
DSSI

DSSI Warm Swapping Guide for BA400-Series Enclosures and KFQSA Adapters

Order Number: EK-457AA-SG-001

Tables

Preface

This manual describes the warm swapping procedures for the various devices available for Q–bus Digital Storage Systems Interconnect (DSSI) enclosures. This is the first time that these procedures have been documented.

Structure of This Manual

Chapter 1	Understanding Digital Storage System Interconnect (DSSI) Warm Swapping
Chapter 2	Warm Swapping Procedure for Q–bus System CPU Modules
Chapter 3	Warm Swapping Procedure for KFQSA (M7769) Q–bus Digital Storage System Interconnect (DSSI) Modules
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Appendix A	Related Documents
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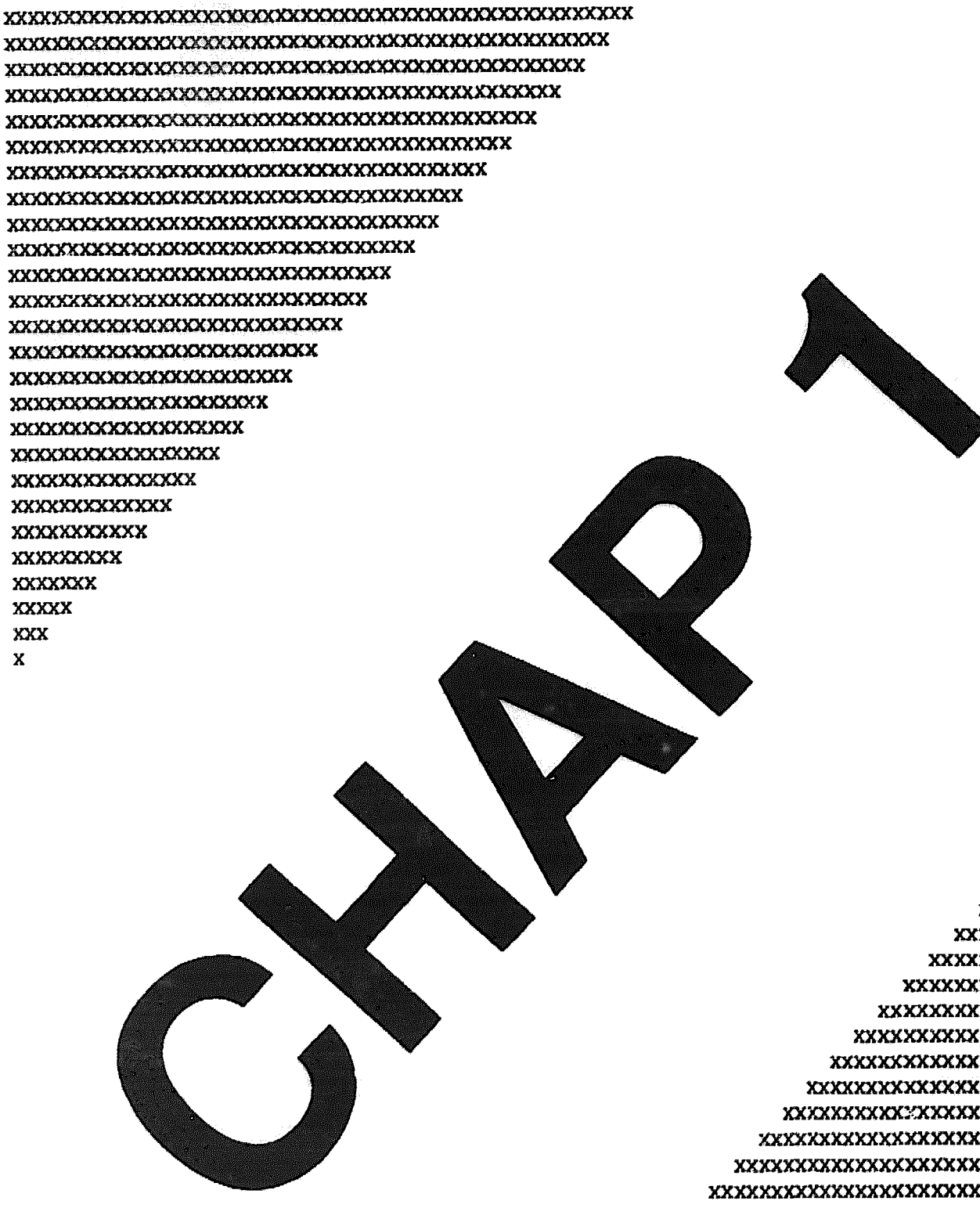
Appendix C	ISE Parameter Work Sheets

Intended Audience

This document is intended for Digital Services personnel and self-maintenance customers.


CHAPTER 1

1

Understanding DSSI Warm Swapping

1.1 Introduction

This document describes warm swapping procedures for the Q–bus hardware devices that are Digital Storage Systems Interconnect (DSSI) field-replaceable units (FRU). This chapter contains a brief overview of the following:

- DSSI warm swapping
- DSSI-based devices that *do* support warm swapping
- DSSI-based devices that *do not* support warm swapping
- Physical attributes of the DSSI bus
- Warm swapping minimum requirements

1.2 Warm Swapping

DSSI *warm swapping* refers to the procedure by which a Digital Storage Systems Interconnect (DSSI) field-replaceable unit (FRU) is powered off and removed from an active DSSI bus without affecting availability of the host system or the rest of the DSSI subsystem. When performed properly, warm swapping eliminates the need for shutting down the entire VAXcluster system during certain routine maintenance activities.

Without warm swapping, the necessary removal or replacement of any one DSSI device (such as disks, tape drives, or adapters) requires that an entire local area VAXcluster system or multisystem DSSI VAXcluster configuration be properly shut down and powered off.

Warm swapping procedures make it possible to preserve system resources when replacement or removal of a device is necessary. Within DSSI VAXcluster configurations, warm swapping DSSI Q–bus adapters, CPUs, and ISEs increases system availability since there is no need for shutting down the entire VAXcluster system and/or mass storage resources.

1.3 DSSI Devices and Warm Swapping

The following are DSSI FRUs:

- Q–bus System CPUs with embedded DSSI adapters
- Q–bus option DSSI adapters
- RFxx or TFxx series Integrated Storage Elements (ISEs).

The following sections describe the devices that *do* and *do not* support warm swapping procedures.

Note

For warm swap procedures of Digital's SFxx or TF857 DSSI storage building blocks see related documentation listed in Appendix A.

1.3.1 DSSI Devices That *do* Support Warm Swapping

Using the procedures listed in this document, the following DSSI devices will support warm swapping:

- RFxx devices within BA400-Series and R23RF-series enclosures
- TFxx devices within BA400-series enclosures
- BA440-based and BA441-based CPUs with embedded DSSI adapters and the H3604 (70-27400-01 revision C01) console panel
- KFQSA (M7769, revision K04 or later) Q–bus option DSSI adapters with S-box (70-26020-02) front handles.

Note

Warm swapping procedures are not supported for KFQSA (M7769) Q–bus option adapters within BA200-series enclosures when the adapter is configured as the primary DSSI adapter connected to the internal DSSI bus of these enclosures.

However, if a second KFQSA (M7769, revision K04 or later) Q–bus adapter with the S-box handle (70-26020-02) is configured within the BA200-series enclosure, warm swapping of this adapter *is* supported.

1.3.2 DSSI Devices That *do not* Support Warm Swapping

Due to architectural limitations described within this document, the following Digital DSSI devices *do not* support warm swapping:

- RFxx devices within BA23-series, BA123-series, and BA200-series enclosures
- TFxx table top enclosures
- CPUs with embedded DSSI adapter and DSSI terminators, such as the KA640 (M7624), and the KA660 (M7626)
- BA440-based and BA441-based CPUs with embedded DSSI adapters without the H3604 console panel (70-27400-01 revision C01)
- Any KFQSA Q–bus option DSSI adapter without the S-box front handle (70-26020-02)

Caution

Warm swapping rules and regulation procedures should be fully understood before attempting to repair or replace any DSSI device.

1.4 DSSI Bus Physical Properties

Like most electrical buses, the DSSI bus requires the maintaining of four physical properties to support its signal integrity. The four properties are:

- DSSI Termination
- DSSI Continuity
- DSSI VTERM
- DSSI Enclosure Power Cycling Limitations

To successfully perform warm swapping maintenance, you must fully understand these four physical properties of the DSSI bus.

1.4.1 DSSI Termination

Note

Make certain that all DSSI buses are properly terminated at both ends.

There must be proper DSSI termination present at both ends of a DSSI bus. This termination can be supplied by the presence of a DSSI termination connector (12-29258-01) or DSSI CPUs and Q–bus adapters which employ embedded DSSI termination through the use of resistive integrated circuit (IC) packages.

CPUs and Q–bus adapters with embedded termination are all KA640 (M7624) and KA660 (M7626) CPU modules and KFQSA (M7769 revision J06 or earlier) Q–bus adapter option. To be certain of which revision of the KFQSA a system may contain, refer to Chapter 3, Warm Swapping Procedures for KFQSA Q–bus DSSI Modules, later in this document.

CPU modules supported within the BA440 and BA441 system enclosure do not contain embedded DSSI termination for their embedded DSSI adapters. Resident on the BA440 and BA441 system backplane, are embedded resistive IC packages that supply DSSI termination for the CPU end of DSSI BUS 0. This is true for all VAX 4000 Model 300 and later systems. As for BUS 1 of the BA440 and BA441 enclosures, proper DSSI termination must be applied to both DSSI connections of the CPU's H3604 front console panel.

1.4.2 DSSI Continuity

Note

Make certain that all DSSI buses are kept continuous during all moments of operation.

Warm swapping procedures *do not* include the removal or repair of *any* enclosure internal or external DSSI cables when they are attached to an active DSSI bus. These cables include:

- All enclosure internal DSSI cables attached to the DSSI connector of a CPU and/or KFQSA Q–bus adapter.
- All length variations of BC21M, BC22Q, and BC21Q external DSSI cables.

WARNING

The improper removal or replacement of any DSSI cable, terminator, distribution panel, or DSSI adapter may render the bus non-continuous or improperly terminated and can result in DSSI bus errors which could potentially cause data corruption on ISEs.

1.4.3 DSSI VTERM

Note

Keep in mind that the DSSI cable carries internal terminator voltage power (VTERM).

Unlike other components of a Q–bus system, the DSSI bus itself will still have power applied to it even if an enclosure to which the bus is attached is powered off. Due to the internal propagation of a +5 Vdc signal line, the DSSI bus remains active even if only one of the systems or expanders to which it is attached is powered up.

Known as DSSI VTERM (for TERMinator Voltage), this +5 Vdc signal line is essential for the proper operation of DSSI bus termination circuitry. Therefore, VTERM is applied by all BA400-series enclosures and adapters which support DSSI devices.

VTERM is physically provided to the DSSI bus by the following enclosures and adapters through the following means:

- B400X—via M9715-AA module located to the left of H7874 power supply
- R400X—via M7493-PA module located to the left of H7874 power supply
- BA440 DSSI BUS 0—via VTERM Regulator module (54-20404-01) on backplane
- BA440 DSSI BUS 1—via H3604s +5 Vdc through 2.0 A 125 V (F3) fuse
- KFQSA—on board via +5 Vdc through 2.0 A 125 V (F1) fuse
- KA640—on board via +5 Vdc through 1.5 A 125 V (F3) fuse
- KA660—on board via +5 Vdc through 2.0 A 125 V (F3) fuse

For CPUs within BA440 system enclosures, VTERM is applied by either the backplane resident VTERM regulator module or the +5 Vdc/fuse circuit of the H3604 CPU console front panel.

For example, consider a BA440 attached via a common DSSI through an R400X expander to a BA430 system enclosure. If the R400X is powered off for repair, it appears that all of its components are inactive. However, the DSSI bus which passes through the enclosure is still being powered with VTERM sourced at the remaining two enclosures of the configuration.

