPE sets the console for hard-copy terminal operation. (These qualifiers have the same effect as /NOHARDCOPY and /HARDCOPY.)
/SYNC_I[n], /NOSYNC_I[n]	/SYNC_IN causes the console to recognize the Ctrl/S and Ctrl/Q flow-control characters. /NOSYNC_IN causes the console to ignore Ctrl/S and Ctrl/Q and pass them as normal characters.
/SYNC_O[ut], /NOSYNC_O[ut]	/SYNC_OUT causes the console to generate Ctrl/S and Ctrl/Q for flow control from the processor module. /NOSYNC_OUT causes the console to disable flow control.
/SP[eed]=*rate* or /SP[eed]:*rate*	Sets the baud rate for the port issuing the command. Valid baud rates are: 300, 600, 1200, 2400, 4800, 9600, and 19200. The default baud rate is 9600.

5.11.3 SET TERMINAL PROGRAM

The SET TERMINAL PROGRAM command sets the I/O mode for the terminal issuing the command.

Example

```
>>> SET TERMINAL PROGRAM

                        ! Sets the terminal to the program
                        ! I/O mode.
```

The SET TERMINAL PROGRAM command syntax is:

```
SE[T] T[ERMINAL] P[ROGRAM]
```

The SET TERMINAL PROGRAM command is synonymous with the PIO command. The mode change commands are listed in Table 5–6.

Table 5–6 Terminal Mode Change Commands

Command	Function
P[io] or SE[t] T[erminal] P[rogram]	Changes the console mode from CIO or MIO to PIO mode. To recognize and process PIO commands, the operating software must be running. In PIO mode, all keyboard characters are passed to the operating software.
CI[o]	Changes the console mode from MIO to CIO. The Break key is used to enter CIO mode from PIO mode. To recognize and process CIO commands, the operating software must be halted and the processor must be running the console firmware.
M[io]	Changes the console mode from CIO to MIO. You cannot enter MIO mode from PIO mode; first enter CIO mode. You do not need to halt the operating software to use the MIO mode commands. For a remote operator to use MIO mode, full access privileges must be set by the local operator.

5.11.4 SET ZONE

The SET ZONE command establishes the zone configuration.

Examples

```
1.  >>> SET ZONE A     ! Configures the zone for zone A operation.
2.  >>> SET ZONE B     ! Configures the zone for zone B operation.
```

The SET ZONE_ID command syntax is:

```
SE[T] Z[ONE] option
```

The option specifier may be the letter A or B. The zone configuration is always stored in the EEPROM of the zone issuing the command.

CAUTION

The SET ZONE command is used only during installation and maintenance procedures. After a SET ZONE, initialize the system (Section 5.6, INITIALIZE).

5.12 SHOW

The SHOW command displays the system operating parameters.

Example

```
>>> SHOW BOOT                     ! Displays all stored boot
CTzn SHOW BOOT                    ! commands in volatile memory.

        TAPE /R5:0000004 MIA0    ! Sends to all terminals,
          .       .        .     ! where z identifies the
          .       .        .     ! zone issuing the command
          .       .        .     ! as A or B, and n identifies
          .       .        .     ! the local terminal as 0 and
          .       .        .     ! the remote terminal as 1.
```

The SHOW command syntax is:

```
SH[OW] option
```

The options are listed in Table 5–7. An option specifier *must* be supplied.

Table 5–7   SHOW Command Options

Option	Function
B[OOT]	Identifies the zone and issuing terminal and displays the settings for all stored boot commands.
CO[NFIGURATION]	Displays a table of the modules in the backplane.
CP[U]	Displays the ROM version of the CPU and the primary I/O controller module.
E[THERNET]	Displays the physical Ethernet addresses.
P[ORT]	Displays the port address.
ALL	Displays boot, configuration, CPU, and Ethernet parameters.

5.13   START

The START command begins execution of the operating software from the specified address.

Example

```
>>> S 100              ! Starts the program beginning
                       ! at address 100 (hex).
```

The START command syntax is:

```
    S[TART] [address]
```

The address specifier is optional and used to identify the hex value of the starting address. Program execution starts at the specified address or, if the address is omitted, at the PC contents saved on the previous HALT. If memory management is enabled, the address is virtual. If memory management is not enabled, the address is physical.

5.14 TEST

The TEST command invokes the ROM-based diagnostic (RBD) monitor on
the processor module.

Examples

```
1.  >>> T               ! Invokes the RBD monitor.
    VAXft 3000 RBD Monitor VX.X
    RBD>

2.  >>> T /RBD          ! Invokes the RBD monitor
    RBD>                ! and returns the RBD> prompt.
                        ! You are able to run RBD tests.
                                          .
                                          .
                                          .
    RBD> QUIT           ! Leaves the RBD monitor and returns
    >>>                 ! you to CIO mode.

or

1.  >>> T               ! Invokes the RBD monitor.
    VAXft RBD Monitor VX.X
    RBD>

2.  >>> T /RBD          ! Invokes the RBD monitor
    RBD>                ! and returns the RBD> prompt.
                        ! You are able to run RBD tests.
                                          .
                                          .
                                          .
    RBD> QUIT           ! Leaves the RBD monitor and returns
    >>>                 ! you to CIO mode.
```

The TEST command syntax is:

```
T[EST] [/R[bd]]
```

The TEST and TEST /RBD commands invoke the RBD interactive mode, return the RBD> prompt, and terminate all other processor functions. The operator may then run the complete set or selected parts of the processor module diagnostics from the RBD monitor. RBD tests may be run from the local console terminal or remote console terminal.

When the operator exits RBD mode, the processor returns to CIO mode (the console firmware).

CAUTION
The TEST command is used only by qualified maintenance personnel.

5.15 Z

The Z command invokes the RBD monitor on any system logic module
except for the primary system I/O controller module, processor module, or
a memory module.

Example

```
>>> Z 2               ! Invokes the RBD monitor on the
CTA0: Z 2             ! secondary system I/O controller module
MIO> T/R              ! in slot 1 of the backplane. When the
MIO> T/R              ! module responds, press  Return  again and
                      ! issue the TEST/RBD command.

VAXft 3000 RBD Monitor Vx.x

RBD2>                 ! Places you in the RBD monitor on the
                      ! secondary system I/O controller module
                      ! in slot 1. (Slot 1 has slot ID 2. See
                      ! Chapter 4.) You are able to run RBD tests.
                                        .
                                        .
                                        .
RBD2> QUIT            ! Exits the RBD monitor and
 Return               ! enters the MIO mode.
MIO> ^P               ! Type  Ctrl/P  to return to
>>>                   ! CIO mode.

or

>>> Z 2               ! Invokes the RBD monitor on the
CTA0: Z 2             ! secondary system I/O controller module
 Return               ! in slot 1 of the backplane. When the
MIO> T/R              ! module responds, press  Return  again and
                      ! issue the TEST/RBD command.

VAXft RBD Monitor Vx.x

RBD2>                 ! Places you in the RBD monitor on the
                      ! secondary system I/O controller module
                      ! in slot 1. (Slot 1 has slot ID 2. See
                      ! Chapter 4.) You are able to run RBD tests.
                                        .
                                        .
                                        .
RBD2> QUIT            ! Exits the RBD monitor and
 Return               ! enters the MIO mode.
MIO> ^P               ! Type  Ctrl/P  to return to
>>>                   ! CIO mode.
```

The Z command syntax is:

```
Z n
```

The n specifies the slot ID number of an approved I/O or adapter module in the backplane of **the local zone** (Chapter 4, Console Operations). If you specify a slot that does not contain a module, the console returns an error message.

The Z command invokes a system console communication mode that allows the console operator to run interactive RBD tests on the designated module. The console returns the RBDn> prompt. The n is the slot ID number of the module under test. See Figure 4–6.

CAUTION
The Z command is used only by qualified maintenance personnel and cannot be used to go to another zone.

6
MIO Mode Console Commands

This chapter describes the console commands available when the console is in the module I/O (MIO) mode. MIO commands affect output to the console terminal or port; the processor may be running or halted. This chapter includes:

- Entering MIO mode

- MIO mode console commands:

CIo	**SE**t **LA**nguage	**SH**ow
DIAlout	**SE**t **L**ocal	**SH**ow **LA**nguage
DISable **R**emote	**SE**t **M**odem_type	**SH**ow **L**ocal
Enable **R**emote	**SE**t **N**otification	**SH**ow **N**otification
Hangup	**SE**t **P**ort	**SH**ow **P**ort
Pio	**SE**t **REM**ote	**SH**ow **REM**ote
Rbd	**SE**t **RES**tart_action	**SH**ow **RES**tart_action
SEt	**SE**t **T**erminal **P**rogram	**T**est

NOTE
The shortest possible command abbreviations are shown in bold capital letters.

NOTE
The focus of this chapter is model 310, 410, 610, and 612 systems.
If you own a model 110 system, keep in mind the following:

• **An expanded system is always a model 310, 410, 610, or 612**
  system.

• **A dual cabinet system is always a model 310, 410, 610, or 612**
  system. In a model 110 system, the two zones are housed in a
  single cabinet.

• **The Local Console Disable switch is present on model 310, 410,**
  610, and 612 systems. In a model 110 system, the consoles are
  always enabled.

6.1 Entering MIO Mode

Using the example as a guide, follow the numbered steps to enter MIO
mode. For a remote operator to use MIO mode, full access privileges must
be set by the local operator.

Example

```
$                      ! From PIO mode, release the Local Console
$   Break              ! Disable  switch (OFF, button out). The
                       ! indicator is dark (unlit). Then press the
>>>                    !  Break  key.
>>> MIO
MIO>
                                  .
                                  .
                                  .
MIO> CIO or            ! Entering the CIO or PIO command returns
      PIO              ! you to CIO or PIO mode, respectively.
```

Comments are allowed on a command line. Comments, or characters
following an exclamation point (!), are ignored by the console when the
Return key is pressed. This feature is useful when documenting a console
session on a hard-copy terminal.

To enter and use MIO mode:

1. Your console terminal is connected to a system cabinet. While still in PIO mode, check the summary panel on that system cabinet. Make sure the Local Console Disable switch on the summary panel is released (OFF, button out) and the indicator is dark (unlit).

2. Press the ⃞Break key to leave PIO mode. When the console enters CIO mode it returns the >>> prompt.

3. Enter the MIO command and press ⃞Return. (The processor may be running or halted.) When the console returns the MIO> prompt, enter MIO commands.

4. To return to one of the other modes, enter one of these commands: SET TERMINAL PROGRAM, PIO, or CIO.

Chapter 4 provides more information on use of the various console operating modes.

Some commands controlling the terminal ports on the primary system I/O controller module (SET PORT and SET TERMINAL PROGRAM) are recognized in CIO and MIO modes. **To recognize and process CIO commands, the operating software must be halted and the processor must be running the console firmware**. CIO commands are described in Chapter 5.

6.2   CIO

The CIO command changes the console mode from MIO to CIO.

Example

```
MIO> CIO                 ! Changes the console to CIO mode
>>>                      ! and issues the >>> console prompt.
```

The CIO command syntax is:

```
    CI[O]
```

The CIO command changes the console mode from MIO to CIO to allow use of CIO mode console commands (Chapter 5). Halt the operating software to use the CIO mode commands.

For more information on terminal mode change commands, see Table 6–10.

6.3 DIALOUT

The DIALOUT command invokes the console autonotification process.

Example

```
MIO> DIALOUT           ! Invokes the console dialout procedure.
```

The DIALOUT command syntax is:

```
DIA[LOUT]
```

When the DIALOUT command is issued, the autonotification process dials out using the stored notification phone number, retry count, and retry delay time. (These parameters are set using the SET NOTIFICATION command.) If the connection is successful, the notification message is transmitted and the MIO> prompt is returned to the issuing console terminal. If the connection is not successful, an error message is returned to the issuing console terminal.

CAUTION

The DIALOUT command is used only during maintenance procedures.

6.4 DISABLE REMOTE

The DISABLE REMOTE command disables all remote terminal console privileges.

Example

```
MIO> DISABLE REMOTE   ! Disables all remote console privileges.
```

The DISABLE REMOTE command syntax is:

```
DIS[ABLE] R[EMOTE]
```

The DISABLE REMOTE command has the same function as the SET REMOTE OFF command. If a remote session is in progress, the command does not take effect until the remote terminal "hangs up" and breaks the connection. Future dial-in attempts are ignored.

6.5 ENABLE REMOTE

The ENABLE REMOTE command enables remote terminal console
privileges.

Examples

```
1.  MIO> ENABLE REMOTE

                    ! Enables all remote console privileges.

2.  MIO> ENABLE REMOTE USER

                    ! Enables PIO mode access for the remote
                    ! console.
```

The ENABLE REMOTE command syntax is:

```
    E[NABLE] R[EMOTE] [U[SER]]
```

Without the USER option, the command has the same function as the
SET REMOTE FULL command, enabling all privileges including dial-in
access when the remote connection is made through a modem.

With the USER option, the command has the same function as the SET
REMOTE SECURE command, enabling access for the remote operator,
but only in PIO mode. If the remote terminal is in any other mode,
the command does not take effect until the remote operator enters PIO
mode. Then the remote operator cannot leave PIO mode until full access
privileges are set by the local operator.

6.6 HANGUP

The HANGUP command breaks the remote terminal telephone connection.

Example

```
MIO> HANGUP            ! Disconnects the telephone connection.
```

The HANGUP command syntax is:

```
H[ANGUP]
```

When the HANGUP command is issued from a remote terminal connected through a modem, the modem breaks the connection by deasserting the data terminal ready (DTR) signal. If a DISABLE REMOTE or SET REMOTE OFF command has also been issued, the remote terminal becomes inactive.

6.7 PIO

The PIO command changes the console mode from MIO to PIO.

Example

```
MIO> PIO               ! Changes the console to PIO mode.
```

The PIO command syntax is:

```
    P[IO]
```

The PIO command has the same function as the SET TERMINAL
PROGRAM command. In PIO mode, all keyboard characters are passed
to the operating software.

For more information on terminal mode change commands, see
Table 6–10.

6.8 RBD

The RBD command invokes the ROM-based diagnostic (RBD) monitor on the primary system I/O controller module. In the RBD monitor, the system drives can be configured using the diagnostic/utility protocol (DUP) facility.

Example

```
>>> MIO                ! Enters MIO mode from CIO mode.
MIO> RBD               ! Invokes the RBD monitor and
RBD1>                  ! returns the RBD1> prompt.
```

The RBD command syntax is:

```
R[BD]
```

The RBD command is identical to the TEST/RBD command. It invokes the RBD interactive mode, returns the RBD> prompt, and terminates all other console functions. When the operator exits RBD mode, the primary system I/O controller module initializes itself and returns to PIO mode (the default).

CAUTION

The RBD command is used only by qualified maintenance personnel. The RBD command must not be used while the operating system is running.

6.8.1 Setting System Drive Parameters

Placing two drives with the same DSSI parameters in the same system can prevent the use of one of the devices or can cause irretrievable loss of data. Therefore, no two drives at a computer site should have the same unit number or DSSI node name.

Drives may be written with the parameters shown in the following sections or as required by the application. The parameters shown in Sections 6.8.1.1 or 6.8.1.2 should be written during the system installation. Sections 6.8.2 and 6.8.3 provide examples of how to read and write parameters on a halted system.

If, at a later date, you need to install a new drive, or a drive that has had the DSSI controller/interface module replaced, write the drive parameters to configure the drive into the system. The *VAXft System Services Manager's Guide* provides further information on replacing or configuring drives in a running system.

6.8.1.1 Base System

Drive numbering sequences greater than 7 (decimal) should be used as shown in the following chart. This method ensures each drive has a unique unit number[1] and DSSI node name[1], even if drives are improperly installed later.

First system on site: Allocation Class = 1

Zone A Cabinet Drives   Zone B Cabinet Drives

DSSI Node Name	DSSI Node ID	Unit Number	VMS Device Name	DSSI Node Name	DSSI Node ID	Unit Number	VMS Device Name
TAPE15	5[1]	15	TAPE15$MIA15	DISK25	5[1]	25	1DIA25
DISK17	7	17	1DIA17	DISK27	7	27	1DIA27

Second system on site: Allocation Class = 2

Zone A Cabinet Drives   Zone B Cabinet Drives

DSSI Node Name	DSSI Node ID	Unit Number	VMS Device Name	DSSI Node Name	DSSI Node ID	Unit Number	VMS Device Name
TAPE35	5[1]	35	TAPE35$MIA35	DISK45	5[1]	45	2DIA45
DISK37	7	37	2DIA47	DISK47	7	47	2DIA47

Third system on site: Allocation Class = 3

Zone A Cabinet Drives   Zone B Cabinet Drives

DSSI Node Name	DSSI Node ID	Unit Number	VMS Device Name	DSSI Node Name	DSSI Node ID	Unit Number	VMS Device Name
TAPE55	5[1]	55	TAPE55$MIA55	DISK65	5[1]	65	3DIA65
DISK57	7	57	3DIA57	DISK67	7	67	3DIA67

---

[1] Node 5 may be a disk or tape device. The DIA or MIA portion of the unit number cannot be changed. In the VMS device name, the number parsed by dollar signs identifies the allocation class. Tapes do not have allocation classes.

6.8.1.2 System with Expansion

Drive numbering sequences greater than 7 (decimal) should be used as shown in the following chart. This method ensures each drive has a unique unit number[1] and DSSI node name[1], even if drives are improperly installed later.

```
First system on site: Allocation class = 1
Zone A Expander Cabinet Drives           Zone B Expander Cabinet Drives

DSSI       DSSI     Unit    VMS          DSSI       DSSI     Unit    VMS
Node Name  Node ID  Number  Device Name  Node Name  Node ID  Number  Device Name

DISK10     0        10      $1$DIA10     DISK20     0        20      $1$DIA20
DISK11     1        11      $1$DIA11     DISK21     1        21      $1$DIA21
DISK12     2        12      $1$DIA12     DISK22     2        22      $1$DIA22
DISK13     3        13      $1$DIA13     DISK23     3        23      $1$DIA23
DISK14     4        14      $1$DIA14     DISK24     4        24      $1$DIA24
DISK15     5[1]     15      $1$MIA15     DISK25     5[1]     25      $1$DIA25

Second system on site: Allocation Class = 2
Zone A Expander Cabinet Drives           Zone B Expander Cabinet Drives

DSSI       DSSI     Unit    VMS          DSSI       DSSI     Unit    VMS
Node Name  Node ID  Number  Device Name  Node Name  Node ID  Number  Device Name

DISK30     0        30      $2$DIA30     DISK40     0        40      $2$DIA40
DISK31     1        31      $2$DIA31     DISK41     1        41      $2$DIA41
DISK32     2        32      $2$DIA32     DISK42     2        42      $2$DIA42
DISK33     3        33      $2$DIA33     DISK43     3        43      $2$DIA43
DISK34     4        34      $2$DIA34     DISK44     4        44      $2$DIA44
DISK35     5[1]     35      $2$MIA35     DISK45     5[1]     45      $2$DIA45

Third system on site: Allocation Class = 3
Zone A Expander Cabinet Drives           Zone B Expander Cabinet Drives

DSSI       DSSI     Unit    VMS          DSSI       DSSI     Unit    VMS
Node Name  Node ID  Number  Device Name  Node Name  Node ID  Number  Device Name

DISK50     0        50      $3$DIA50     DISK60     0        60      $3$DIA60
DISK51     1        51      $3$DIA51     DISK61     1        61      $3$DIA61
DISK52     2        52      $3$DIA52     DISK62     2        62      $3$DIA62
DISK53     3        53      $3$DIA53     DISK63     3        63      $3$DIA63
DISK54     4        54      $3$DIA54     DISK64     4        64      $3$DIA64
DISK55     5[1]     55      $3$MIA55     DISK65     5[1]     65      $3$DIA65
```

---

[1] Node 5 may be a boot or backup device. The DIA or MIA portion of the unit number cannot be changed. In the VMS device name, the number parsed by dollar signs identifies the allocation class. Tapes do not have allocation classes.

6.8.2 The SHOW_DSSI Command

NOTE
The SHOW_DSSI command does not apply to model 110 systems because the node IDs are fixed at 0, 1, and 2.

The SHOW_DSSI command shows the parameters for all available drives connected to the primary system I/O controller module in the zone issuing the command.

Zone A of a base system might show the following combination of drives in the left system cabinet:

```
RBD1> SHOW_DSSI

DSSI Node 5  (T7GAT0)
-MIA5    (TF70)

DSSI Node 6  (*)

DSSI Node 7  (R3DK3G)
-DIA7    (RF-series)

RBD1>
```

In the previous example, the zone A cabinet contains a TF70 cannister tape drive in the DSSI ID 5 slot and an RF-series cannister disk drive in the DSSI ID 7 slot. DSSI node 6 is occupied by the primary system I/O controller module.

The drives return the following information:

- DSSI node ID value (node 5 and 7) from the backplane
- Factory-set DSSI node name (T7GAT0 and R3DK3G)
- Unit number (MIA5 and DIA7) from the backplane
- Device type (TF70 and RF-series)

Zone B of a base system might show the following combination of drives in the right system cabinet:

```
RBD1> SHOW_DSSI
DSSI Node 5  (R3DK3D)
-DIA5    (RF-series)

DSSI Node 6  (*)

DSSI Node 7  (R3DK3E)
-DIA7    (RF-series)

RBD1>
```

In the above example, the zone B cabinet contains RF-series carrier disk drives in the DSSI ID 5 and DSSI ID 7 slots. DSSI node 6 is occupied by the primary system I/O controller module.

The drives return the following information:

- DSSI node ID value (node 5 and 7) from the backplane

- Factory-set DSSI node name (R3DK3D and R3DK3E)

- Unit number (DIA5 and DIA7) from the backplane

- Device type (RF-series)

6.8.3 DUP PARAMS Commands

Setting the force unit (FORCEUNI) bit to a 0 causes the drives to use the stored unit numbers written by the DUP PARAMS procedure.

Setting the FORCEUNI bit to a 1 (the factory default) causes the drives to use the hardwired unit numbers selected by the backplane.

<div align="center">

CAUTION

The FORCEUNI bit must be the same in all drives in the system. Digital recommends setting the FORCEUNI bit to 0. Doing so causes the unit number to remain the same if the device is moved to another DSSI device slot.

</div>

The following examples show how to write DSSI parameters to the drives in both system cabinets of a base system. The same procedures can be used with a system with expansion. Use the numbering sequences shown in Section 6.8.1.1 for a base system or Section 6.8.1.2 for a system with expansion.

Zone A Parameters

The following example shows how to write the drive parameters in the zone A cabinet of a base system.

```
RBD1> DUP 5 PARAMS             ! Selects backplane DSSI
Starting DUP server...         ! ID 5 slot.

DSSI Node 5  (T7GAT0)
Copyright (C) 1988  Digital Equipment Corporation

PARAMS> SET FORCEUNI 0         ! Sets FORCEUNI equal to 0.
PARAMS> SET UNITNUM 15         ! Sets 15 as the unit number.
PARAMS> SET NODENAME TAPE15    ! The unit number and node
PARAMS> WRITE                  ! name values must be the same.
                               ! The unit number may be up to
                               ! three decimal digits (maximum
                               ! of 999).

Changes require controller initialization, ok? [Y/(N)] Y

PARAMS> EXIT                   ! Leaves PARAMS to select the
Stopping DUP server...         ! next drive in the zone.

RBD1> DUP 7 PARAMS             ! Selects backplane DSSI
Starting DUP server...         ! ID 7 slot.

DSSI Node 7  (R3DK3D)
Copyright (C) 1988  Digital Equipment Corporation

PARAMS> SET FORCEUNI 0         ! Sets FORCEUNI equal to 0.
PARAMS> SET UNITNUM 17         ! Sets 17 as the unit number.
PARAMS> SET NODENAME DISK17    ! The unit number and node
                               ! name values must be the same.
PARAMS> SET ALLCLASS 1         ! Sets allocation class to 1.
PARAMS> WRITE

Changes require controller initialization, ok? [Y/(N)] Y

PARAMS> EXIT
Stopping DUP server...

RBD1>
```

To display the new parameters for the drives, enter the SHOW_DSSI command:

```
RBD1> SHOW_DSSI
DSSI Node 5  (TAPE15)
-MIA15   (TF70)

DSSI Node 6  (*)

DSSI Node 7  (DISK17)
-DIA17   (RF-series)

RBD1> QUIT                   ! The console leaves the RBD
$ CIO                        ! monitor and enters PIO mode.
>>>                          ! The CIO command then places
                             ! you in CIO mode.
```

Zone B Parameters

The following example shows how to write the drive parameters in the zone B cabinet of a base system.

<div align="center">

NOTE
</div>

ALLCLASS should be set to match the SYSGEN parameter ALLOCLASS for the node.

```
RBD1> DUP 5 PARAMS           ! Selects backplane DSSI
Starting DUP server...       ! ID 5 slot.

DSSI Node 5  (R3DK3F)
Copyright (C) 1988  Digital Equipment Corporation

PARAMS> SET FORCEUNI 0       ! Sets FORCEUNI equal to 0.
PARAMS> SET UNITNUM 25       ! Sets 25 as the unit number.
PARAMS> SET NODENAME DISK25  ! The unit number and node
                             ! name values must be the same.
PARAMS> SET ALLCLASS 1       ! Sets allocation class to 1.
PARAMS> WRITE
```

```
Changes require controller initialization, ok? [Y/(N)] Y

PARAMS> EXIT                    ! Leaves PARAMS to select the
Stopping DUP server...         ! next drive in the zone.

RBD1> DUP 7 PARAMS             ! Selects backplane DSSI
Starting DUP server...         ! ID 7 slot.

DSSI Node 7  (R3DK3G)
Copyright (C) 1988  Digital Equipment Corporation

PARAMS> SET FORCEUNI 0         ! Sets FORCEUNI equal to 0.
PARAMS> SET UNITNUM 27         ! Sets 27 as the unit number.
PARAMS> SET NODENAME DISK27    ! The unit number and node
                               ! name values must be the same.
PARAMS> SET ALLCLASS 1         ! Sets allocation class to 1.
PARAMS> WRITE

Changes require controller initialization, ok? [Y/(N)] Y

PARAMS> EXIT
Stopping DUP server...

RBD1>
```

To display the new parameters for the drives, enter the SHOW_DSSI command:

```
RBD1> SHOW_DSSI
DSSI Node 5  (DISK25)
-DIA25   (RF-series)

DSSI Node 6  (*)

DSSI Node 7  (DISK27)
-DIA27   (RF-series)

RBD1> QUIT                     ! The console leaves the RBD
$ CIO                          ! monitor and enters PIO mode.
>>>                            ! The CIO command then places
                               ! you in CIO mode.
```

6.9 SET

The SET command establishes the console settings.