It is for this reason that care must be taken to avoid inappropriately removing or replacing DSSI devices.

1.4.4 DSSI Enclosure Power Cycling Limitations

Note

Before removing any DSSI device, the *entire* enclosure in which the device is located must be powered off.

Within almost all Digital Q–bus systems and storage expansion pedestals, the need for powering down a component contained within the enclosure mandates the power cycling of the entire enclosure.

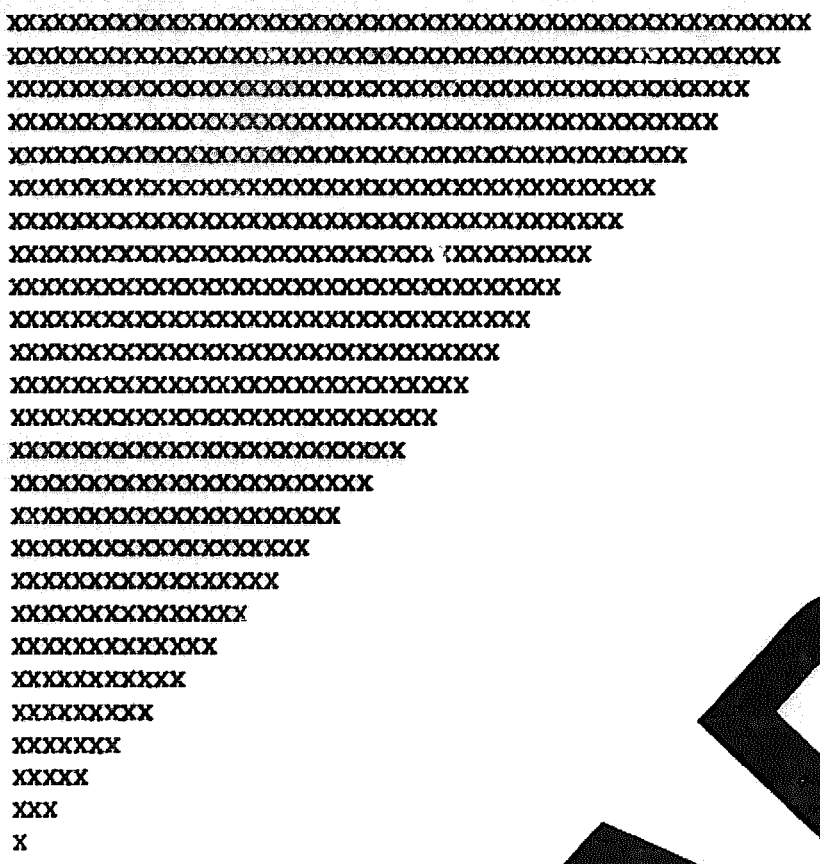
For example, consider the necessary maintenance of a BA440-based DSSI device. In order to repair or replace the device, the entire enclosure must be powered off, resulting in the temporary loss of all ISE, Q–bus, memory, and CPU resources within the enclosure.

Consequently, proper system management tasks (for example, dismounting of all affected devices) must be properly planned and executed.

1.5 Warm Swapping Requirements

The following are the minimum requirements for implementing any warm swapping procedures:

- All DSSI buses must be properly terminated at both ends.
- All DSSI buses must remain electrically continuous, from end-to-end.
- Before warm swapping any device, the entire enclosure in which the device is located must be powered off.
- Be sure to follow all warm swapping instructions in the appropriate sections of this document.



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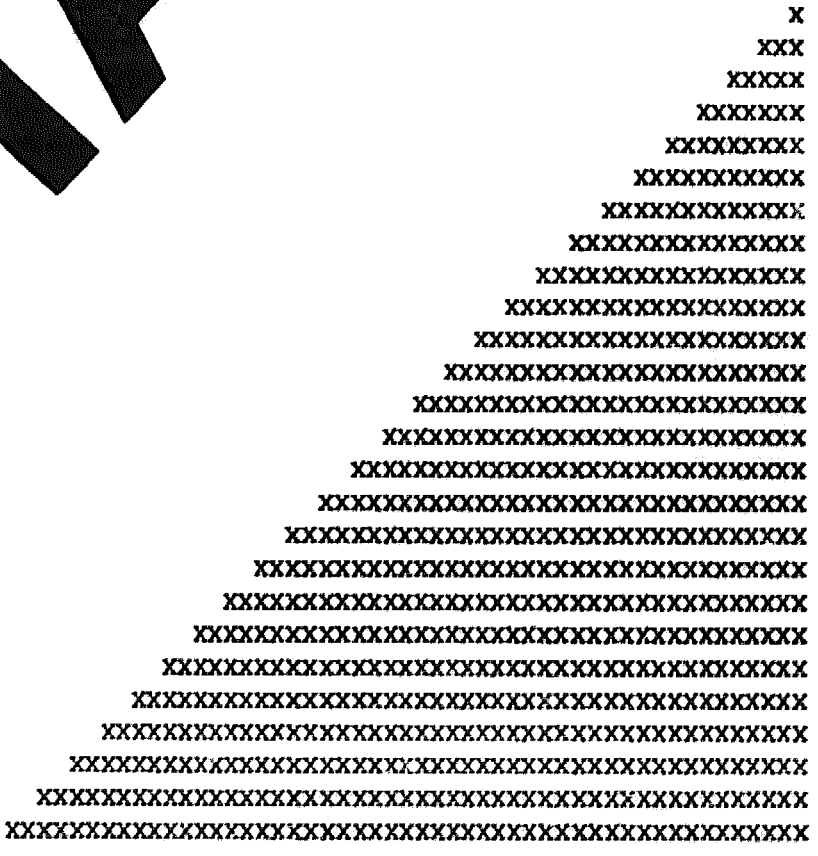


2

Warm Swapping Procedures for CPU Modules

2.1 Introduction

This chapter contains a description of the following:

- Description of CPU modules that *do* support warm swapping
- Description of CPU modules that *do not* support warm swapping
- Removal and installation procedures for warm swapping CPU modules

2.2 Warm Swapping CPU Modules

Warm swapping of CPU modules applies only to the repair and replacement of failed CPUs within multisystem DSSI VAXcluster configurations (where two or more CPU modules make up the DSSI VAXcluster system). The following sections describe those CPU modules that support warm swapping procedures, along with any restrictions that may apply.

2.2.1 Non-DSSI CPU Modules (KA630, KA650, and KA655)

Like other non-DSSI devices (fan trays, power supplies, memory, non-DSSI Q–bus options, and so forth) the MicroVAX II (KA630), MicroVAX 3500/3600 (KA650), and MicroVAX 3800/3900 (KA655) series CPUs can be properly shutdown, powered down and replaced without disturbing any DSSI bus.

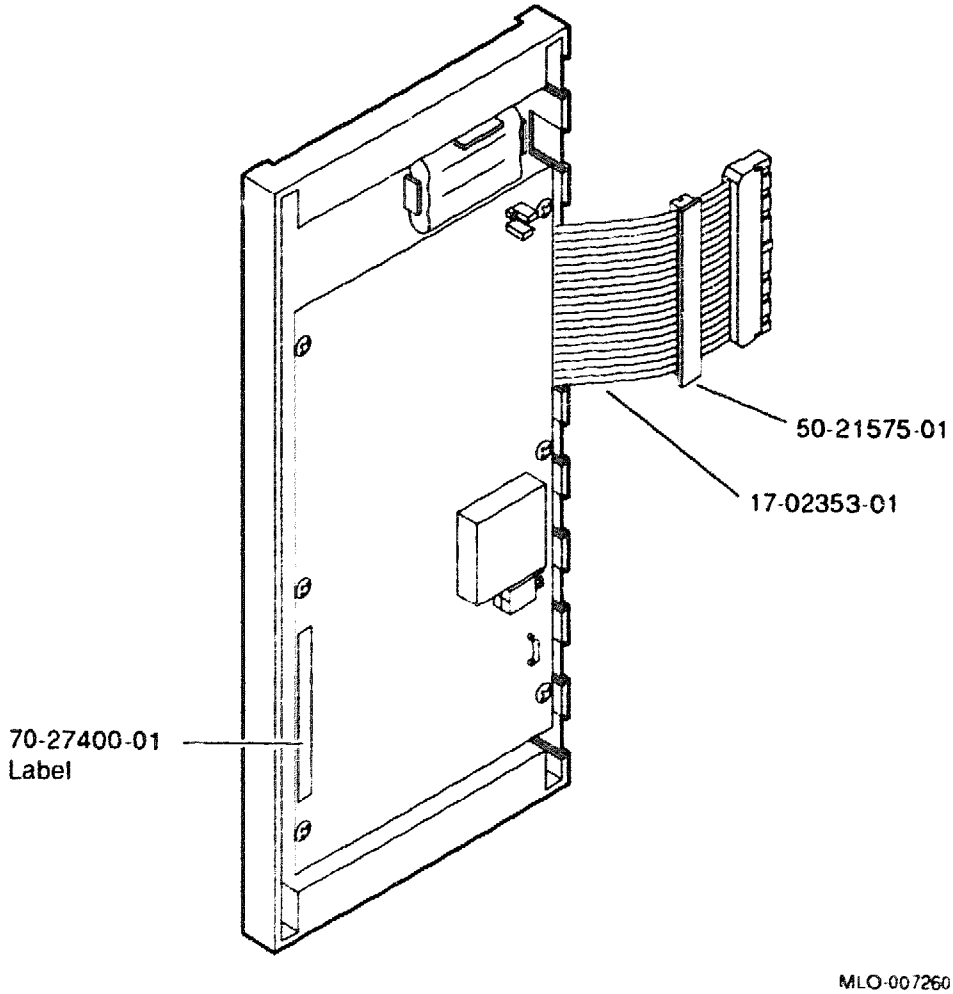
Since these CPUs do not contain DSSI logic and are not connected directly to a DSSI, the replacement or removal of such modules is not *technically* considered warm swapping.

2.2.2 DSSI CPU Modules (KA670 and KA680)

Due to DSSI signal routing between the H3604 console front panel module of the KA670 and KA680 CPUs in the BA440 and BA441 enclosures, *not all* such systems support warm swapping of the resident CPU.

Only the H3604 (70-27400-01 revision C01 or later) front panel will support warm swapping of its CPU. This revision of the H3604 can be identified by the presence of a small connector/printed circuit module combination (50-21575-01) attached to the (17-02353-01 revision B01) cable assembly (Figure 2–1).

Figure 2–1 H3604 Console Front Panel (17-02353-01 revision B01)



Caution

Earlier models of the H3604 front panel (70-27400-01 revision B01 and earlier) front panel *do not* have the appropriate cable assembly to support warm swapping.

2.3 CPU Modules That *do not* Support Warm Swapping

The following section describes the details of those CPU modules that *do not* support warm swapping procedures.

2.3.1 DSSI CPU Modules (KA640 and KA660)

The support for warm swapping both the MicroVAX 3300/3400 (KA640) and VAX 4000 Model 200 (KA660) CPUs is *not* possible due to the modules' on-board DSSI termination designs. Removing such modules from a live DSSI will cause improper DSSI termination.

2.4 Removal and Installation Procedures

The following sections describe the removal and replacement of failed Q–bus CPU modules.

2.4.1 Considerations for System Enclosures

In the case of a failing system CPU within a multisystem DSSI configuration, proper VMS operating system shutdown procedures must be performed for that particular Q–bus system setup. Provided the system disk is not resident within this enclosure, the remaining systems within the multisystem configuration should remain up and running during the warm swapping maintenance.

All ISEs resident within the failing system enclosure, as well as any local devices being served by the system, will be temporarily unavailable during the replacement of the failing CPU. Consequently, proper system management planning should be considered in advance so that all users are made aware of the scheduled maintenance and *all* affected devices are properly dismounted.