Examples

```
1.  MIO> SET LANGUAGE ENGLISH

                      ! Sets language to the ENGLISH option
                      ! in volatile memory.

2.  MIO> SET /PERMANENT LANGUAGE ENGLISH

                      ! Sets language to the ENGLISH option
                      ! both in volatile memory and in EEPROM.
```

The SET command syntax is:

```
    SE[T] [/P[ermanent]] option parameter
```

The /P[ermanent] qualifier is optional, but the option and the parameter for the option *must* be supplied.

Without the /P[ermanent] qualifier, the command stores the setting in volatile memory. The volatile memory value is lost if power is removed from the processor.

With the /P[ermanent] qualifier, the command stores the setting in volatile memory and in EEPROM. The EEPROM value is saved if power is removed from the processor and is written to volatile memory when power is restored.

The SET command establishes the console settings for the following options:

LA[nguage]	N[otification]	RES[tart_action]
L[ocal]	P[ort]	T[erminal] P[rogram]
M[odem_type]	REM[ote]	

6.9.1 SET LANGUAGE

The SET LANGUAGE command sets the MIO console error message
output.

Examples

```
1.  MIO> SET /PERMANENT LANGUAGE ENGLISH

                    ! Sets the terminal display to English
                    ! for the MIO error message code and
                    ! the error description.

2.  MIO> SET /PERMANENT LANGUAGE INTERNATIONAL

                    ! Sets the display to International.
                    ! Displays the MIO error message code
                    ! without the error description.
```

SET /P LANGUAGE I and SET LANGUAGE I both set the display
temporarily to international. Once the zone or system is powered off and
then powered on, the language defaults to English.

The SET LANGUAGE command syntax is:

```
    SE[T] [/P[ermanent]] LA[NGUAGE] option
```

The options are listed in Table 6–1. An option specifier *must* be supplied.

Table 6–1   SET LANGUAGE Command Options

Option	Function
E[nglish]	Displays the error code with the definition in English text.
I[nternational]	Displays the error code without the text.

6.9.2 SET LOCAL

The SET LOCAL command sets the operating parameters for the local terminal port.

Examples

```
1.   MIO> SET LOCAL /SCOPE

                         ! Sets the local console terminal port
                         ! for a video terminal.

2.   MIO> SET LOCAL /NOSCOPE

                         ! Sets the local console terminal port
                         ! for a hard-copy terminal.
```

The SET LOCAL command syntax is:

```
     SE[T] [/P[ermanent] L[OCAL] /qualifier(s)
```

The qualifiers are listed in Table 6–2. At least one qualifier *must* be supplied.

The SET LOCAL command may be issued from the local console terminal or the remote console terminal (with full access privileges). It uses the same qualifiers used with the SET PORT and SET REMOTE commands.

Table 6–2 SET LOCAL Command Qualifiers

Qualifier	Function
/B[reak], /NOB[reak]	/BREAK enables baud-rate cycling for the port after the port receives two consecutive Break characters from the terminal. /NOBREAK disables the baud-rate cycling for the port.
/U[pper] /L[ower]	/UPPER changes the received character to uppercase before it is interpreted by the console. (Has no effect in PIO mode.) /LOWER inhibits changes to uppercase; all characters are accepted and interpreted as received.
/H[ardcopy], /NOH[ardcopy]	/HARDCOPY sets the console for hard-copy terminal operation. /NOHARDCOPY sets the console for video terminal operation. (These qualifiers have the same effect as /NOSCOPE and /SCOPE.)
/S[cope], /NOS[cope]	/SCOPE sets the console for video terminal operation. /NOSCOPE sets the console for hard-copy terminal operation. (These qualifiers have the same effect as /NOHARDCOPY and /HARDCOPY.)
/SYNC_I[n], /NOSYNC_I[n]	/SYNC_IN causes the console to recognize the Ctrl/S and Ctrl/Q flow-control characters. /NOSYNC_IN causes the console to ignore Ctrl/S and Ctrl/Q and pass them as normal characters.
/SYNC_O[ut], /NOSYNC_O[ut]	/SYNC_OUT causes the console to generate Ctrl/S and Ctrl/Q for flow control from the processor module. /NOSYNC_OUT causes the console to disable flow control.
/SP[eed]=*rate* or /SP[eed]:*rate*	Sets the baud rate for the port issuing the command. Valid baud rates are: 300, 600, 1200, 2400, 4800, 9600, and 19200. The default baud rate is 9600.

6.9.3 SET MODEM_TYPE

The SET MODEM_TYPE command defines the type of connection between the remote terminal and the system I/O module.

Example

```
MIO> SET /PERMANENT MODEM_TYPE V22

                       ! Sets the console interface for the
                       ! modem both in volatile memory and
                       ! in EEPROM.
```

The SET MODEM_TYPE command syntax is:

```
    SE[T] [/P[ermanent]] M[ODEM_TYPE] option
```

The options are listed in Table 6–3. An option specifier *must* be supplied.

Table 6–3   SET MODEM_TYPE Command Options

Option	Function
N[one]	The remote terminal is connected directly to the system I/O module or through a Digital remote services console (RSC) interface.
V2[2]	The remote terminal is connected through an asynchronous modem that conforms to V22, such as a Digital DF03 or DF224 modem.

NOTE
To ensure data integrity, error correcting modems using conditioned lines are suggested.

6.9.4   SET NOTIFICATION

The SET NOTIFICATION command sets the operating parameters for the
autonotification process.

Example

```
MIO> SET NOTIFICATION TRANSMIT_DELAY 5

                        ! Sets the notification transmit
                        ! delay to 5 seconds.
```

The SET NOTIFICATION command syntax is:

```
SE[T] /P[ermanent] N[OTIFICATION] option
```

The options are listed in Table 6–4. An option specifier *must* be supplied.
Quoted parameters *must* be entered within quotation marks (" ") as
shown.

The autonotification process is invoked when the system I/O module loses
contact with the host operating system or when the DIALOUT command
is issued.

Table 6–4   SET NOTIFICATION Command Options

Option	Function
P[hone_number] "number"[1]	
	The "number" is the phone number for the dial-out process. The quoted string is sent to the modem when autonotification is invoked.
	Normal dial-outs use the phone number stored in volatile memory. Emergency dial-outs use the phone number stored in EEPROM.
M[essage] "message"[1]	
	The "message" is the message to be transmitted when the DIALOUT command is successful.

[1]The quoted string may consist of up to 255 ASCII characters if preceded by the escape
(<ESC>) character (ASCII 27).

Table 6–4   (Continued)   SET NOTIFICATION Command Options

Option	Function
C[ountry] *name*	
	The *name* is the country from which a dialout message will occur. Each country has an associated retry count, retry delay, and disconnect timeout. Table 6–5 lists the countries you can select. The defaults are as follows:
	• Retry count = 1
	• Retry delay = 0
	• Disconnect timeout = 60
E[mergency_message] "message"[1]	
	The "message" is the message to be transmitted by the autonotification process if the I/O module loses communication with the processor module.
PARAM1 "parameter"[1]	
	The "parameter" is the first of three parameters passed to the script interpreter for the dial-out procedure.
PARAM2 "parameter"[1]	
	The "parameter" is the second of three parameters passed to the script interpreter for the dial-out procedure.
PARAM3 "parameter"[1]	
	The "parameter" is the third of three parameters passed to the script interpreter for the dial-out procedure.
T[ransmit_delay] *value*	
	The *value* is a positive 0 to 255 (decimal) value representing the number of seconds the autonotification process waits before transmitting a message after data set ready (DSR) is asserted by the modem (indicating that the remote connection has been established). The value is also used as the delay after the message is sent before data terminal ready (DTR) is released.

[1]The quoted string may consist of up to 255 ASCII characters if preceded by the escape (<ESC>) character (ASCII 27).

Table 6–5   Dialout Countries

Country	Retry Count	Retry Delay	Disconnect Timeout
AL[geria]	1	0	60
AUSTRA[lia]	10	120	61
AUSTRI[a]	10	120	90
B[elgium]	10	120	80
C[anada]	10	120	90
D[enmark]	10	120	61
E[gypt]	1	0	60
FI[nland]	4	120	90
FR[ance]	5	120	120
G[ermany]	8	120	90
IR[eland]	4	120	61
IS[rael]	4	300	61
I[taly]	4	300	61
J[apan]	10	300	61
NET[herlands]	10	120	61
NEW[_zealand]	4	300	61
NO[rway]	10	120	61
P[ortugal]	4	300	61
SA[udi_Arabia]	1	0	60
SP[ain]	4	300	61
SWE[den]	10	120	61
SWI[tzerland]	5	120	90
UK	7	120	61
US[a]	10	120	90

6.9.5 SET PORT

The SET PORT command sets the operating parameters for the terminal port issuing the command.

Example

```
MIO> SET PORT /SPEED=9600

                        ! Sets terminal port input and output
                        ! rate to 9600 baud.
```

The SET PORT command syntax is:

```
    SE[T] [/P[ermanent]] P[ORT] /qualifier(s)
```

The qualifiers are listed in Table 6–6. At least one qualifier *must* be supplied.

The SET PORT command affects *only* the terminal port connected to the terminal issuing the command. It may be issued from the local console terminal or the remote console terminal (with full access privileges). It uses the same qualifiers that are used with the SET LOCAL and SET REMOTE commands.

Table 6–6 SET PORT Command Qualifiers

Qualifier	Function
/B[reak], /NOB[reak]	/BREAK enables baud-rate cycling for the port after the port receives two consecutive Break characters from the terminal. /NOBREAK disables the baud-rate cycling for the port.
/U[pper], /L[ower]	/UPPER changes the received character to uppercase before it is interpreted by the console. (Has no effect in PIO mode.) /LOWER inhibits changes to uppercase; all characters are accepted and interpreted as received.
/H[ardcopy], /NOH[ardcopy]	/HARDCOPY sets the console for hard-copy terminal operation. /NOHARDCOPY sets the console for video terminal operation. (These qualifiers have the same effect as /NOSCOPE and /SCOPE.)
/SC[ope], /NOS[cope]	/SCOPE sets the console for video terminal operation. /NOSCOPE sets the console for hard-copy terminal operation. (These qualifiers have the same effect as /NOHARDCOPY and /HARDCOPY.)
/SYNC_I[n], /NOSYNC_I[n]	/SYNC_IN causes the console to recognize the Ctrl/S and Ctrl/Q flow-control characters. /NOSYNC_IN causes the console to ignore Ctrl/S and Ctrl/Q and pass them as normal characters.
/SYNC_O[ut], /NOSYNC_O[ut]	/SYNC_OUT causes the console to generate Ctrl/S and Ctrl/Q for flow control from the processor module. /NOSYNC_OUT causes the console to disable flow control.
/SP[eed]=*rate* or /SP[eed]:*rate*	Sets the baud rate for the port issuing the command. Valid baud rates are: 300, 600, 1200, 2400, 4800, 9600, and 19200. The default baud rate is 9600.

6.9.6 SET REMOTE

The SET REMOTE command sets the operating parameters and
privileges for the remote terminal port.

Example

```
MIO> SET REMOTE FULL    ! Enables the remote terminal for
                        ! full console access privileges.
MIO> SET REMOTE /SCOPE  ! Enables the remote port for
                        ! video terminal option.
```

The SET REMOTE command syntax is:

```
    SE[T] [/P[ermanent]] REM[OTE] option
```

or:

```
    SE[T] [/P[ermanent]] REM[OTE] /qualifier(s)
```

The options are listed in Table 6–7. The qualifiers are listed in Table 6–8.
At least one option or qualifier *must* be supplied, but multiple qualifiers
may be issued. However, options and qualifiers cannot be issued in the
same command.

The SET REMOTE option command sets access privileges for the remote
terminal port without affecting a remote session currently in progress.
The command may be issued from the local console terminal or the
remote console terminal (with full access privileges).

The SET REMOTE /qualifier(s) command may affect a remote session
currently in progress. SET REMOTE uses the same qualifiers used with
the SET LOCAL and SET PORT commands.