2.4.2 Shutting Down VMS System Software

If the VMS operating system is up and running on the failing CPU, the following command should be issued:

```
$ @SYS$SYSTEM:SHUTDOWN
```

This should be followed by system-specific shutdown options.

For proper system shutdown procedures, refer to the *VMS System Manager's Manual.*

2.4.3 Obtaining and Recording CPU Module Specific Parameters

Within DSSI multisystem VAXcluster configurations, each CPU has specific console level parameters used for proper system booting and configuring.

The CPU system-specific parameters are stored within the CPU's embedded System Support Chip's (SSC) internal RAM, which is battery backed up by the CPU's front console panel battery pack. Disconnecting any console front panel from its CPU module will cause the loss of these parameter values.

Before disconnecting any CPU from its console front panel, one must first note the programmed CPU specific RAM parameters. Below is a list of the most common parameters. Use the console command SHOW to record the failed systems parameters in Table 2–1.

Note

For most MicroVAX series CPUs many of these parameters will be *not applicable.*

Table 2–1 Failed System Specific Console Parameters

Command	Value
>>> SHOW BOOT	
>>> SHOW BFLAG	
>>> SHOW CONTROLP	
>>> SHOW HALT	
>>> SHOW LANGUAGE	
>>> SHOW RECALL	

If the system has failed such that one cannot access these parameters, refer to the site-specific configuration booklet for the proper values.

2.4.4 Removal and Replacement of CPU Modules

CAUTION

Static electricity can damage integrated circuits. Always use antistatic wrist strap, grounding clip, and antistatic pad found in the static-protective field service kit (29-26246-00) when working with the internal parts of any computer system.

After the system manager shuts down the operating system and all appropriate CPU-specific parameters are obtained, power down the system enclosure, remove the failed CPU, and install the replacement CPU as described in the appropriate enclosure maintenance manual listed in Appendix A.

2.4.5 Restoring CPU Module Specific Parameters

After the repaired or replaced CPU is installed, power up its enclosure. Use the console command SET to reprogram the new CPU with the original CPU's system-specific console parameters which were recorded in Table 2–1.

2.4.6 Booting of CPU Modules

After the repaired or replacement CPU is reprogrammed, use the following console command:

```
>>>BOOT
```

With its BOOT and BFLAG parameters properly reprogrammed as described in Section 2.4.5, the replacement CPU will automatically boot the appropriate device and VMS system root needed to bring up the entire VMS operating system software.


CHAP 3

3

Warm Swapping Procedures for KFQSA Q–bus DSSI Modules

3.1 Introduction

This chapter contains a detailed description of the following:

- Description of KFQSA modules that *do* support warm swapping
- Description of KFQSA modules that *do not* support warm swapping
- Removal and installation procedures for warm swapping KFQSA modules

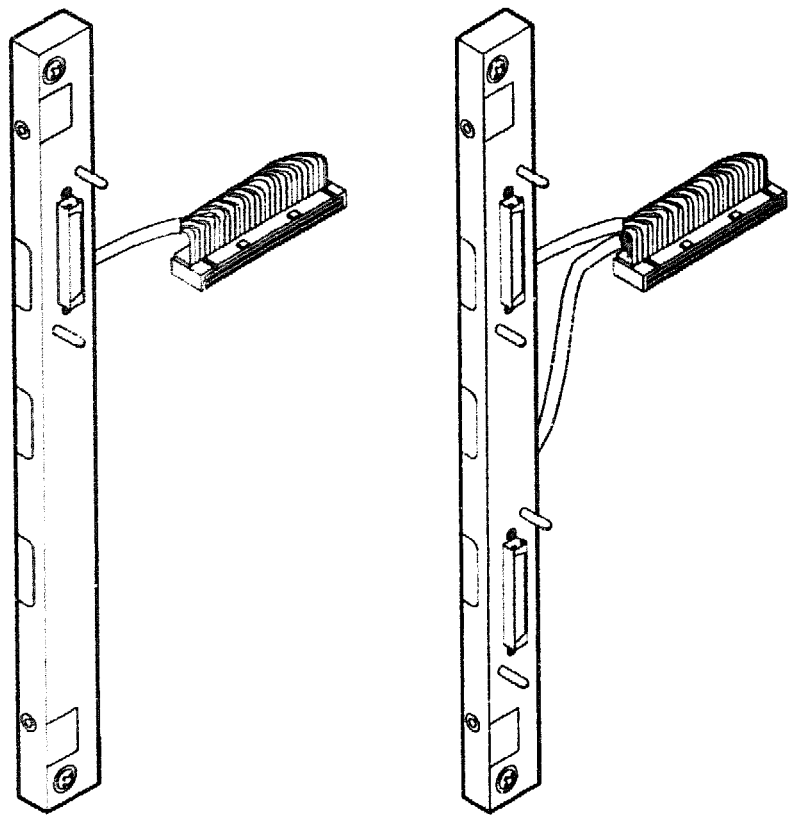
3.2 Warm Swapping KFQSA Q-Bus Modules

Warning

Warm Swapping of the KFQSA Q–bus option requires additional information given in the *KFQSA Installation and User Manual* (EK-KFQSA-IN). This manual should be obtained *before* performing warm swapping procedures on any KFQSA Q–bus adapter.

Warm swapping of KFQSA Q–bus modules only applies to the repair and replacement of failing KFQSA Q–bus modules within multisystem DSSI VAXcluster configurations. The following section describes the KFQSA Q–bus modules that support warm swapping maintenance, along with any restrictions that may apply.

Figure 3–1 Models of the KFQSA S-box Front Handle



3.2.1 KFQSA (M7769, revision K04 and later) Support Warm Swapping

The KFQSA (M7769, revision K04) Q–bus module and its S-box front handle (70-26020-02) are specifically designed to offer warm swapping capabilities. Shown in Figure 3–1, this modified S-box front handle (70-26020-02) can easily be distinguished from its single input counterpart (70-26020-01) by its physical characteristic of having two external DSSI connectors.

The *proper use* of the warm swapping S-box front handle (70-26020-02) also requires the simultaneous removal of on-board DSSI termination resistors from the KFQSA (M7769, revision K04) Q–bus module. (See Section 3.4.4 for more information.)

KFQSAs (M7769, revision K04 and later) are the only models that support warm swapping procedures for the BA200-series and BA400-series enclosures.

3.3 KFQSA Revisions That *do not* Support Warm Swapping

Due to a lack of provisions to maintain external DSSI bus continuity, coupled with non-removable embedded DSSI termination, KFQSA (M7769, revision J06 or earlier) Q–bus modules *do not* support warm swapping maintenance techniques. The attempted warm swapping of any of the earlier revisions of the KFQSA Q–bus module will leave the DSSI bus not terminated and susceptible to bus errors which could cause data corruption on ISEs.

Warm swapping procedures are also not supported for KFQSA (M7769) Q–bus option adapters within BA200-series enclosures when the adapter is configured as the primary DSSI adapter connected to the internal DSSI bus of these enclosures.

3.4 Removal and Installation Procedures

The following sections describe the procedures required to remove and replace failed KFQSA (M7769, revision K04 or later) Q–bus modules.

3.4.1 Considerations for System Enclosures

Before replacing any system KFQSA Q–bus module, proper system management shutdown procedures must be performed, if possible.

In the case of a failing KFQSA Q–bus adapter within a multisystem DSSI configuration, proper VMS operating system shutdown procedures must be performed for that particular Q–bus system setup. Provided the system disk is not resident within this enclosure, the remaining systems within the multisystem configuration should remain up and running during the warm swapping maintenance.

3.4.2 Shutting Down VMS System Software

If the VMS operating system is up and running on the failing KFQSA Q–bus, the following command should be issued:

```
$ @SYS$SYSTEM:SHUTDOWN
```

This should be followed by system-specific shutdown options.

For proper system shutdown procedures, refer to the *VMS System Manager's Manual*.

3.4.3 Obtaining and Recording KFQSA Module Specific Parameters

Similar to the system-specific parameters of a CPU, the KFQSA Q–bus module contains programmed information that is specific to the system configuration in which it resides.

Each module within a Q–bus must use a set of unique Q–bus addresses and interrupt vectors. These addresses, also known as the control and status register (CSR) addresses, are necessary for each Storage System Port (SSP) controller that resides on the Q–bus. Typically, these addresses are uniquely set with the use of switches or jumpers resident on most Q–bus options.

Through its unique architecture, the KFQSA Q–bus module *emulates* an SSP controller for each ISE connected to its DSSI bus. Therefore, the KFQSA Q–bus module must present a separate CSR address for each emulated controller.

Unlike most Q–bus, modules the KFQSA CSR address values are not set using physical switches or jumpers. Instead, the unique CSR addresses for each KFQSA-based ISE are programmed and stored in the form of a configuration table within the KFQSA Q–bus module's on-board nonvolatile memory. It is this specific information that must be obtained and restored when you replace a KFQSA Q–bus module.

Interrupt vectors for the KFQSA Q–bus module are programmed automatically by the operating system, and do not need to be programmed or restored manually.

The following sections describe how to access and record the failing KFQSA Q–bus module's unique configuration information.

3.4.3.1 Accessing a KFQSA Module's Configuration Table

The configuration table of the KFQSA Q–bus module cannot be accessed under the VMS operating system. This procedure must be performed at the CPU console program level. Consequently, within multisystem DSSI VAXcluster configurations, a KFQSA Q–bus module must be programmed from the console terminal of its respective system enclosure.

Use the console command:

```
>>> SET HOST/UQSSP/MAINTENANCE/SERVICE n
```

where:

/UQSSP	Selects a device to be accessed
/MAINTENANCE	Used exclusively to examine and modify KFQSA EEPROM configuration parameters
/SERVICE n	Specifies the controller number of a KFQSA in *service* mode. The range of n is from 0— 3.

Note

For details on accessing the configuration table of the KFQSA Q–bus module refer to the *KFQSA Module Installation and User Manual.*

After configuring the failed KFQSA Q–bus module within SERVICE mode, the appropriate SET HOST console command will display the current contents of the configuration table.

For example:

```
>>> set host/uqssp/maintenance/service 0
  UQSSP Controller (774420)

  Enter  SET, CLEAR, SHOW, HELP, EXIT, or QUIT

  Node CSR Address Model
   0  772150   21
   1  760334   21
   2  760340   21
   7       -------- KFQSA ------
  ?
```

Record the failed KFQSA configuration table's contents within Table 3–1.

Note

If the failing KFQSA Q–bus module is resident within a system that does not have support for console command accessing the module, the MicroVAX diagnostic Monitor (MDM) must be used for this procedure.

Table 3–1 KFQSA Configuration Table

NODE	CSR ADDRESS	MODEL
0		
1		
2		
3		
4		
5		
6		
7		

When a KFQSA Q–bus module failure disables access to its configuration table, refer to the site-specific configuration booklet for the module's original settings or recalculate the CSR settings using the console level CONFIGURE process discussed in Section 3.4.3.2.

3.4.3.2 Obtaining CSR Settings Using the Console Command CONFIGURE

If the site-specific configuration booklet does not contain the necessary information on the KFQSA Q–bus module's unique configuration table, the console command CONFIGURE must be used to determine the repaired or replaced module's CSR settings.

The console command CONFIGURE is similar to the VMS SYSGEN CONFIGURE utility. It permits the user to enter device names, and then generates a table of recommended Q–bus CSR address settings. To obtain the necessary CSR setting using CONFIGURE, perform the following steps:

Note

For more information on the use of the console command CONFIGURE, refer to the *KFQSA Module Installation and User Manual.*

1. At the console prompt, enter CONFIGURE.

```
>>> CONFIGURE
```

The system prompts the user for a device and a number. To find what valid responses are, enter HELP. The console will display a list of all possible devices that may be configured.

```
>>> CONFIGURE
Enter device configuration, HELP, or EXIT
Device, Number?
```

2. Respond by entering the device name and the number of each device. After all the devices are entered enter EXIT. For example, if the system is configured with a TK70 tape drive, three RFxx ISEs, and a DESQA interconnect, respond as follows:

```
Device, Number?  tk70
Device, Number?  kfqsa-disk,3
Device, Number?  desqa
Device, Number?  exit
```

The system responds with the CSR address and vector assignments for all entered devices:

```
Address/Vector Assignments
-774440/120  DESQA
-772150/154  KFQSA-DISK
-760334/300  KFQSA-DISK
-760340/304  KFQSA-DISK
-774500/260  TK70
```

3. Record the address assignments within Table 3–1.

Remember only the CSR address assignments are necessary for programming the KFQSA Q–bus module. The vector assignments will be calculated automatically by the system software.

Continue the warm swapping maintenance procedures described in the next section.

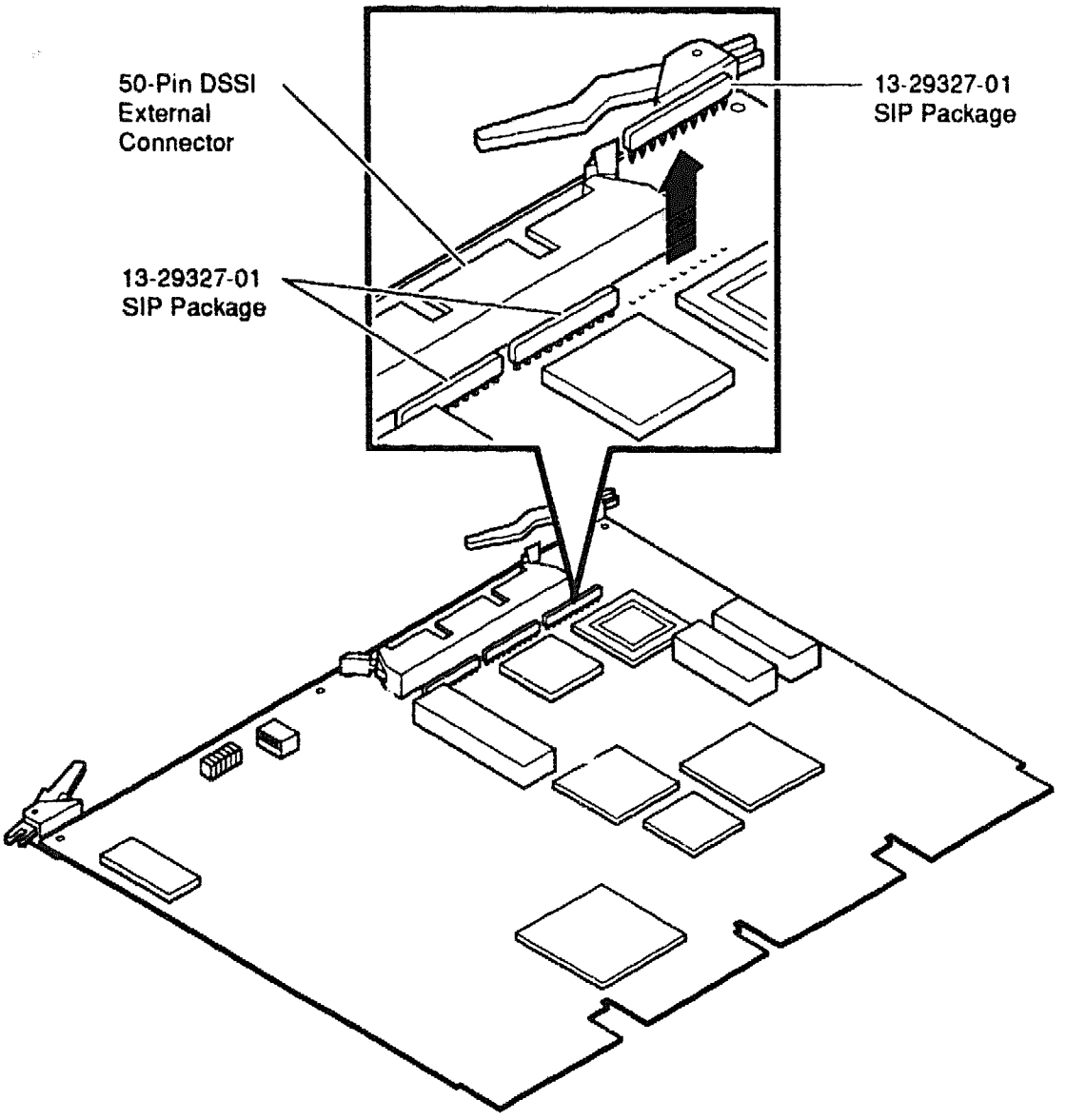
3.4.4 Removal and Replacement of KFQSA Q-Bus Modules

After making sure that the failing KFQSA Q–bus module supports warm swapping maintenance procedures, complete the following steps:

1. Set the Power switch of the enclosure that contains the failing module to off (0).
2. Disconnect the S-box front handle (70-26020-02) from the KFQSA Q–bus module, being careful *not* to disconnect the external DSSI cables or terminators that are attached to the front of the handle itself.
3. Remove the failing module from its enclosure.

4. Remove the embedded DSSI termination (if present) of the repaired or replaced KFQSA Q–bus module by removing the three resistor SIP packages (13-29327-01 or 13-38234-01) located directly behind the 50-pin DSSI external connector shown in Figure 3–2.
5. Store the SIP terminators in a safe place for possible re-use.

Figure 3–2 DSSI and SIP Terminators on KFQSA Revision K04 or Later



6. At this time do the following:
   - Set the Dual In-Line Plastic (DIP) switchpack of the repaired or replaced KFQSA to SERVICE mode.
   - Install the repaired or replaced KFQSA (M7769, revision K04 or later) into the appropriate Q–bus enclosure.
   - Connect the S-box front handle to the KFQSA Q–bus module.

Caution

The S-box front handle *must be* connected to the KFQSA Q–bus module, in order to successfully restore the configuration table.

   - Set the enclosure Power switch to on (1).

Continue with the warm swap maintenance procedures described in the next section.

3.4.5 Restoring the KFQSA Q-Bus Module's Configuration Table

After the repaired or replaced KFQSA Q–bus module has been properly installed, complete the following steps:

1. Use the CSR settings previously recorded in Table 3–1 to reconfigure or to reprogram the repaired or replaced module. For more information on restoring the module refer to the *KFQSA Module Installation and User Manual.*
2. Reset the DIP switchpack for normal operation (non-SERVICE mode).
3. Power off and then power on the system enclosure containing the repaired or replaced KFQSA.
4. Verify that the KFQSA Q–bus module is properly reconfigured and that all ISEs are seen using the console command SHOW UQSSP.

For example:

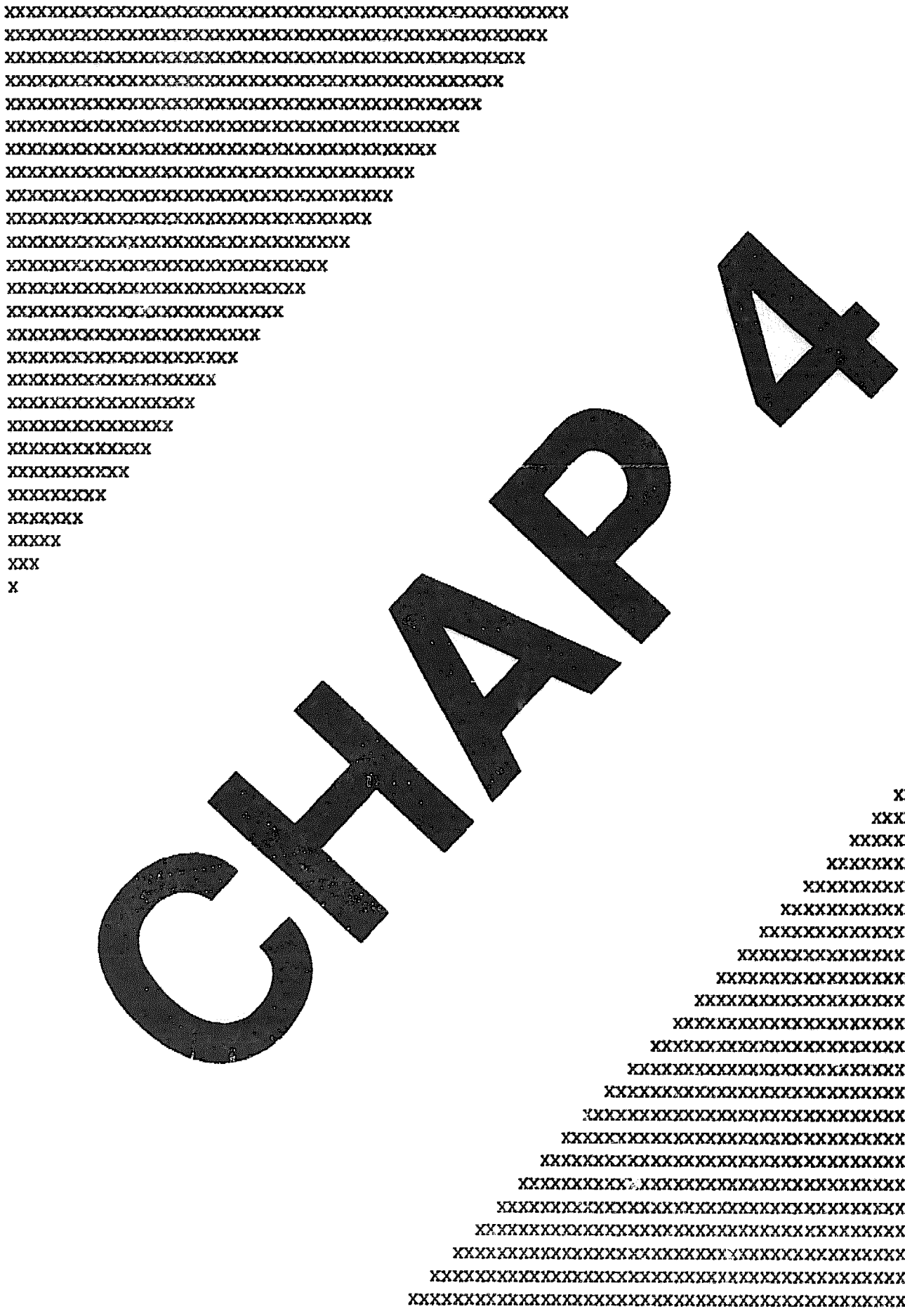
```
>>> show uqssp
UQSSP Disk Controller 0  (772150)
-DUA0  (RF31)

UQSSP Disk Controller 1  (760334)
-DUB1  (RF72)

UQSSP Disk Controller 2  (760340)
-DUC2  (RF31)

UQSSP Tape Controller 0  (774500)
-MUA0  (TK70)
```

5. Reboot the operating system software at this time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For example:

```
>>> show uqssp
UQSSP Disk Controller 0  (772150)
-DUA0  (RF31)

UQSSP Disk Controller 1  (760334)
-DUB1  (RF72)

UQSSP Disk Controller 2  (760340)
-DUC2  (RF31)

UQSSP Tape Controller 0  (774500)
-MUA0  (TK70)
```

5. Reboot the operating system software at this time

4.2.1 ISE FRU Warm Swapping Requirements

The replacement of a failing ISE within an active DSSI bus is not as simple as merely pulling out the failed device and installing the replacement device. Using a detailed procedure similar to the techniques used in Hierarchical Storage Element (HSC) configurations, the repaired or replaced ISE must be pre-programmed with the failed ISE's unique DSSI VAXcluster parameters.

CAUTION

This procedure must be followed carefully. If a parameter is not entered correctly, then a system reboot will be necessary or the ISE (and possibly the system) will be temporarily rendered unusable. The VMS operating system recognizes an ISE by its unique values for these parameters. If the appropriate parameters are not changed, VMS will *refuse* connections to both the old and new parameter values for the ISE.

Values must be assigned for each of the ISE parameters described in Table 4–1.