Table 6–7   SET REMOTE Command Options

Option	Function
F[ull]	Enables the remote terminal for full access privileges as a console terminal. Synonymous with the ENABLE REMOTE command.
S[ecure]	Enables the remote terminal for use only as an operating terminal in PIO mode. If a remote session is in progress, the command does not take effect until the remote operator enters PIO mode. Synonymous with the ENABLE REMOTE command.
O[ff]	Disables all remote user terminal console functions. If a remote session is in progress, the command does not take effect until the remote terminal "hangs up" and breaks the connection. Future dial-in attempts are ignored. Synonymous with the DISABLE REMOTE command.

Table 6–8   SET REMOTE Command Qualifiers

Qualifier	Function
/B[reak], /NOB[reak]	/BREAK enables baud-rate cycling for the port after the port receives two consecutive Break characters from the terminal. /NOBREAK disables the baud-rate cycling for the port.
/U[pper], /L[ower]	/UPPER changes the received character to uppercase before it is interpreted by the console. (Has no effect in PIO mode.) /LOWER inhibits changes to uppercase; all characters are accepted and interpreted as received.
/H[ardcopy], /NOH[ardcopy]	/HARDCOPY sets the console for hard-copy terminal operation. /NOHARDCOPY sets the console for video terminal operation. (These qualifiers have the same effect as /NOSCOPE and /SCOPE.)
/SC[ope], /NOS[cope]	/SCOPE sets the console for video terminal operation. /NOSCOPE sets the console for hard-copy terminal operation. (These qualifiers have the same effect as /NOHARDCOPY and /HARDCOPY.)
/SYNC_I[n], /NOSYNC_I[n]	/SYNC_IN causes the console to recognize the Ctrl/S and Ctrl/Q flow-control characters. /NOSYNC_IN causes the console to ignore Ctrl/S and Ctrl/Q and pass them as normal characters.
/SYNC_O[ut], /NOSYNC_O[ut]	/SYNC_OUT causes the console to generate Ctrl/S and Ctrl/Q for flow control from the processor module. /NOSYNC_OUT causes the console to disable flow control.
/SP[eed]=*rate* or /SP[eed]:*rate*	Sets the baud rate for the port issuing the command. Valid baud rates are: 300, 600, 1200, 2400, 4800, 9600, and 19200. The default baud rate is 9600.

6.9.7 SET RESTART_ACTION

The SET RESTART_ACTION command defines the action the zone takes after an initialization or power-on sequence.

Example

```
MIO> SET /PERMANENT RESTART_ACTION HALT

                        ! Sets the zone to halt and invokes
                        ! the console firmware after an
                        ! initialization or power-on sequence.
```

The SET RESTART_ACTION command syntax is:

```
SE[T] [/P[ermanent]] RES[TART_ACTION] option
```

The options are listed in Table 6–9. An option specifier *must* be supplied.

The SET RESTART_ACTION command determines what action the system reset process takes after the system self-test diagnostics run successfully. The action is invoked after a system initialization, power-on sequence, or power-on following a power failure.

Table 6–9   SET RESTART_ACTION Command Options

Option	Function
R[estart]	First, an operating system dump to disk is performed. Then the system boots from a device specifier or boot specification stored in volatile memory or EEPROM. (Only EEPROM is valid for a power-on sequence.)
B[oot]	Similar to RESTART, but without the operating system dump to disk. The system boots from a device specifier or boot specification stored in volatile memory or EEPROM. (Only EEPROM is valid for a power-on sequence.)
H[alt]	The processor halts execution of the operating software and enters the console firmware. The local console terminal and remote console terminal (if enabled) both enter CIO mode.

6.9.8 SET TERMINAL PROGRAM

The SET TERMINAL PROGRAM command sets the I/O mode for the terminal issuing the command.

Example

```
MIO> SET TERMINAL PROGRAM

                        ! Sets the terminal to the program
                        ! I/O mode.
```

The SET TERMINAL PROGRAM command syntax is:

    SE[T] T[ERMINAL] P[ROGRAM]

The SET TERMINAL PROGRAM command is synonymous with the PIO command. The mode change commands are listed in Table 6–10.

Table 6–10 Terminal Mode Change Commands

Command	Function
P[io] or SE[t] T[erminal] P[rogram]	Changes the console mode from CIO or MIO to PIO mode. To recognize and process PIO commands, the operating software must be running. In PIO mode, all keyboard characters are passed to the operating software.
CI[o]	Changes the console mode from MIO to CIO. The Break key is used to enter CIO mode from PIO mode. To recognize and process CIO commands, the operating software must be halted and the processor must be running the console firmware.
M[io]	Changes the console mode from CIO to MIO. You cannot enter MIO mode from PIO mode; first enter CIO mode. You do not need to halt the operating software to use the MIO mode commands. For a remote operator to use MIO mode, full access privileges must be set by the local operator.

6.10 SHOW

The SHOW command displays the current settings for the specified option.

Examples

```
MIO> SHOW REMOTE        ! Shows the remote port parameters
                        ! stored in volatile memory.

MIO> SHOW /PERMANENT RESTART_ACTION

                        ! Shows the restart-action switch
                        ! setting stored in EEPROM.
```

The SHOW command syntax is:

```
SH[OW] [/P] option
```

Without the /P[ermanent] qualifier, the command displays the current settings stored in volatile memory. The volatile memory value is lost if power is removed from the processor.

With the /P[ermanent] qualifier, the command displays the current settings stored in EEPROM. The EEPROM value is saved if power is removed from the processor and is written to volatile memory when power is restored.

The SHOW command displays the current settings for the following options:

LA[nguage]	P[ort]	RES[tart_action]
L[ocal]	REM[ote]	N[otification][1]

[1]Display includes the MODEM_TYPE setting.

6.11 TEST

The TEST command invokes the ROM-based diagnostic (RBD) monitor on the primary system I/O controller module.

Examples

```
1.  MIO> TEST          ! Invokes the power-on self-tests.

2.  MIO> TEST /RBD     ! Invokes the RBD monitor
    RBD1>              ! and returns the RBD1> prompt.
```

The TEST command syntax is:

```
    T[EST] [/R[bd]]
```

With the /R[bd] qualifier, the command has the same function as the RBD command. It invokes the RBD interactive mode, returns the RBD> prompt, and terminates all other processor functions. The operator may then run the complete set or selected parts of the system I/O module diagnostics from the RBD monitor. RBD tests may be run from the local console terminal or the remote console terminal.

The QUIT command must be used to exit the RBD tests.

CAUTION
The TEST command is used only by qualified maintenance personnel.

A
TF70 Tape Drive Operation

The TF70 cannister tape drive or the TK70 fixed tape drive serves as a system software load device. The cannister tape drive consists of a TK70 streaming tape drive shock-mounted inside a removable cannister with a DSSI controller module and an interface module. The fixed tape drive (in model 110 systems) is fixed behind the I/O bulkhead.

The TF70 drive accepts a TK tape cartridge that contains the magnetic tape on a single-feed reel. When a tape cartridge is inserted, the drive hooks the end of the tape and threads it onto a takeup reel inside the drive. The tape must be completely rewound and unloaded before the cartridge can be removed from the drive. Rewinding and unloading may take up to 90 seconds. This appendix includes:

- Controls and indicators
- TK tape cartridge
- Loading a tape cartridge
- Unloading a tape cartridge
- Handling and storing tape cartridges
- Inspecting the tape leader
- Inspecting the drive takeup leader
- If there is a problem

A.1   Controls and Indicators

Figure A–1 shows a front view of the TF70 cannister tape drive.
Figure A–2 shows a front view of a TK70 fixed tape drive.

Figure A–1   TF70 Cannister Tape Drive

MR-0186-90.DG
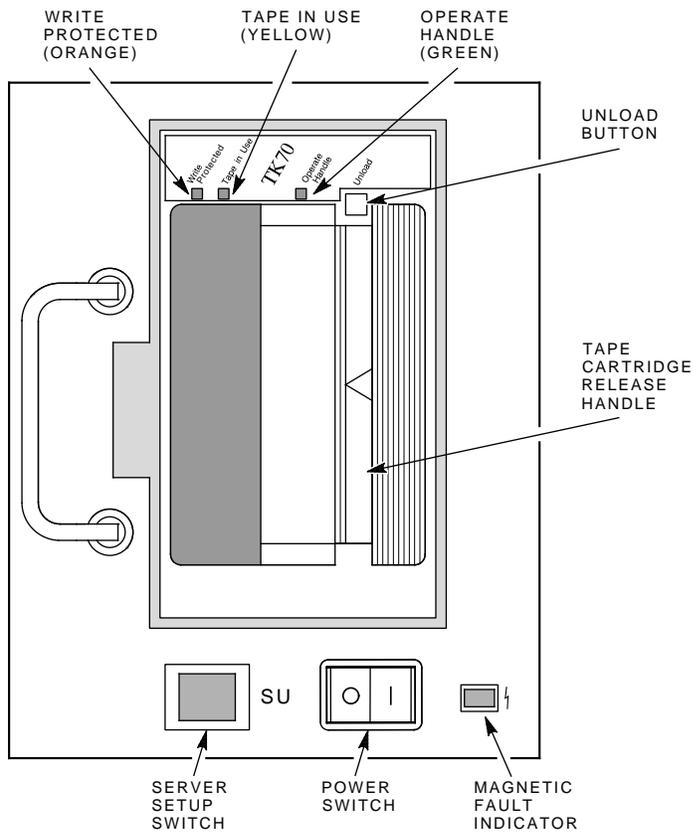
Figure A–2   TK70 Fixed Tape Drive

CS-8840
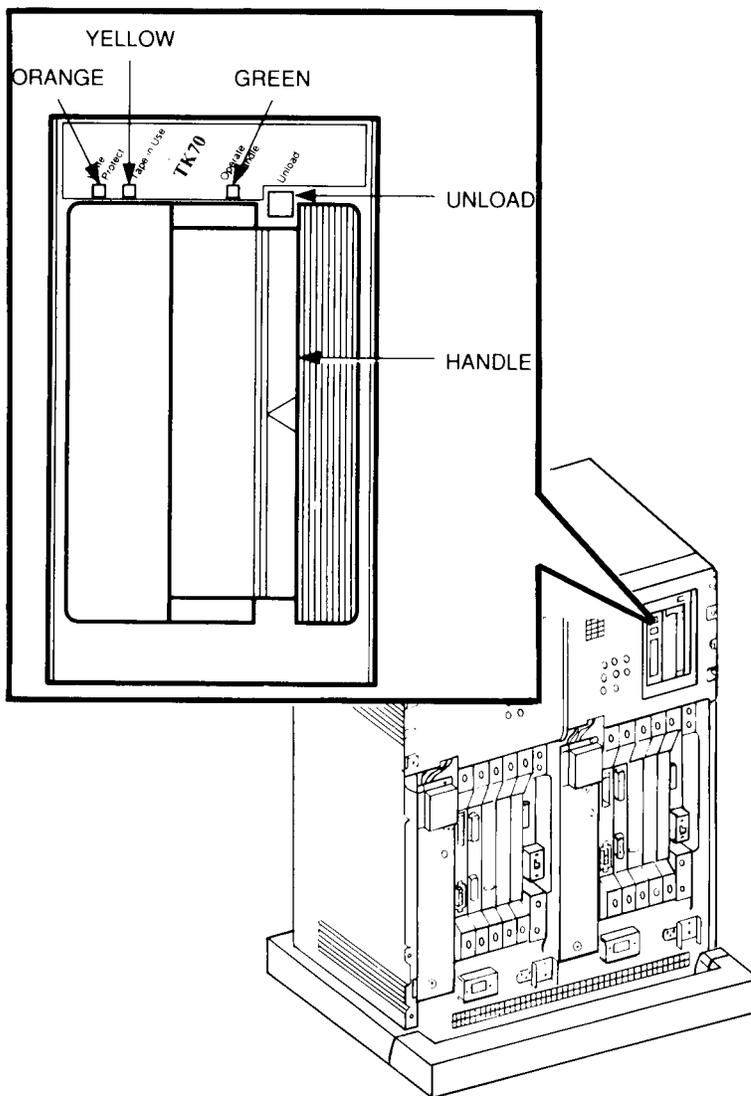
Table A–1 summarizes the TK70 tape drive controls. Table A–2 describes the TK70 tape drive indicators.

The TF70 drive can read data from a tape written by a TK70 or TK50 drive, but it cannot overwrite a tape originally written by a TK50. (Also, a TK50 drive cannot read a tape written by a TK70 or TF70.)

Before executing a tape command, the TF70 drive determines whether the cartridge was written by a TK50 drive. If so, the TF70 drive sets its own write protection so the tape cannot be written.

Table A–1   TK70 Tape Drive Controls

Control	Position	Function
Handle	Open	Lets you insert or remove a tape after rewind and unload operations are completed.
	Closed	Locks tape in operating position and begins load sequence.
Unload button	Momentary contact switch	Rewinds and unloads the tape.