Table 4–1 ISE PARAMETERS

Parameter	Description
ALLCLASS	Allocation class. The default value is 0 (false). Set the ALLCLASS value to 0 or the allocation class chosen for the system. Note that shadowed disk devices must be set to a nonzero allocation class.
FORCENAM	Force name parameter that determines if the ISE is to use the NODENAME parameter value instead of the manufacturing name given to the ISE. The value must be 0. If the value is 1 the ISE uses a generic device name such as RF31x.
FORCEUNI	Force unit parameter. To use UNITNUM as the device unit number, set the FORCEUNI parameter to 0. The factory default value of 1 uses the DSSI node plug value (on the front bezel of the ISE) as the unit number.
NODENAME	Node name for an ISE. Each ISE has a node name that is stored in EEPROM. The node name is determined in the manufacturing process and is unique to each ISE. The node name can be changed depending on the needs of the system site.
SYSTEMID	System identification number. All SYSTEMIDs must be unique within the system. Replacement drives must be programmed with the identical SYSTEMID of their failed counterpart.
UNITNUM	Unit number that specifies a numeric value within the allocation class to which the ISE is being configured. Follow the unit number scheme of the site system setup.
HISPEED	The factory setting for this parameter is 0 (false). If set to 1 (true), only half of the ISE capacity is presented to hosts. This reduces the stroke of the seek, and thus improves performance at the expense of capacity.

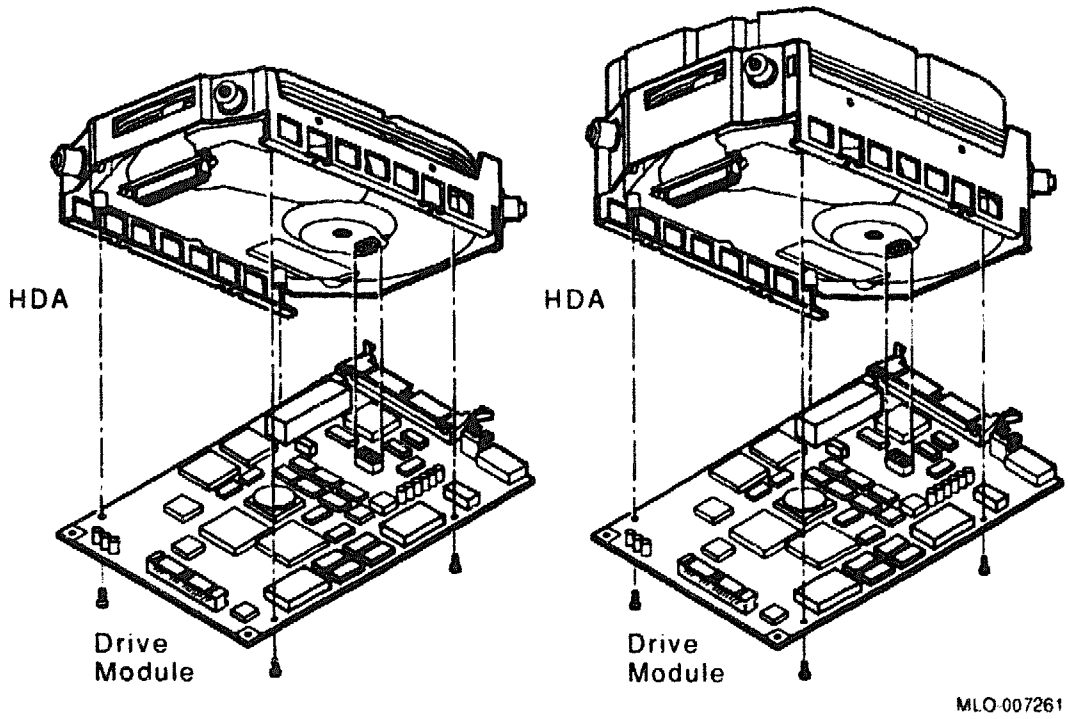
4.2.1.1 Warm Swapping RF-Series ISEs

The RF-series ISEs each consist of two basic FRUs:

- The head-disk assembly (HDA)
- The drive module

See Figure 4–1.

Figure 4–1 RF-Series ISE Showing HDA and Drive Module



The drive module is a single printed circuit board containing the controller and device electronics and is mounted on the right side of the HDA when situated in a BA400-series enclosure.

4.2.1.2 Warm Swapping TF-Series ISEs

The TF-series ISEs each consist of two basic FRUs:

1. The two-board controller
2. The tape drive.

See Figure 4–2.

4.3 Obtaining and Recording Current ISE Specific Parameters

The fundamental reason for using warm swapping techniques is to keep the VMS operating system up and running while performing system maintenance.

In many system configurations it is possible to use console commands to obtain these parameters. In DSSI-based single CPU systems, however, console commands cannot be used if the VMS operating system is to be kept up and running. The next three sections describe techniques for obtaining the ISE parameters while the VMS operating system is operational.

4.3.1 Using the VMS Diagnostic Utility Protocol (DUP)

Perhaps the most important function of warm swapping ISEs is the proper reconfiguring of repaired or replaced ISEs so that they appear to the VMS operating system with the identical parameters of the originally failed ISEs.

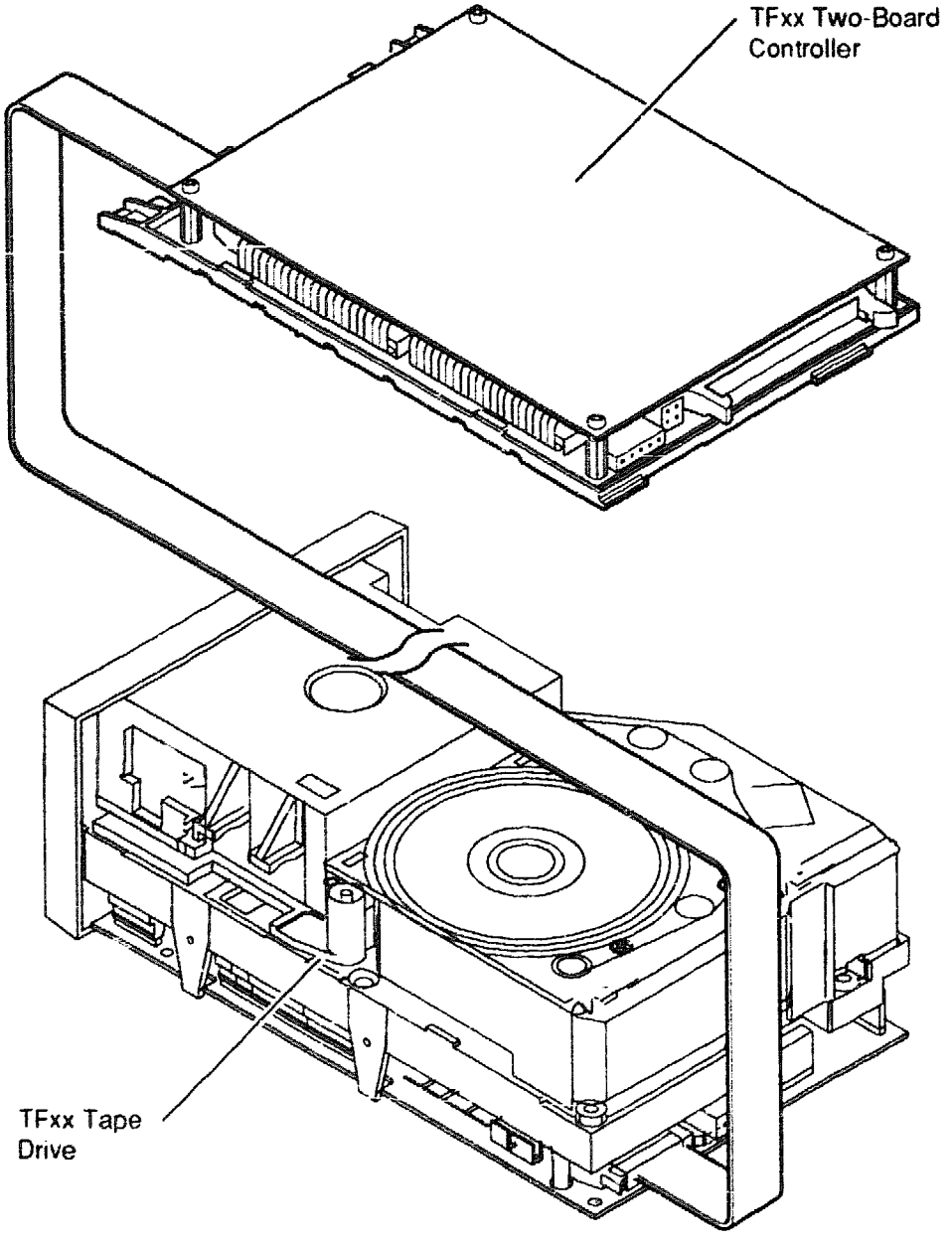
This recording and restoring of ISE unique parameters can be done with the use of the VMS diagnostic utility protocol (DUP).

Using DUP, a user can connect a terminal to a storage controller by first loading the VMS DUP class driver followed by "setting host" to the ISE's individual DUP server which is resident within the ISE's controller microcode.

Upon execution of the following Digital Command Language (DCL) command:

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=taskname nodename
```

Figure 4–2 Showing Components of TF-Series ISE



where:

taskname	=	the utility or diagnostic program name to be executed on the target ISE
nodename	=	the node name of the ISE

This creates a *virtual* terminal connection to the MSCP$DUP server that allows the execution of a utility or diagnostic program on the MSCP storage controller (ISE) that uses the DUP standard dialogue.

Once the connection is established, operations are under the control of the utility or diagnostic program. When the utility or program ends, control returns to the local operating system.

PARAMS is the ISE management utility that lets you examine and change ISE parameters such as node name, allocation class, and unit number. PARAMS is also used to display the state of the ISE and performance statistics maintained by the ISE.

PARAMS prompts the user for a command with the PARAMS> prompt. Upon entering one command, PARAMS executes it, and prompts for another command.

To stop the PARAMS utility, press Ctrl/C, Ctrl/Y, Ctrl/Z, or enter Exit. Table 4–2 lists PARAMS commands.

Table 4–2 PARAMS Commands

Command	Description
EXIT	Stops the PARAMS utility
HELP	Displays information on how to use PARAMS commands
SHOW	Displays the setting of a parameter or a class of parameters
WRITE	Records in nonvolatile RAM the device parameter changes made using the SET command

To find more information on reconfiguring and installing RF-series and TF-series ISEs, refer to the *BA400-Series Enclosures Storage Devices Installation Procedures*.

4.3.2 Obtaining Parameters Using DUP

Digital Equipment Corporation recommends that a worksheet of the parameters for all ISEs, as well as the serial number of each ISE, be maintained within the site-specific configuration booklet. This is especially important at sites that maintain a set of spare drives that may be stored for some time before they are used.

The worksheet aids in:

- Preventing duplicate parameters which render an ISE temporarily unusable until the duplication is isolated and corrected
- Determining the parameter setting of a non-operational ISE to create a replacement unit with identical parameters.

Use the ISE parameter worksheets in Table 4–3 to identify and record critical parameter names.

Table 4–3 Individual ISE Worksheet

Serial Number: _____

NODENAME: _____

SYSTEMID: _____

ALLCLASS: _____

UNITNUM: _____

FORCEUNI: _____

FORCENUM: _____

HISPEED: _____

Serial Number: _____

NODENAME: _____

SYSTEMID: _____

ALLCLASS: _____

UNITNUM: _____

FORCEUNI: _____

FORCENUM: _____

HISPEED: _____

If the parameter values were not recorded, use the following steps to extract the information from the failed ISE:

1. Find the node name (NODENAME) for an ISE needing replacement by using one of the following DCL commands:

```
$  SHOW DEVICE [DI OR MI]
```

where:
DI = RF disks
MI = TF tapes

For example:

```
$ SHOW DEV DI  Return
```

```
      Device                  Device   Error  Volume    Free   Trans  Mnt
       Name                   Status   Count   Label    Blocks Count  Cnt
      $1$DIA100:    (WOOFA)  Mounted      0  VMSRL5  1361730   246    1
      $1$DIA101:    (TWEETA) Mounted      5  DISK1    174588     1    1
```

The nodename for the ISE is shown in parentheses.

```
$  SHOW CLUSTER
```

For example:

```
$ SHOW CLUSTER  Return
```

```
View of Cluster from system ID 5487  node: AWDEO
  +-----------------------------+
  |     SYSTEMS       | MEMBERS |
  +-----------------------------+
  | NODE   | SOFTWARE |  STATUS |
  +-----------------------------+
  | AWDEO  | VMS V5.4 | MEMBER  |
  | WOOFA  | RFX V255 |         |
  | TWEETA | RFX V255 |         |
  +-----------------------------+
```

Note
RFX V255

Firmware version number

2. Determine whether the VMS DUP class driver is loaded by entering following DCL command:

```
$ SHOW DEVICE FYA0  Return
```

```
% SYSTEM-W-NOSUCHDEV, no such device available
```

If the driver is not loaded, load it as follows:

```
$ MCR SYSGEN [Return]
SYSGEN> CONNECT FYA0/NOADAPTER [Return]
SYSGEN> EXIT [Return]
```

3. Use the SET HOST command to establish a DUP connection with the ISE:

   ```
   $ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS nodename [Return]
   ```

   This invokes the DUP server on the ISE and runs the PARAMS utility

4. Refer to the parameters listed in Table 4–1 and use the SHOW command to show the appropriate values of the failed ISE. Be sure to record the new parameters on the ISE worksheet as shown in Table 4-3.

   For example:

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS TWEETA
    %HSCPAD-I-LOCPROGEXE, Local program executing - type ^\ to exit
    Copyright (C) 1990  Digital Equipment Corporation

    PARAMS> SHOW NODENAME  [Return]
    Parameter     Current          Default        Type     Radix
    --------- ---------------  ---------------  -------  -----
    NODENAME         TWEETA            RF31      String  Ascii   B

    PARAMS> SHOW SYSTEMID  [Return]
    Parameter     Current          Default        Type     Radix
    --------- ---------------  ---------------  --------  -----
    SYSTEMID     0404100801484    0000000000000  Quadword    Hex   B

    PARAMS> SHOW ALLCLASS  [Return]
    Parameter     Current          Default        Type     Radix
    --------- ---------------  ---------------  --------  -----
    ALLCLASS               1                0      Byte    Dec   B

    PARAMS> SHOW UNITNUM   [Return]
    Parameter     Current          Default        Type     Radix
    --------- ---------------  ---------------  --------  -----
    UNITNUM              101                0      Word    Dec   U

    PARAMS> SHOW FORCEUNI  [Return]
    Parameter     Current          Default        Type     Radix
    --------- ---------------  ---------------  --------  -----
    FORCEUNI               0                1   Boolean   0/1   U

    PARAMS> SHOW FORCENAM  [Return]
    Parameter     Current          Default        Type     Radix
    --------- ---------------  ---------------  --------  -----
    FORCENAM               0                0   Boolean   0/1   B
```

```
PARAMS> SHOW HISPEED [Return]
Parameter     Current          Default          Type      Radix
---------  ---------------  ---------------  --------  -----
HISPEED                 0                0   Boolean    0/1   B
```

Note
SHOW HISPEED [Return]

Only applicable to RF31, RF35, RF72, and RF73 ISE devices

4.3.3 Obtaining Parameters Using VMS

If connection cannot be established with the ISE DUP server, the VMS operating system utilities can be utilized. To find information on some of the parameters use the DCL command ANALYZE/SYSTEM.

In the following sample output, the SYSTEMID is 404100801484 (taken from "Contrl ID") and the ALLCLASS is 1.

```
$ ANALYZE/SYSTEM [Return]

VAX/VMS System analyzer

SDA> SHOW DEVICE $1$DIA101: [Return]

I/O data structures
-------------------
TWEETA$DIA101              RF31              UCB address:  803B17D0

Device status:   00021810 online,valid,unload,lcl_valid
Characteristics: 1C4D4108 dir,rct,fod,shr,avl,mnt,elg,idv,odv,rnd
                 00002221 clu,mscp,nnm,loc

Owner UIC [000001,000004]  Operation count 306  ORB address   803B1900
     PID         00000000  Error count       5  DDB address   806DE690
Alloc. lock ID   000C0034  Reference count   1  DDT address   8042EC38
Alloc. class            1  Online count      1  VCB address   803CCAC0
Class/Type          01/38  BOFF           0000  CRB address   805E5590
Def. buf. size        512  Byte count     0200  PDT address   803A6DC0
DEVDEPEND        07450832  SVAPTE     8338CB54  CDDB address  803B1960
DEVDEPND2        00000000  DEVSTS         0004  I/O wait queue   empty
FLCK index             34  RWAITCNT       0000
DLCK address     00000000

Press [RETURN] for more.
SDA>
I/O data structures
-------------------

        --- Primary Class Driver Data Block (CDDB) 803B1960 ---

Status:              0040 alcls_set
Controller Flags:    80D4 cf_mlths,cf_this,cf_misc,cf_attn,cf_replc
```

```
Allocation class      1  CDRP Queue     empty  DDB address   806DEAF0
System ID       00801484  Restart Queue  empty  CRB address   805E5590
                   0000  DAP Count          0  CDDB link     803B1B20
Contrl. ID      00801484  Contr. timeout    60  PDT address   803A6DC0
                01644041  Reinit Count       0  Original UC   00000000
Response ID     00000000  Wait UCB Count     0  UCB chain     803B17D0
MSCP Cmd status FFFFFFFF

        *** I/O request queue is empty ***

Press [RETURN] for more.
SDA> EXIT  [Return]
$
```

For the remaining ISE parameters, enter the DCL command SHOW DEVICE DI to display the following information:

```
$ SHOW DEV DI  [Return]

   Device                 Device   Error  Volume   Free   Trans  Mnt
    Name                  Status   Count   Label   Blocks Count  Cnt
   $1$DIA100:    (WOOFA)  Mounted      0  VMSRL5  1361730   246    1
   $1$DIA101:    (TWEETA) Mounted      5  DISK1   174588      1    1
```

The failing ISE device name in the sample above is 1DIA101.

- NODENAME

  The node name is shown in parentheses. In the above sample output the node name of the failing ISE is TWEETA.

- ALLCLASS

  Aside from using the ANALYZE/SYSTEM command, the allocation class is found in the device name between the the dollar signs ($). In 1DIA101, the failing ISE has an allocation class of 1. If the allocation class was 0, the node name would display TWEETA$DIA101.

- UNITNUM

  The UNITNUM is the number following the DIA. In 1DIA101: the UNITNUM is 101. It is the MSCP unit number.

- FORCENAM

  The force unit name is set to 0 if NODENAME is anything other than an RF31x. The "x" corresponds to a DSSI node ID (A=0, B=1, and so on).

- FORCEUNI

  The force unit is set to 0 if the unit number of the device appears as larger than seven (7). If the unit number of the device is between 0 and 7 and matches the DSSI node ID plug on the front bezel of the ISE, than FORCEUNI is probably set to its default of 1.

- HISPEED

  Although not directly shown in the sample output, HISPEED is set to 1 if the DCL command, SHOW DEVICE/FULL devicename, reveals a device type of RFHxx instead of RFxx. Otherwise, HISPEED is set to its default of 0.

4.4 Removal and Installation Procedures for ISEs

The following sections describe the procedures required for the removal and replacement of failed ISEs.

4.4.1 Finding Failed ISE FRUs

The maintenance philosophy for the ISE is to replace the failing FRU. The failing FRU can be determined through the use of host level diagnostic error reports, operating system error reports, fault codes displayed on the ISE storage device operator control panel (OCP), or the use of VAXsimPLUS.

For further information on determining an ISE's failing FRU, refer to the appropriate ISE service guide.

4.4.2 Enclosures That Support Warm Swapping

Only ISEs resident within the following enclosures support warm swapping procedures:

- BA430
- BA431
- BA440
- BA441
- B400X
- B401X
- R400X
- R23RF

Because these enclosures do not allow for individual power cycling of their ISE's, the *entire* enclosure must be shut down and/or powered off in order to perform warm swapping maintenance on any one (or more) enclosed ISEs.

Prior to performing any warm swapping procedures, certain system management tasks must be followed depending on which enclosure contains the failed ISE. All drives contained within the same enclosure as the failed ISE, must be logically dismounted.

WARNING

Warm swapping procedures are *not* to be used when connecting or disconnecting an entire DSSI-based enclosure to or from an active DSSI bus. Such maintenance requires the shutting down of the entire DSSI bus prior to its execution.

4.4.3 Dismounting and Removing Failed ISEs

After obtaining the ISE's unique parameters perform the following steps:

1. If the ISE is mounted, logically dismount it from the system or VAXcluster configuration using the following DCL command:

   ```
   $ DISMOUNT/CLUSTER devicename [Return]
   ```

   If the device fails to dismount due to installed files, spooled devices, or open file violations, refer to Appendix B, DISMOUNT Command Regarding Open Files.

2. Make the failing device unavailable to the entire VAXcluster configuration using the VMS SYSMAN utility as follows:

   ```
   $ MCR SYSMAN [Return]
   SYSMAN> SET ENVIRONMENT/CLUSTER [Return]
   %SYSMAN-I-ENV, current command environment:
           Clusterwide on local cluster
           Username SYSTEM    will be used on nonlocal nodes
   SYSMAN> DO SET DEVICE/NOAVAILABLE devicename [Return]
   SYSMAN> EXIT [Return]
   ```

3. Verify that the device has been marked as unavailable by entering the DCL command SHOW DEVICE.

   For example:

   ```
   $ SHOW DEVICE $1$DIA101 [Return]

        Device                  Device      Error  Volume  Free   Trans  Mnt
         Name                   Status      Count   Label  Blocks Count  Cnt
        $1$DIA101:   (TWEETA)  Unavailable     5
   ```

4. If a failing ISE is resident within one of the following enclosures,

   - BA430
   - BA431
   - BA440
   - BA441

- B400X
- B401X

  follow the proper VMS shutdown procedures for that particular Q-Bus system setup prior to powering down the enclosure. The remaining systems in a multisystem configuration, will remain up and running during the warm swapping procedure, if the system disk is not resident in the powered down enclosure.

This should be done using the following command:

```
$ @SYS$SYSTEM:SHUTDOWN [Return]
```

This is followed by system-specific shutdown options.

For proper system shutdown procedures, refer to the *VMS System Manager's Manual*.

5. Set the ISE's enclosure Power switch to off (0). Wait 15 to 20 seconds (for the drive to stop spinning and interlock solonoid to release).

CAUTION

Static electricity can damage integrated circuits. Always use antistatic wrist strap, grounding clip, and antistatic pad found in the static-protective field service kit (29-26246-00) when working with the internal parts of any computer system.

Use great care when handling an ISE. Excessive shock can damage the HDA.

6. Remove the ISE from the system or expander cabinet using those techniques described in the appropriate enclosure manual.

Continue on to the next section.

4.4.4 Installing Repaired or Replaced ISEs

To install a repaired or replacement ISE, perform the following steps:

CAUTION

Static electricity can damage integrated circuits. Always use antistatic wrist strap, grounding clip, and antistatic pad found in the static-protective field service kit (29-26246-00) when working with the internal parts of any computer system.

Use great care when handling an ISE. Excessive shock can damage the HDA.

1. Install the replacement ISE into the correct enclosure using those techniques described in the appropriate enclosure manual listed in Appendix A.
2. Set the ISE's enclosure Power switch to on (1). Wait for the drive to start spinning, lock the interlock solenoid, and complete its self tests.
3. If a failing ISE is resident within one of the following enclosures, boot the operating system software at this time.
   - BA430
   - BA431
   - BA440
   - BA441
   - B400X
   - B401X

Continue on to the next section.