Table A–2   TK70 Tape Drive Indicators

Orange	Yellow	Green	Condition
Off	Off	Off	No power to the tape drive.
Off	Off	On steadily	Safe to move cartridge release handle. Power is present.
Off	Off	Blinking	Load fault. The cartridge leader may be defective. Pull out the handle and remove the cartridge. Do not use the cartridge.
On/Off	On steadily	Off	Tape is loaded but not in motion.
On/Off	Blinking	Off	Tape is in motion.
On	On steadily/ blinking	On	Cartridge is write-protected.
Blinking	Blinking	Blinking	A fault is occurring. Press the Unload button to unload the tape cartridge. If the fault is cleared, the yellow light blinks while the tape rewinds. When the green light comes on, you can move the handle to remove the cartridge. If the fault is not cleared, all three lights continue to blink. Do not attempt to remove the tape cartridge. Call Digital Customer Services.

A.2   TK Tape Cartridge

Figure A–3 shows the CompacTape II tape cartridge recommended for use in TF70 drives.

Figure A–3   CompacTape II Tape Cartridge
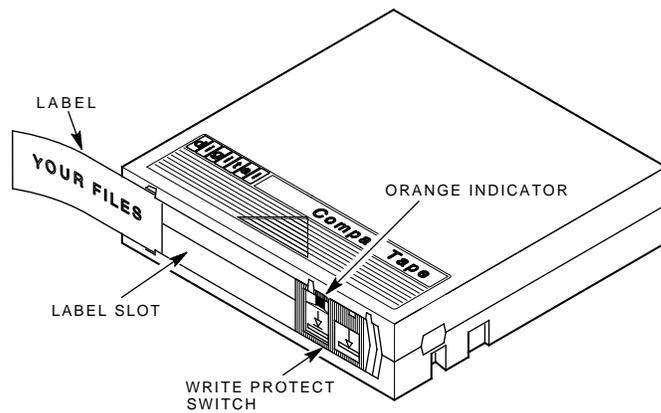
Only CompacTape II high-density cartridges should be used. They provide about 296 MB of formatted data storage.

The cartridge write protect switch slides to the left or right. When the orange indicator is visible, the tape is write protected. When the indicator is not visible, the tape is write enabled.

A.3 Loading a Tape Cartridge

Figure A–4 shows how to insert a TK tape cartridge in the TF70 drive.

Figure A–4   Inserting a Tape Cartridge
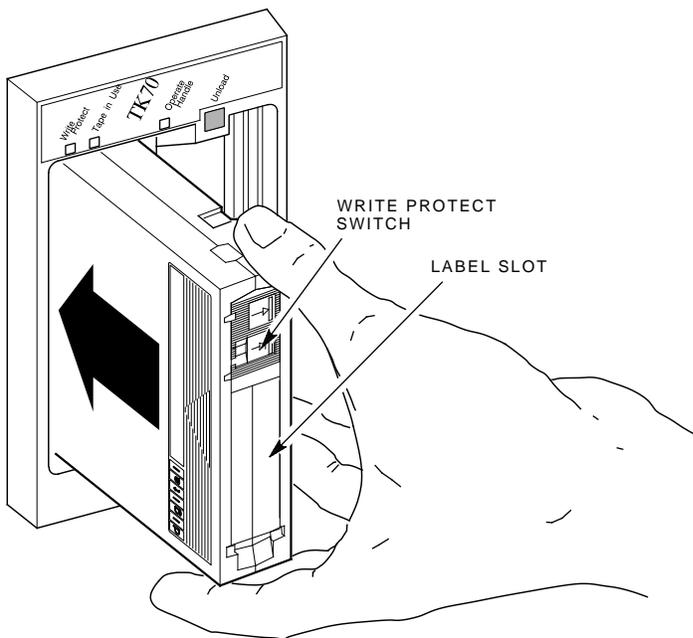
MR-0179-90.DG

Insert a TK tape cartridge into the TF70 drive as follows:

1. Make sure the cartridge write protect switch is in the desired position (write protected or write enabled).

2. If the green indicator is on, pull the cartridge release handle out and to the left (open).

3. Insert the cartridge with the label facing out and the write protect switch towards the top of the drive as shown in Figure A–4.

4. Push the cartridge in until it is completely seated in the drive.

5. Return the cartridge release handle to the closed position.

The yellow indicator blinks while the tape is loading. When it stays on steadily, the drive is ready for use.

A.4   Unloading a Tape Cartridge

Unload a TK tape cartridge from the TF70 drive as follows:

1. Push the unload button shown in Figure A–1.

2. When the beeper sounds and the green indicator turns on, the tape is fully rewound and unloaded.

3. Pull the cartridge release handle out and to the left to eject the cartridge.

4. Remove and store the cartridge. Return the cartridge release handle to the closed position.

A.5   Handling and Storing Tape Cartridges

Observe the following precautions when handling and storing tape cartridges:

- Do not drop or bang the cartridge. If the tape leader is displaced, the cartridge is unusable and may cause damage to the drive.

- Keep cartridges out of direct sunlight and away from heaters and other sources of heat.

- Store cartridges in a dust-free environment where the temperature is between 10°C and 38°C (50°F and 100°F) and the relative humidity is between 20% and 80%.

- If a tape cartridge has been exposed to extreme heat or cold, allow it to stabilize at room temperature for the same amount of time it was exposed (up to 24 hours).

- Do not place cartridges near sources of electromagnetic interference (terminals, motors, video or X-ray equipment). Data on the tape may be erased.

- Place a label on a cartridge only in the label slot shown in Figure A–3.

A.6 Inspecting the Tape Leader

If you have trouble loading a cartridge, inspect both the tape leader and the drive takeup leader.

Figure A–5 shows the correct position of the tape leader inside the cartridge. To release the door lock, lift the catch with your thumb. Open the access door to expose the leader. Make sure the leader is in the correct position as shown.

CAUTION
Do not touch exposed portions of the magnetic tape. If the tape leader is not in the correct position, do not attempt to use it. Use a new cartridge instead.

Figure A–5   Inspecting the Tape Leader
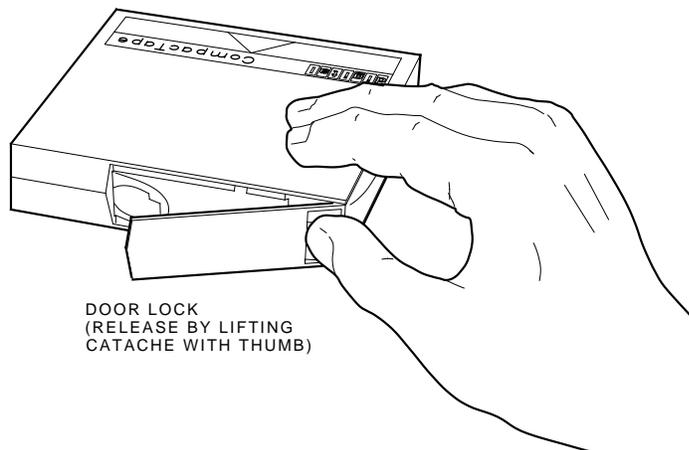
DOOR LOCK
(RELEASE BY LIFTING
CATACHE WITH THUMB)

MR-0180-90.DG

A.7   Inspecting the Drive Takeup Leader

If you have trouble loading a cartridge, inspect the tape leader and the drive takeup leader.

Compare the leader in your drive with the ones shown in Figures A–6 and A–7. If the leader is unhooked, displaced, or damaged, call a qualified service person. Do not attempt to fix the leader yourself.

Figure A–6   Inspecting the Drive Takeup Leader

MR-0181-90.DG
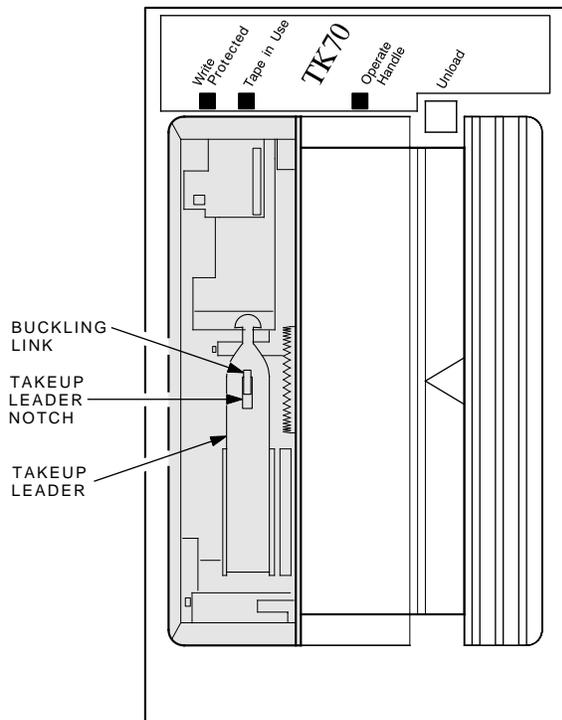
Figure A–7   Drive Takeup Leader Components

CORRECT LOCATION OF LEADER

TAKEUP
LEADER

BUCKLING
LINK

ACCEPTABLE

LEADER UNHOOKED

TAKEUP
LEADER
NOTCH

NOT ACCEPTABLE

LEADER DISPLACED ABOVE LINK

MR-0182-90.DG
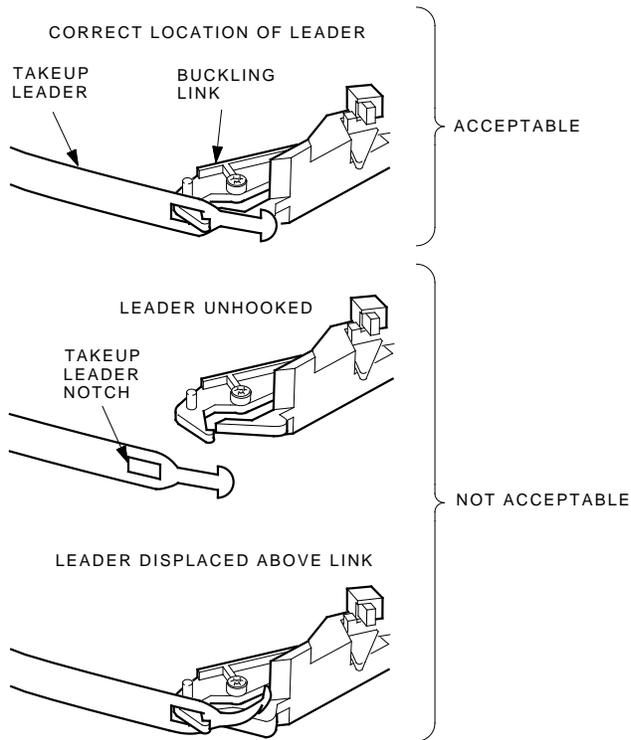
A.8   If There is a Problem

If you experience a problem with your drive, the following checks may help you define the problem.

Correctable Failure During Operation

If the TF70 fails during operation, you may be able to reset the fault, then rewind, unload, and remove the tape cartridge.

If all three drive indicators are blinking, press the unload button. If the error is correctable, the tape begins to rewind and the yellow indicator blinks. When the tape is unloaded, the green indicator turns on and the beeper sounds. Then pull the cartridge release handle open and remove the cartridge.

Noncorrectable Failure During Tape Motion

If the tape does not rewind when you push the unload button and all three indicators continue to blink, the error is not correctable. The drive must be replaced or serviced.

Failure During Cartridge Insertion

A cartridge fault occurs if a tape cartridge is damaged or if internal portions of the drive that handle the cartridge are not working. Suspect a cartridge fault if the green indicator blinks, but the tape does not move (the yellow indicator does not blink). Remove the cartridge and try another or inspect the tape leader and drive takeup leader.

B
TF857 Subsystem Operation

This appendix explains TF857 subsystem operation:

- Power-on process

- Mode Select key modes

- Operator control panel (OCP) indicator functions

- Slot Select, Load/Unload, and Eject button functions

- Magazine cartridge insertion and removal

B.1 Power-On Process

When the TF857 subsystem powers on, all of the indicators on the operator control panel (OCP) light, within 15 seconds. The power-on self-test, or POST, is initializing the subsystem. When POST completes successfully, all OCP indicators, including the Magazine Fault and Loader Fault indicators, turn off — except for Power On.

NOTE
If the Magazine Fault or Loader Fault indicator remains on, POST has detected an error. See the *TF857 Magazine Tape Subsystem Owner's Manual* for information on error conditions.

The elevator scans the magazine to determine which slots contain
cartridges. If the subsystem has a magazine with a cartridge in
slot 0, and no cartridge is in the drive, these indicators should be on:

> Power On
> Eject
> Load/Unload
> Slot Select
> Slot 0

B.2   Mode Select Key

The Mode Select key (Figure B–1) can lock the loader transfer assembly
into the enclosure, as well as lock the receiver closed. It has four modes:
OCP Disabled, Automatic, Manual, and Service. The OCP Disabled,
Automatic, and Manual modes are for operational use; the Service mode
is for head cleaning and servicing procedures.

B.2.1   Operating Modes

The following modes are for operational use:

- **OCP Disabled mode** — When the magazine is inserted into the
  receiver and the receiver is closed, the loader transfer assembly scans
  the magazine. The first cartridge in the magazine automatically loads
  into the drive.

  Operations stop if you are copying data to tape and the storage
  capacity of the last tape cartridge is exceeded or no tape cartridge is
  in the next sequential slot in the magazine.

  To lock the TF857 subsystem into the enclosure and lock the
  receiver, set the Mode Select key to **OCP Disabled** mode. The OCP
  pushbuttons are disabled.

- **Automatic mode** — This mode is the default, or normal, mode of
  the TF857 subsystem. It automatically loads and unloads cartridges
  as necessary during backup procedures. Operations stop if you are
  copying data to tape and the storage capacity of the last tape cartridge
  is exceeded or no tape cartridge is in the next sequential slot in the
  magazine.

  To lock the TF857 subsystem into its normal operating position in the
  enclosure, but leave the receiver unlocked, set the Mode Select key to
  Automatic mode. The receiver can be opened; all OCP pushbuttons
  are enabled.

Figure B–1   TF857 Operator Control Panel

OPERATOR CONTROL PANEL

MODE SELECT KEY

OCP
DISABLED

AUTOMATIC
MODE

SERVICE
MODE

MANUAL
MODE

Eject

Load/Unload

Slot Select

BUTTON
AND
INDICATOR
AREA

CURRENT
SLOT
INDICATORS
0-6

Power On

Write
Protected

Tape In Use

Use
Cleaning Tape

Magazine
Fault

Loader Fault

OCP LABEL

DSSI NODE
ID LABEL

0

1

2

3

4

5

6

SHR_X1025B_89
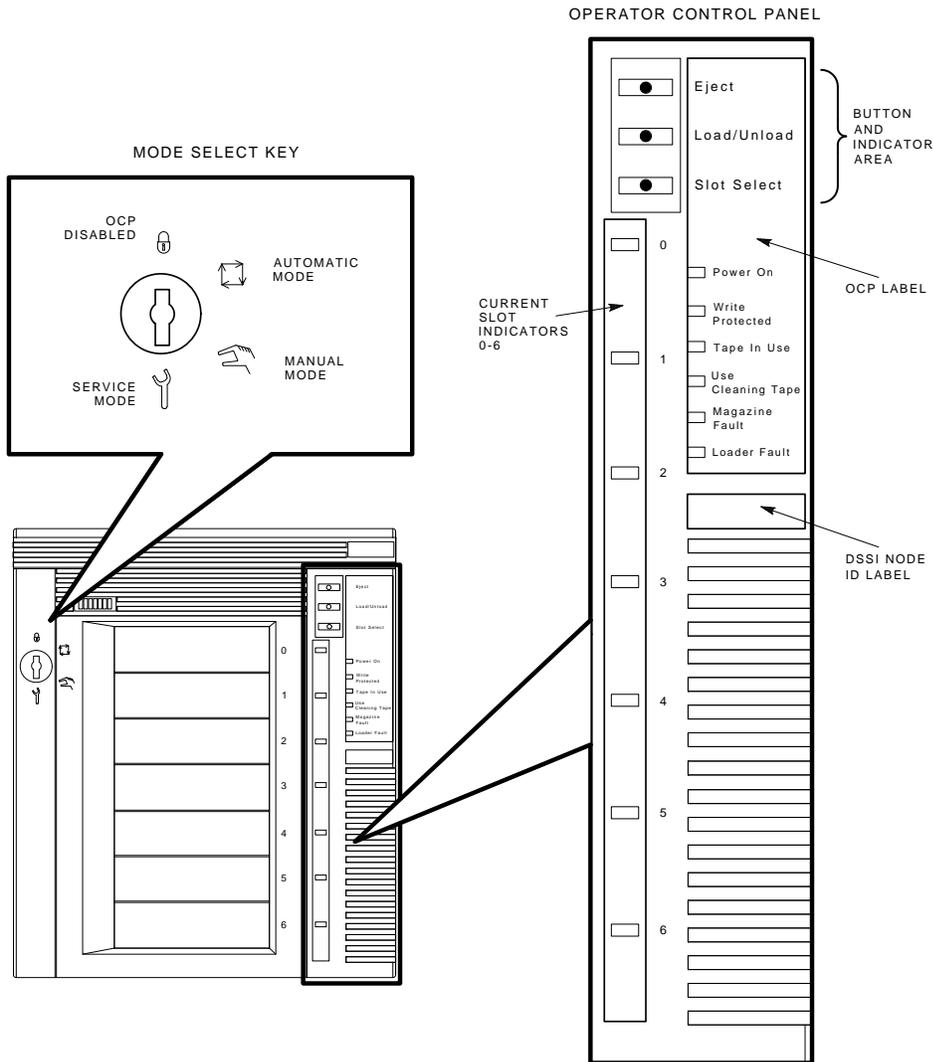
- **Manual mode** — Automatic loading and unloading of cartridges does not occur in this mode; rather, press the Load/Unload button to move each cartridge. This mode is most useful for, but not restricted to, copying specific files to or from tape.

  To lock the TF857 subsystem into the enclosure, set the Mode Select key to **Manual** mode. The receiver is unlocked and can be opened; all OCP pushbuttons are on.

NOTE
During Manual mode, the cartridge returns to the magazine, but the current Slot Select indicator does not advance forward to the next available cartridge.

B.2.2 Service Mode

Service mode is for performing head cleaning by manually loading the CleaningTape III and for performing servicing procedures. See the *TF857 Magazine Tape Subsystem Owner's Manual* for information on head cleaning.

To unlock the TF857 subsystem from its enclosure and remove it from its normal operating position, set the Mode Select key to **Service** mode. The receiver is unlocked and can be opened.

B.3   Operator Control Panel

The TF857 operator control panel (OCP) has 3 OCP pushbuttons and 16 indicators used with the Mode Select key (Table B–1). See Section B.2 for information on the Mode Select key and its functions. See Section B.4 for more details on button and indicator operations.

Table B–1   TF857 Operator Control Panel

Button/Indicator	Color	Function
Eject button	–	Opens the receiver, allowing access to the magazine for removal and insertion of cartridges. Also can be used to unload the tape from the drive to the magazine.
Eject indicator	Green	Indicates that pressing the Eject button opens the receiver. If a cartridge is in the drive, the cartridge unloads to the magazine and the receiver opens. If no cartridge is in the drive, the receiver opens.
Load/Unload button	–	Loads the currently selected cartridge into the TK857 tape drive, or unloads the cartridge in the drive to the magazine.
		If the Loader Fault or Magazine Fault indicators are on, can also be used to reset the subsystem.
Load/Unload indicator	Green	Indicates you can press the Load/Unload button.
Slot Select button	–	When pressed, increments the current slot indicator to the next slot.
Slot Select indicator	Green	Indicates the Slot Select button can be used. Pressing the button increments the current slot indicator to the next slot.
Power On indicator	Green	When on, indicates the TF857 subsystem is in a known good power state (ac and dc voltages are within tolerance). When off, indicates the power is missing from loader.

Table B–1   (Continued)   TF857 Operator Control Panel

Button/Indicator	Color	Function
Write Protected indicator	Orange	When on, indicates the cartridge currently in the drive is write-protected. When off, indicates the current cartridge is write-enabled.
		NOTE **You can write-protect cartridges by:** • **Setting the write-protect switch to write-protect.** • **Using software write-protect qualifiers. (See your operating system documentation.)** • **Using a CompacTape or CompacTape II cartridge previously written by another drive.**
Tape In Use indicator	Yellow	Indicates tape drive activity as follows: • Slow blinking indicates tape is rewinding; rapid blinking indicates tape is reading or writing. • When on steadily, indicates a cartridge is in the drive and the tape is not moving. • When off, indicates no cartridge is in the drive.
Magazine Fault indicator	Red	Indicates a magazine failure.
Use Cleaning Tape indicator	Orange	Indicates the read/write head needs cleaning.
Loader Fault indicator	Red	Indicates a TF857 loader transfer assembly error or drive error.

Table B–1   (Continued)   TF857 Operator Control Panel

Button/Indicator	Color	Function
Current slot indicators 0–6	Green	Identifies the current slot (see Slot Select button). Each current slot indicator blinks when its corresponding cartridge moves to or from the drive. Also used with the Magazine Fault or Loader Fault indicator to indicate the type of fault.

B.4   Slot Select, Load/Unload, and Eject Button Functions

The Slot Select, Load/Unload and Eject buttons are OCP pushbuttons. They contain a green indicator and are operable only when their corresponding indicators are on.

NOTE
The Load/Unload button has three functions: *load*, *unload*, and *reset*. If there is a loader fault and the Loader Fault indicator is on, press the Load/Unload button to reset the TF857 subsystem.

B.4.1   Selecting a Cartridge

Use the **Slot Select** button to select a cartridge; press this button to advance the slot indicator light to the next available slot. After a successful initialization, the TF857 subsystem automatically selects slot 0 and the Slot Select button becomes active. The Load/Unload and Eject indicators remain on during the slot selection.

B.4.2   Loading the Cartridge

Press the **Load/Unload** button to load the cartridge into the drive. This action causes the Select Slot, Load/Unload, and Eject indicators to turn off, and the elevator to move to the selected slot, indicated by the light. The cartridge is then removed from the magazine and placed in the elevator. The elevator moves to the drive position and inserts the cartridge into the drive. The indicators remain off until the tape has loaded to the beginning of the tape (BOT). After the cartridge is loaded into the drive, the Eject and Load/Unload indicators turn on, and the corresponding buttons are enabled. The Slot Select indicator remains off.

B.4.3 Unloading the Cartridge

CAUTION
Do not press the Load/Unload button until backup or other tape operations are stopped at the terminal. Doing so can result in operation failure and drive unavailability.

When you press the Load/Unload button, the Select Slot, Load/Unload, and Eject indicators turn off, and the cartridge unloads from the drive into the magazine. However, automatic operation now stops and the Select Slot operation does not increment. The indicators turn on once the cartridge is returned to the magazine.

The Load/Unload indicator must be on before you press the button to load or unload a cartridge. If the Loader Fault indicator is on, showing a malfunction, press the Load/Unload button to reset the subsystem and try to clear the error.

B.4.4 Opening the Receiver

The **Eject** button opens the receiver for insertion or removal of the magazine. It is disabled when the Mode Select key is in the OCP Disabled position. The Eject button can also be used to *unload* a tape from the drive.

NOTE
When a cartridge is not in the drive, the Slot Select, Load/Unload, and Eject indicators are on before any operation begins. Pressing the Eject button causes all indicators to turn off. The elevator then returns to its home position and the receiver opens.

When a cartridge is in the drive, the Eject and Load/Unload indicators are on before the operation begins. When you press the Eject button, both indicators turn off and the cartridge unloads from the drive and moves back into the magazine. The receiver then opens to allow access to the magazine.

In both situations, once the receiver is closed again, a magazine scan begins, and the indicators turn back on when the scan is complete.

B.5 Magazine

The front of the magazine has numbers, 0 through 6, that indicate the number of the slot.

NOTE
Insert and remove all cartridges at the *front* of the magazine.

B.5.1 Inserting a Cartridge into the Front of the Magazine

To simplify cartridge insertion, place the magazine on its back and facing you. Each slot is numbered — to ensure you are inserting the cartridge correctly in the front of the magazine. Usually, cartridges are inserted into consecutive slots.

To insert a cartridge into the magazine:

1. Grasp the cartridge with the CompacTape III label facing up and the write-protect switch facing you (Figure B–2).

2. Set the cartridge's write-protect switch to the desired position. If you want to write on the tape, slide the switch to the right (orange indicator is not visible). If you want to write-protect the tape, slide the switch to the left (orange indicator is visible).

Figure B–2   Write-Protect Switch on a Cartridge

SHR_X1020C_89
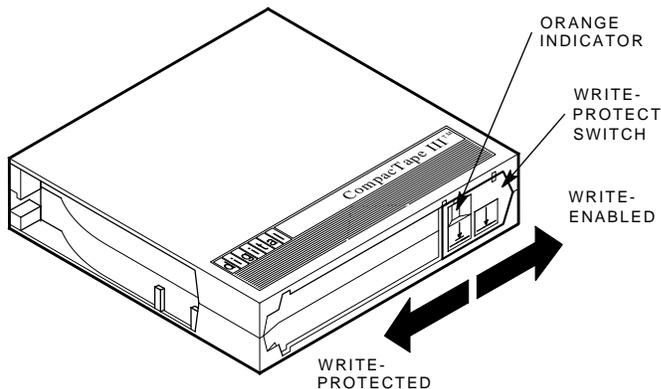
3.   Insert the cartridge (Figure B–3) by pushing it into the slot until you
     hear a click. A small metal tab holds the cartridge in place.