4.5 Restoring the ISE Specific Parameters

Warm swapping restore procedures will vary, depending on which of the following FRU components of the RF-series or TF-series ISEs is replaced:

- RFxx drive module
- RFxx HDA
- TFxx tape drive
- TFxx two-board controller

When the drive module of an RFxx ISE or the two-board controller of a TFxx ISE is to be replaced, all ISE unique parameters must be obtained from the failed module and reprogrammed into the repaired or replaced module. Use those warm swapping procedures listed in Section 4.5.1 when any one of the following need replacement:

- RFxx drive module
- TFxx two-board controller
- Complete RFxx or TFxx ISE

Parameter changes are *not* necessary when the FRU being replaced is one of the following:

- RFxx HDA
- TFxx tape drive

When any of these FRUs needs replacement, continue with those warm swapping procedures listed in Section 4.5.2.

4.5.1 Replacement of FRUs Requiring Parameter Reprogramming

When the drive module of an RFxx ISE or the two-board controller of a TFxx ISE is to be replaced, complete the following steps to restore the parameters from the failed ISE:

1. Find the NODENAME parameter for the replacement ISE by using one of the following DCL commands.

```
$ SHOW DEVICE [DI OR MI]

where:
DI  = RF disks
MI  = TF tapes

For example:

$ SHOW DEV DI  [Return]

      Device                  Device          Error   Volume    Free
       Name                   Status          Count    Label   Blocks
      R1QSAA$DIA3:            Online              0
      $1$DIA100:    (WOOFA)   Mounted             0   VMSRL5  1361574
      $1$DIA101:    (TWEETA)  HostUnavailable     0
```

   The nodename for the ISE is shown before the dollar sign ($) of the device name.

Note

At this time, the original device will appear as *HostUnavailable* since VMS does not see any ISE "host" with the identical ISE unique parameters of that failed ISE.

```
$ SHOW CLUSTER
```

For example:

```
$ SHOW CLUSTER  Return
  View of Cluster from system ID 5487  node: AWDEO
  +------------------------------+
  |     SYSTEMS        | MEMBERS |
  +------------------------------+
  | NODE   | SOFTWARE |  STATUS |
  +------------------------------+
  | AWDEO  | VMS V5.4 | MEMBER  |
  | WOOFA  | RFX V255 |         |
  | TWEETA | RFX V255 |         |
  | R1QSAA | RFX V255 |         |
  +------------------------------+
```

Note
V255
Firmware version number

2. Determine whether the VMS DUP class driver is loaded by entering following DCL command:

```
$ SHOW DEVICE FYA0  Return
% SYSTEM-W-NOSUCHDEV, no such device available
```

If the driver is not loaded, load it as follows:

```
$ MCR SYSGEN  Return
SYSGEN> CONNECT FYA0/NOADAPTER  Return
SYSGEN> EXIT  Return
```

3. Use the SET HOST command to establish a DUP connection with the ISE:

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS nodename  Return
```

This invokes the DUP server on the ISE and runs the PARAMS utility

4. Refer to the parameter listed in Table 4-1 and use the SET command to set appropriate values for the parameters. Since the replacement ISE will have a new serial number, be sure to record its new parameters on the worksheet for the ISE.

For example:

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS R1QSAA
%HSCPAD-I-LOCPROGEXE, Local program executing - type ^\ to exit
Copyright (C) 1990  Digital Equipment Corporation

PARAMS> SHOW NODENAME [Return]
Parameter     Current          Default        Type      Radix
--------- ---------------  ---------------  --------  -----
NODENAME        R1QSAA            RF31       String  Ascii   B

PARAMS> SET NODENAME TWEETA [Return]

PARAMS> SHOW SYSTEMID [Return]
Parameter     Current          Default        Type      Radix
--------- ---------------  ---------------  --------  -----
SYSTEMID     593200495860     0000000000000  Quadword    Hex   B

PARAMS> SET SYSTEMID 404100801484 [Return]

PARAMS> SHOW ALLCLASS [Return]
Parameter     Current          Default        Type      Radix
--------- ---------------  ---------------  --------  -----
ALLCLASS                0                0      Byte    Dec   B

PARAMS> SET ALLCLASS 1 [Return]

PARAMS> SHOW UNITNUM [Return]
Parameter     Current          Default        Type      Radix
--------- ---------------  ---------------  --------  -----
UNITNUM                 0                0      Word    Dec   U

PARAMS> SET UNITNUM 101 [Return]

PARAMS> SHOW FORCEUNI [Return]
Parameter     Current          Default        Type      Radix
--------- ---------------  ---------------  --------  -----
FORCEUNI                1                1   Boolean    0/1   U

PARAMS> SET FORCEUNI 0 [Return]

PARAMS> SHOW FORCENAM [Return]
Parameter     Current          Default        Type      Radix
--------- ---------------  ---------------  --------  -----
FORCENAM                0                0   Boolean    0/1   B

PARAMS> SHOW HISPEED [Return]
Parameter     Current          Default        Type      Radix
--------- ---------------  ---------------  --------  -----
HISPEED                 0                0   Boolean    0/1   B

PARAMS> WRITE [Return]

Changes require controller initialization, ok? [Y/[N]] Y [Return]
Initializing...
```

```
HSCPAD-S-REMPGMEND, Remote program terminated - message number 3
%HSCPAD-S-END, Control returned to AWDEO
$
```

Note
SHOW HISPEED [Return]
Only applicable to RF31, RF35, RF72, and RF73 ISE devices

Note

Do not forget to enter the WRITE command since no changes will be stored without its execution.

When the initialization is complete, the replacement ISE and its parameters are made available to the VMS operating system. This can be seen by using the DCL command SHOW DEVICE DI.

For example:

```
$ SHOW DEVICE DI [Return]

Device                  Device           Error  Volume      Free
Name                    Status           Count   Label      Blocks
R1QSAA$DIA3:            HostUnavailable      0
$1$DIA100:     (WOOFA)  Mounted              0  VMSRL5    1361574
$1$DIA101:     (TWEETA) Online               0
```

Note

The DCL commands SHOW DEVICE DI or SHOW CLUSTER continue to show the name of the replacement ISE as *HostUnavailable*. This *does not* harm the system. After the next reboot, this replacement ISE name will disappear.

---

5. Make the repaired or replacement device available to the entire VAXcluster configuration using the VMS SYSMAN utility as follows:

```
$ MCR SYSMAN [Return]
SYSMAN> SET ENVIRONMENT/CLUSTER [Return]
%SYSMAN-I-ENV, current command environment:
        Clusterwide on local cluster
        Username SYSTEM    will be used on nonlocal nodes
SYSMAN> DO SET DEVICE/AVAILABLE devicename [Return]
SYSMAN> EXIT [Return]
$
```

6. Verify that the device has been marked as online by entering the DCL command SHOW DEVICE. For example:

```
$ SHOW DEVICE DIA101 [Return]

Device                  Device     Error  Volume  Free   Trans  Mnt
Name                    Status     Count   Label  Blocks Count  Cnt
$1$DIA101:   (TWEETA)   Online         0
```

7. If appropriate, mount the device using the DCL MOUNT command which is specific to the system site setup.

4.5.2 Replacement of FRUs not Requiring Parameter Reprogramming

The following ISE FRUs allow for replacement but do not require parameter reprogramming:

- RFxx HDA
- TFxx tape drive

For these FRUs, perform the following steps to complete the ISE warm swapping procedure:

1. Make the repaired or replacement device available to the entire VAXcluster configuration using the VMS SYSMAN utility as follows:

```
$ MCR SYSMAN [Return]
SYSMAN> SET ENVIRONMENT/CLUSTER
%SYSMAN-I-ENV, current command environment:
        Clusterwide on local cluster
        Username SYSTEM    will be used on nonlocal nodes
SYSMAN> DO SET DEVICE/AVAILABLE devicename [Return]
SYSMAN> EXIT [Return]
$
```

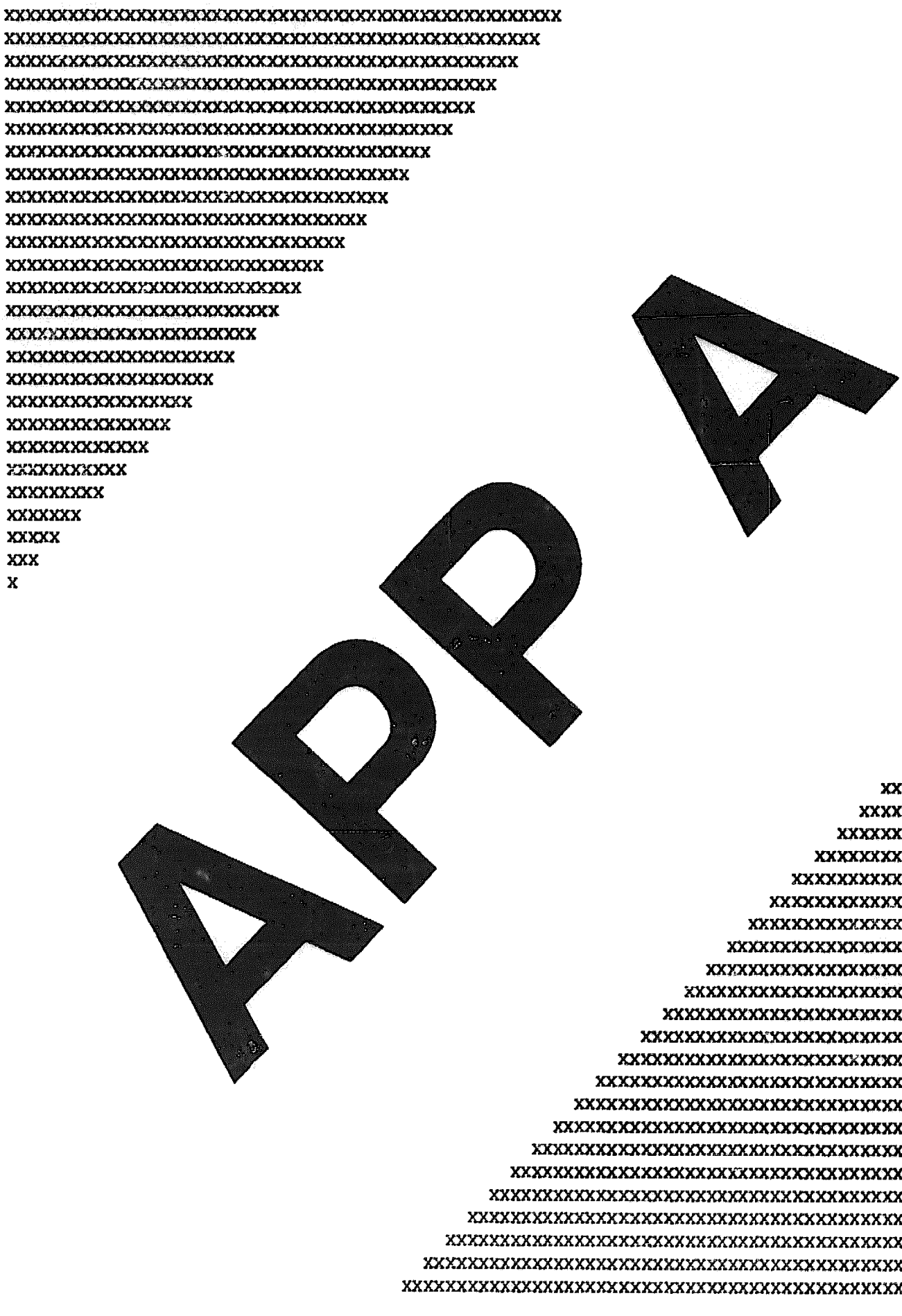
2. Verify that the device has been marked as available by entering the DCL command SHOW DEVICE.