Figure B–3   Inserting a Cartridge into the Magazine

BACK OF
MAGAZINE

1

2   3

NOTE: Push tape in
until a click is heard

SLOT
NUMBERS
0-6

FRONT OF
MAGAZINE

SHR_X1021_89
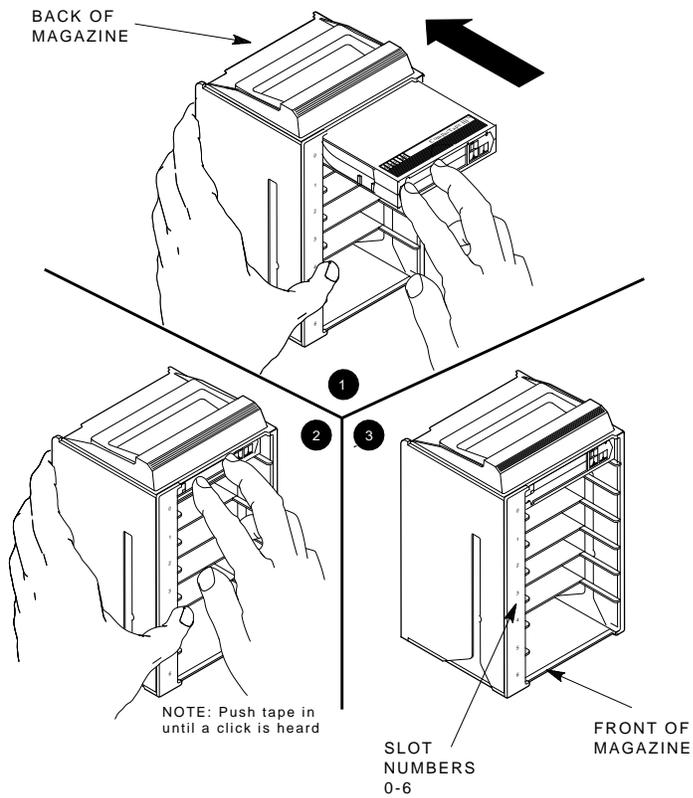
B.5.2 Removing a Cartridge from the Magazine

To remove a cartridge from the magazine, press the cartridge (Figure B–4) at the front of the magazine until you hear a click; then, release. The slot uses a spring-release action. When you press the cartridge in all the way, it pops out.

NOTE

Never apply labels to the top or bottom of tape cartridges. Doing so can cause cartridge jams in the TF857 subsystem. Use the space on the front of the cartridge for labels. If a jam occurs, call your Digital Customer Services representative.

B.5.3 Removing the Magazine from the Receiver

To remove the magazine from the receiver, be sure the:

1. Power On indicator is on (Figure B–1).

2. Tape drive is unloaded.

3. Eject indicator is on. (It must be on before you can press the Eject button.)

Then:

1. Press the Eject button (Figure B–1) to open the receiver.

2. Grasp the receiver after it opens (Figure B–5) and gently pull it forward to access the magazine.

3. Grasp the magazine's handle only to lift the magazine out of the receiver.

B.5.4 Installing the Magazine into the Receiver

To install the magazine into the receiver:

1. Slide the magazine down into the receiver (Figure B–5) while holding the magazine by the handle. Since the magazine is slotted, restore it in the correct orientation only.

2. Push the receiver closed.

3. Observe that the receiver is fully closed in the TF857 subsystem before proceeding.

Figure B–4   Removing a Cartridge from the Front of the Magazine

BACK OF
MAGAZINE

NOTE: Push tape in
until a click is heard

SLOT
NUMBERS
0-6

FRONT OF
MAGAZINE

SHR_X1022_89
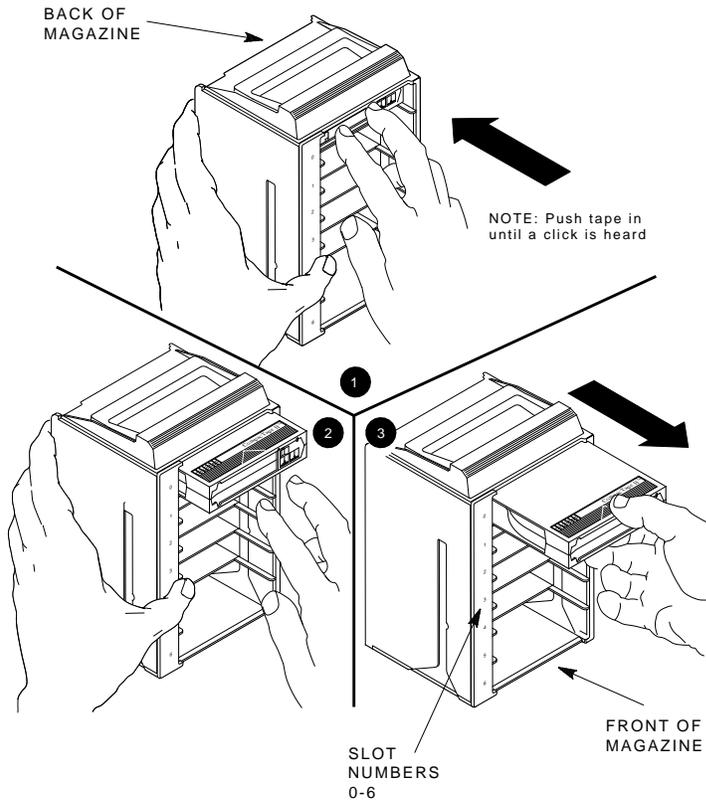
Figure B–5   Receiver Opened

FRONT
BEZEL

Eject

Load/Unload

Slot Select

Power On

Write Protect

Tape in Use

Use
Cleaning Tape

Drive Fault

Load Fault

SHR-X0046-90
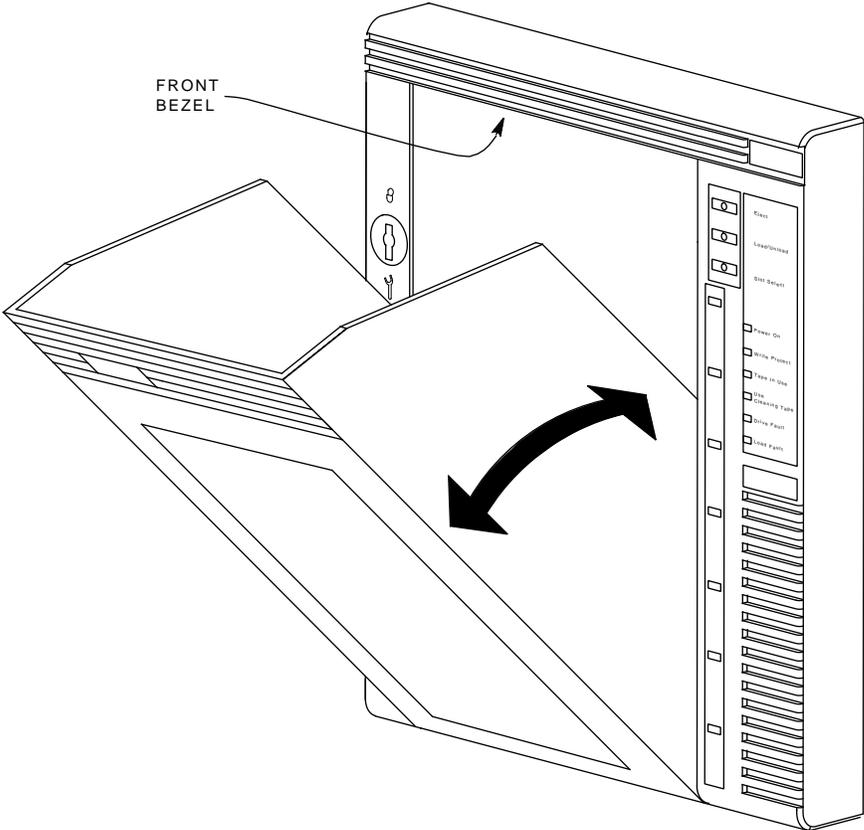
C
System Drive Removal and Replacement

Cannister drives used as boot or backup devices may be removed or replaced during normal operation. The tape drive is also a removable unit.

CAUTION

Carrier drives must not be removed, except by qualified maintenance personnel.

Always wear a grounded wrist strap when you remove or replace a tape or disk drive.

Shadowed drives must first be removed from the configuration before you remove them from the system. They must be added to the configuration when you return them to the system. When nonshadowed drives are removed, shut down the application (or part of the application) using the drive. The *VAXft System Services Manager's Guide* provides information on reconfiguring the system. This appendix includes:

- Removing and replacing a cannister drive

- Removing and replacing a carrier drive

- Using the server setup switch

C.1 Removing/Replacing a Cannister Drive

Figure C–1 shows the location of the latch that secures the cannister drives in the model 310 and 410 systems.

Figure C–2 shows the location of the latch that secures the cannister drives in the model 610 and 612 systems.

C.1.1 Removing a Cannister Drive

Do not power off the cabinet to remove a system drive. To remove a cannister drive from the system backplane:

1. Write protect a disk drive by pressing the summary panel Write Protect switch in. The Write Protect indicator should be on.

    Then take the disk drive off-line by pressing the summary panel On Line switch in.

    The summary panel switches have no effect on the cannister tape drives. Tape may be write protected by setting the write protect switch on the TK cartridge.

2. Set the drive power switch to off (0). Wait 15 to 20 seconds (for disk drive to stop spinning and interlock solenoid to release).

3. Attach the grounded wrist strap to your wrist.

    CAUTION
    Use great care when removing, replacing, or transporting a drive. Do not drop the drive or allow it to come into contact with any object while you carry it.

    Always wear a grounded wrist strap when you remove or replace a tape or disk drive.

4. See Figure C–1. Push the drive latch down and pull the drive straight out of the slot.

5. If you are not replacing the drive with another, a blank cannister module (PN 70-27929-01) must be inserted in the slot to maintain cooling airflow.

Figure C–1   Model 310/410 Cannister Drive Controls and Latch

MR-0183-90.DG
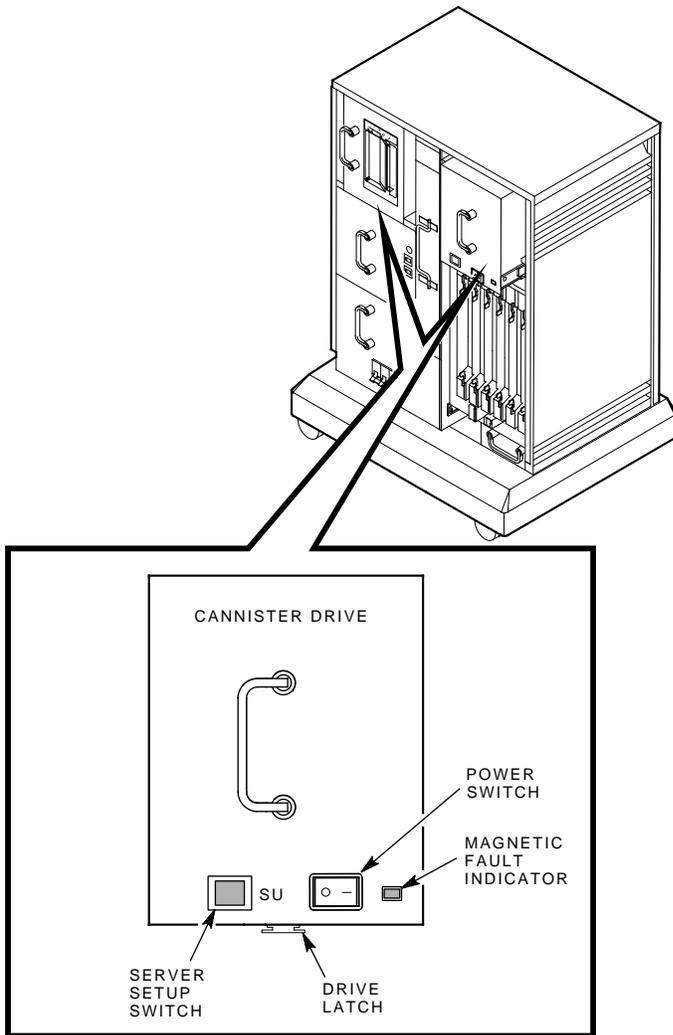
Figure C–2   Model 610/612 Cannister Drive Controls and Latch

MR–0471–91RAGS
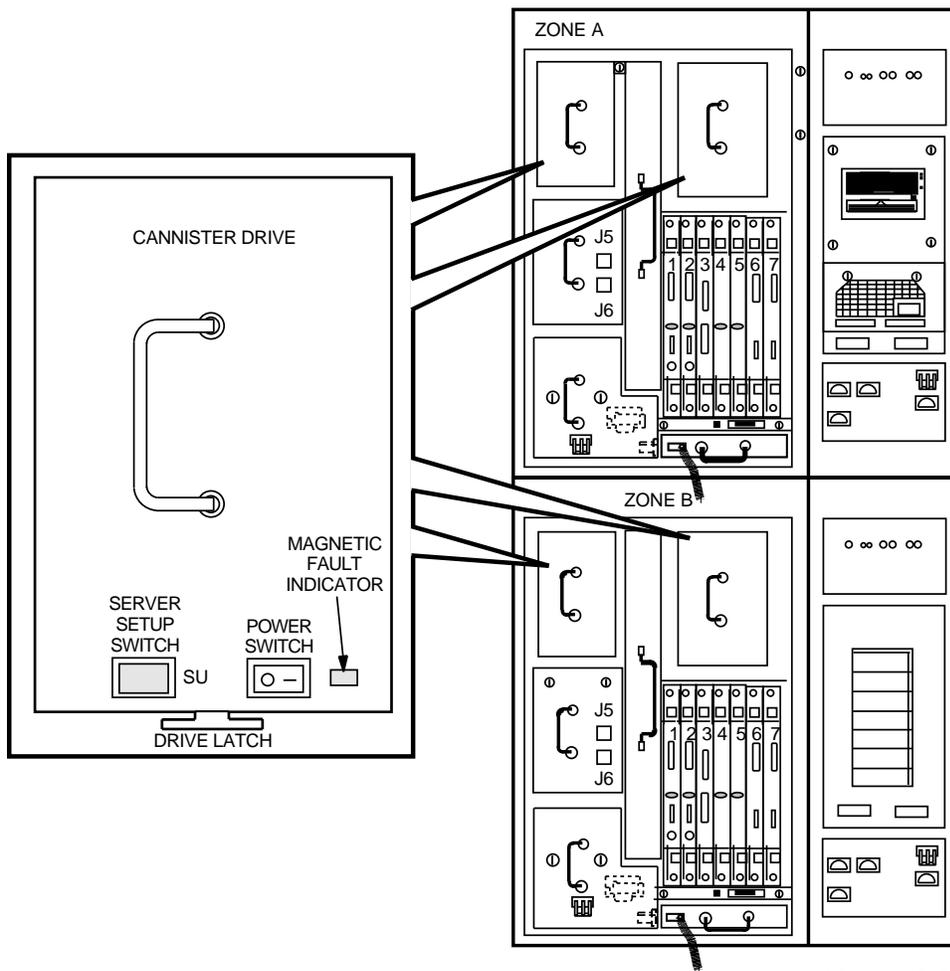
C.1.2 Replacing a Cannister Drive

When you remove a cannister disk or tape drive and then return it to the same slot, the drive keeps the same DSSI node address.

When you install a new drive, or replace a drive after replacing its DSSI interface module, use the server setup switch. Section C.3 covers use of the server setup (SU) switch.

To replace a cannister drive in the system backplane:

1. Attach the grounded wrist strap to your wrist.

<div align="center">CAUTION</div>

Use great care when removing, replacing or transporting a drive. Do not drop the drive or allow it to come into contact with any object while you carry it.

Always wear a grounded wrist strap when you remove or replace a tape or disk drive.

2. Insert the drive in the slot. Push the drive straight in and seat it firmly.

3. Secure the drive with the drive latch as shown in Figure C–1.

4. Set the drive power switch to on (1). Wait 15 to 20 seconds (for disk drive to come up to speed and Ready indicator to turn on).

5. Write protect the drive, if necessary. Then bring the drive on-line by releasing the On Line switch (button out).

   The summary panel switches have no effect on the cannister tape drives. Tape is write protected by setting the write protect switch on the TK cartridge.

C.2   Removing and Replacing a Carrier Drive

Figure C–3 shows the location of the captive screw that secures the carrier drives in the expander cabinets.

CAUTION

Carrier drives must not be removed, except by qualified maintenance personnel.

Always wear a grounded wrist strap when you remove or replace a tape or disk drive.

Figure C–3   Carrier Drive Controls and Captive Thumb Screw

MAGNETIC
FAULT
INDICATOR

SERVER
SETUP
SWITCH

SU

POWER
SWITCH

CAPTIVE
THUMB
SCREW

MR-0184-90.DG
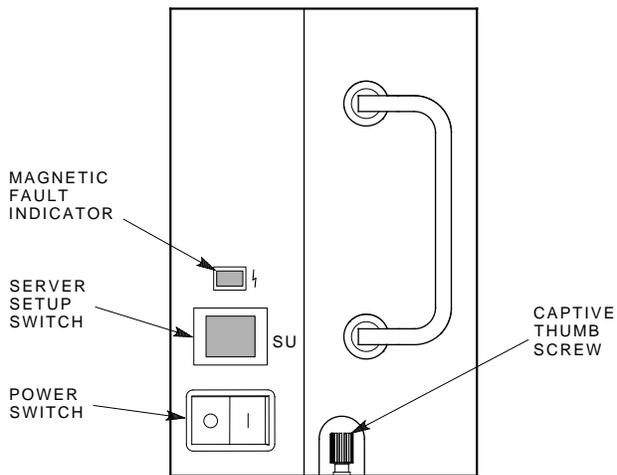
C.2.1 Removing a Carrier Drive

You do not need to power off the cabinet to remove a system drive. To remove a carrier drive:

1. Write protect the drive by pressing the summary panel Write Protect switch in. The Write Protect indicator should be on.

    Then take the drive off-line by pressing the summary panel On Line switch in.

2. Set the drive power switch to off (0). Wait 15 to 20 seconds (for disk drive to stop spinning and interlock solenoid to release).

3. Attach the grounded wrist strap to your wrist.

<div align="center">CAUTION</div>

Use great care when removing, replacing, or transporting a drive. Do not drop the drive or allow it to come into contact with any object while you carry it.

Always wear a grounded wrist strap when you remove or replace a tape or disk drive.

4. See Figure C–3. Release the captive thumb screw. Then pull the drive straight out of the slot.

5. If you are not replacing the drive with another, a blank carrier module (PN 70-27928-01) must be inserted in the slot to maintain cooling airflow.

C.2.2 Replacing a Carrier Drive

When you remove a carrier drive and then return it to the same slot, the drive keeps the same DSSI node address.

When you install a new drive, or replace a drive after replacing its DSSI interface module, use the server setup switch. Section C.3 covers use of the server setup (SU) switch.

To replace a carrier drive in the expander cabinet backplane:

1. Attach the grounded wrist strap to your wrist.

CAUTION
Use great care when removing, replacing, or transporting a drive. Do not drop the drive or allow it to come into contact with any object while you carry it.

Always wear a grounded wrist strap when you remove or replace a tape or disk drive.

2. Insert the drive in the slot. Push the drive straight in and seat it firmly.

3. Secure the drive with the captive thumb screw as shown in Figure C–3.

4. Set the drive power switch to on (1). Wait 15 to 20 seconds (for disk drive to come up to speed and Ready indicator to turn on).

5. Write protect the drive, if necessary. Then bring the drive on-line by releasing the On Line switch (button out).

C.3 Using the Server Setup Switch

The server setup (SU) switch is provided for use on a running system and has no effect when the system is halted.

CAUTION

The server setup switch must only be used during maintenance procedures.

Using the server setup switch when you power on a drive inhibits the drive from joining the DSSI cluster. This allows the console operator to set host from DCL and write DSSI parameters to the drive under the diagnostic/utility protocol (DUP) facility without halting the system.

DSSI parameters must be set whenever you install a tape or disk drive with unknown parameters. Placing a drive in service without first writing the parameters could cause irretrievable loss of data. Write DSSI parameters if the drive you are installing or replacing is:

• A new drive with factory-set parameters

• An existing drive with a new DSSI controller/interface module

The diagnostics chapter of the *VAXft Systems Maintenance Guide* (EK-VXFT1-MG) provides information on setting host from DCL. The RBD command description in Chapter 6 of this manual provides information and guidelines for writing DSSI parameters to the storage devices under the DUP facility.

To set drive parameters on a running system, power on the drive as follows:

1. Press and hold the server setup switch

2. Set the power switch to on (1)

3. Release the server setup switch

It takes 15 to 20 seconds for a disk drive to come up to speed and the Ready light to turn on (light). Then set the drive switches as follows:

1. Place a disk drive on-line by releasing the summary panel On-Line button to the out position

2. Write-enable a disk drive by releasing the summary panel Write Protect button to the out position

3. The summary panel switches and indicators have no effect on a tape drive

When you have set host and written the DSSI parameters, place the drive in service as follows:

1. Set the drive power switch to off (0).

2. Wait a few seconds for the drive power to bleed off. Wait 15 to 20 seconds for a disk drive to stop spinning.

3. Set the drive power switch to on (1). Wait 15 to 20 seconds for a disk drive to come up to speed and the Ready indicator to turn on (light).

4. Set the Write Protect switch to the desired state and add the drive into the system configuration.

D
Module Handling, Removal, and Installation/Replacement Procedures

This appendix describes how to remove or install a logic module in a system cabinet.

NOTE
The following procedures are intended for use during system installation. Before using any of these procedures on a system that is running, first contact the responsible customer representative, system manager, or application manager to shut down the zone and power off the system cabinet.

This appendix includes:

- Module handling and ESD procedures

- Removing a module

- Installing/replacing a module

Observe the module handling and ESD procedures (Section D.1) whenever you need to remove, install, or replace a logic module in a system cabinet.

CAUTION
An ESD wrist strap, ground clip, and grounded ESD workmat must be used as described in Section D.1 whenever you handle the logic modules.

If you **must** use any of these procedures on a running system, first contact the responsible customer representative, system manager, or application manager to shut down the zone and power off the system cabinet. The *VAXft System Services Manager's Guide* (AA-NL35A-TE) describes how to shut down the zone and power off the system cabinet from the console.

D.1   Module Handling and ESD Procedures

Three grounding cords are stored in the lower front door of the system cabinet. One cord is connected to a wrist strap. The other cord is connected to a grounding clip for attaching to an antistatic ESD box. When the wrist strap is in place, there must be no more than 10 MΩ through the grounding cord, wrist strap, and your wrist.

T3000-series modules are very fragile and static sensitive. Use the grounding cords and observe the following precautions when handling logic modules.

- Always put on a grounded wrist strap **before** handling a logic module.

- Be sure nothing touches the module or the components on the module because leads can be damaged. Avoid contact with the wrist strap, grounding cord, clothing, jewelry, cables, or other modules.

- Minimize any potential for physical or ESD damage as follows:

  — Remove all unnecessary materials in the service area (tools, documents, paper, plastics, polystyrene).

  — Avoid clothing that contains more than 80% nonconductive materials (silk or synthetic fiber).

  — Do not wear a jacket. Wear a short-sleeve shirt or roll up the sleeves on a long-sleeve shirt.

  — Do not wear jewelry.

  — Loose clothing, such as a necktie, must be fastened in place.

- Before removing a module from an ESD box, place the box on a clean surface. Do not allow the box to fall.

NOTE
Never place an ESD box on the floor.

- Keep the module in the antistatic ESD box until you are ready to install it.

- Before removing a module from an ESD box, attach the grounding clip to the ESD box.

- If you are replacing a module, put the module you just removed on a grounded ESD workmat on a clean surface in the service area. Put the module side 2 down on the ESD workmat.

- Save the ESD box for future use. Store a module in the ESD box until you are ready to install it.

- When removing or installing a module, be sure the module does not come into contact with a cable or another module. Also, be sure nothing else touches the module or any module components.

- Hold a module **only** by the handle or by the edges with your hands flat and perpendicular to the circuit board. Do not touch the etch circuit or any components, leads, or connector pins. Do not bend the module.

- Do not slide the module across any surface because the leads are fragile and can be damaged.

- An ESD sensitive module may come into contact with the following items **only**:

  — Approved ESD workmat

  — Antistatic packaging on the ESD workmat

  — Tools and test equipment on the ESD workmat

  — Chassis being serviced

  — Hands of someone wearing an ESD wrist strap

D.2   Removing a Module

To remove a module (or a T3999 blank module) from a system backplane:

CAUTION
An ESD wrist strap, ground clip, and grounded ESD workmat must be used as described in Section D.1 whenever you handle the logic modules.

1. Locate the module to be removed. Attach the grounded wrist strap to your wrist.

2. If the module has cables attached, remove the cables.

3. Release the fasteners at the top and bottom of the module handle. Push in each fastener and turn it one quarter turn to the left.

4. Use both hands to remove the module. Pull the module levers to disengage the backplane connector. You may hear a "snap" when the connector disengages.

5. Grasp the module handle. Slide the module out of the card cage slot.

6. Put the module in an ESD box or on a grounded ESD workmat.

D.3   Installing/Replacing a Module

To install/replace a module in the system backplane:

CAUTION
An ESD wrist strap, ground clip, and grounded ESD workmat must be used as described in Section D.1 whenever you handle the logic modules.

1. Before removing the module from the ESD box, attach a grounding clip to the ESD box.

2. Holding the module **only** by the handle, remove it from the ESD box. Hold the module vertically with the backplane connector on the right.

3. Guide the edges of the module into the upper and lower tracks of the card cage slot. Gently push the module and slide it into position.

4. Use both hands to seat the module. Press the module levers at the top and bottom with equal force. You may hear a "snap" when the module is fully seated.

5. Secure the fasteners at the top and bottom of the module handle. Push in each fastener and turn it one quarter turn to the right.

6. Attach any cables that must be connected.

7. Make sure the cables are connected correctly and verify installation procedures.

8. Contact the responsible customer representative, system manager, or application manager **before** you power on the system cabinet.

9. When you are ready, power on the system cabinet by turning the ac circuit breaker to the ON (up) position.

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