   For example:

```
$ SHOW DEVICE $1$DIA101 [Return]

Device                  Device     Error  Volume  Free   Trans  Mnt
Name                    Status     Count   Label  Blocks Count  Cnt
$1$DIA101:   (TWEETA)   Online         0
```

3. If appropriate, mount the device using the DCL MOUNT command which is specific to the system site setup.


APPA

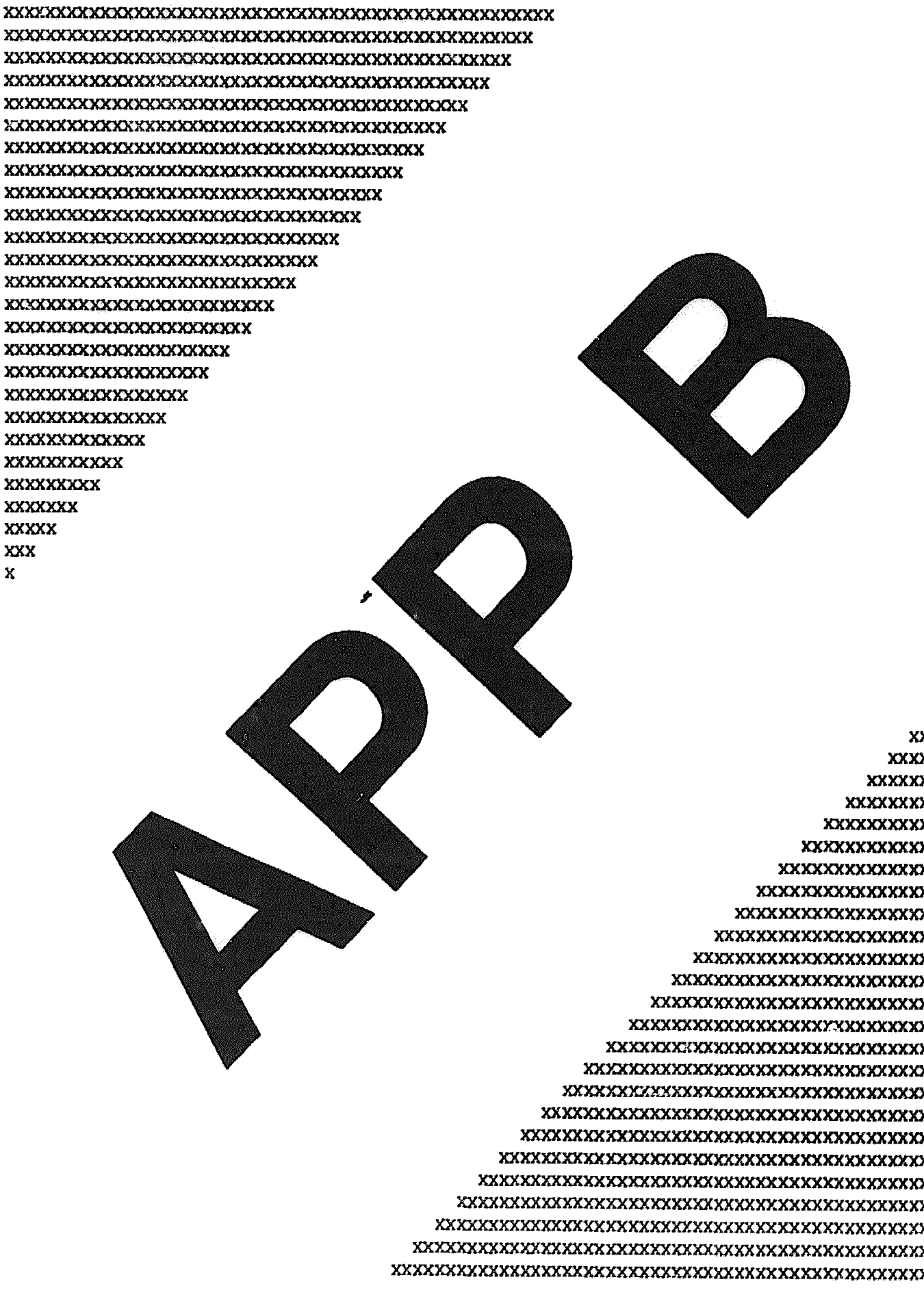
A

Related Documentation

Document	Order Number
BA400-Series Enclosures IPB	EK–440/430–AB*–IP
BA400-Series Enclosures Storage Devices Installation Procedures	EK–BA44A*–IN
BA400-Series Mass Storage Devices	EK–441AC*–IP
BA430/440 Enclosure Maintenance	EK–348A*–MG
KA670 CPU System Maintenance	EK–347AB*–MG
KFQSA Module Installation and User Manual	EK–KFQSA–IN
KFQSA Module Service Guide	EK–KFQSA–SG
MicroVAX Diagnostic Monitor User's Guide	AA–FM7A*–DN
R400X Expander Installation and Maintenance	EK–349A*–MG
RF-Series Integrated Storage Element User Guide	EK–RF72D*–UG
TF85 Cartridge Tape Subsystem Owner's Manual	EK–TF85–OM
TF857 Cartridge Tape Subsystem Owner's Manual	EK–TF837–OM
VMS General User's Manual	AA–LA98A*–TE
VMS System Manager's Manual	AA–LA00B*–TE

Note

* Indicates the revision code. The latest revision will always be shipped when a manual is ordered.


APP B

B

DISMOUNT Command Regarding Open Files

B.1 DISMOUNT Command

With VMS Version 5.2 and subsequent versions, the DISMOUNT command checks for the following conditions that will prevent the dismount from completing:

- Installed swap and page files
- Installed images
- Devices spooled to the volume
- Open user files (any files not falling into one of the first three groups)

If none of these conditions are found, the volume is marked for dismount as usual, and the volume changes quickly from the marked-for-dismount state to the dismounted state. If any of these conditions exists, the DISMOUNT command does not mark the volume for dismount, but instead displays messages indicating that the volume cannot be dismounted, the conditions that exist, and the number of instances of each condition. For example:

```
$ DISMOUNT $10$DJA100: Return

%DISM-W-CANNOTDMT, $10$DJA100: cannot be dismounted
%DISM-W-INSWPGFIL, 4 swap or page files installed on volume
%DISM-W-SPOOLEDEV, 3 devices spooled to volume
%DISM-W-INSTIMAGE, 7 images installed on volume
%DISM-W-USERFILES, 6 user files open on volume
```

As shown in the example, the conditions are displayed in order of decreasing severity (severity refers to the level of difficulty you would have rectifying the conditions).

The return status from the DISMOUNT command reflects the most severe conditions. You can use this return status to construct a command procedure or image that calls routines to handle the individual conditions. Once one condition has been addressed, the procedure should loop back and attempt the DISMOUNT command again to determine if other conditions exist. The symbol names and values for the four conditions are:

DISM$_INSWPGFIL = %X739018
DISM$_SPOOLEDEV = %X739020
DISM$_INSTIMAGE = %X739028
DISM$_USERFILES = %X739030

B.1.1 Closing Files

With VMS Version 5.2 and subsequent versions, you can address all the conditions that prevent a volume from being dismounted if you have the appropriate privileges.

Some knowledge of the files specific to your environment might be required to eliminate the conditions preventing a volume from being dismounted.

First you must determine the names of the files open on the device and the process that owns each file. Each file can then be addressed as shown in the following sections. This information can be displayed using the following command:

```
$ SHOW DEVICE/FILES ddcu: [Return]
```

where:

ddcu — Is the name of the device you are attempting to dismount

B.1.1.1 System-Owned Files (Process ID = 0) with the Extension SYS

The files INDEXF.SYS and QUOTA.SYS can remain open. INDEXF.SYS is normally open on any mounted volume. QUOTA.SYS is normally open if quotas are enabled on the volume. Neither of these open files prevents the volume from being dismounted.

Any remaining files with the extension SYS are most likely installed secondary swap and page files. You can verify this by examining the site-specific system startup file SYS$MANAGER:SYPAGSWPFILES.COM and by using the DCL command SHOW MEMORY/FILES/FULL. To cancel the installed status of these files, use one of the following SYSGEN commands:

```
$ RUN SYS$SYSTEM:SYSGEN [Return]
SYSGEN> DEINSTALL filespec[/PAGEFILE] [Return]
SYSGEN> DEINSTALL filespec[/SWAPFILE] [Return]
SYSGEN> DEINSTALL/INDEX=page-file-number [Return]
```

For further information, refer to SYSGEN's online help.

B.1.1.2 System-Owned Files (Process ID = 0) with the Extension EXE

System-owned files with the extension EXE are most likely installed images. You should verify this by examining the installed-image list using the INSTALL command LIST. You can then cancel the installed status of the files, as described in the VMS Install Utility Manual.

B.1.1.3 Process-Owned Files

Process-owned files are normally closed when the processes accessing the files finish with them. Contact the users who own the processes and ask them to complete their work and close the files or log out. If this cannot be done, you can force the processes to exit using the DCL command STOP PROCESS/ID=process-id.

B.1.2 Spooled Devices

You can locate spooled devices using the DCL command SHOW DEVICE. The SHOW DEVICE command displays "spooled" in the device status field if the device is spooled. You can examine the system startup command procedure SYS$MANAGER:SYSTARTUP_V5.COM to determine whether the device is spooled to the volume that is being dismounted and to get the names of the queues used by the spooled device. Once you have done this, you should first prevent any queued files from being lost by setting the queue to retain jobs on error, as follows:

```
$ SET QUEUE/RETAIN=ERROR queue-name [Return]
```

where:

queue-name Is the name of the queue set to retain jobs on error.

Next, stop the queue while queuing the current job again but by placing it on hold as follows:

```
$ STOP/QUEUE/REQUEUE/HOLD queue-name [Return]
```

where:

queue-name Is the of the queue to be placed on hold.

The device can then be set not to be spooled:

```
$ SET DEVICE/NOSPOOLED device [Return]
```

where:

device Is the device set not to be spooled.

You can now restart the queue without losing any jobs in the queue or any files that have been spooled to the volume. If you do not want to wait until the volume is remounted to restart the queue, you can set the device to be spooled to a different volume and restart the queue immediately.

B.1.3 Clusterwide Support for DISMOUNT

You can use the DISMOUNT command throughout the cluster if you specify DISMOUNT/CLUSTER. This command first checks for conditions that will prevent the volume from dismounting on the local node. If none is found, it then checks for such conditions on all of the other nodes in the cluster. If the command DISMOUNT/CLUSTER finds one of the conditions on any node, it sends an error message identifying the device and the node on which the error occurred, followed by an error message indicating that there are open files on the volume. For example:

```
$ DISMOUNT/CLUSTER $10$DJA100: Return

%DISM-W-RMTDMTFAIL, $10$DJA100: failed to dismount on node SALT
%DISM-W-FILESOPEN, volume has files open on remote node
%DISM-W-RMTDMTFAIL, $10$DJA100: failed to dismount on node PEPPER
%DISM-W-FILESOPEN, volume has files open on remote node
%DISM-W-CANNOTDMT, $10$DJA100: cannot be dismounted
```

In this example, the final return status is DISM-W- CANNOTDMT. Note that, while this message is also displayed when one of the error conditions is found on the local node, it acts as a return status only if the conditions are found on a remote node. Thus, it can be used in a command procedure or an image to distinguish the location of the error condition. The symbol and value for this status are:

```
DISM$_CANNOTDMT = %X739010
```

B.1.4 Restoring the Previous Behavior of the DISMOUNT Command

In some cases you might want to mark a volume for dismount even though files are open on the volume. Marking the volume for dismount prevents users from opening any new files, thereby allowing activity to wind down. Also, file-system caches are flushed at the time the volume is marked for dismount, which is especially important when the system is shutting down and the file-system caches must be written to the disk. For these reasons, the qualifier /OVERRIDE=CHECKS has beeen provided for the DCL command DISMOUNT to override the new VMS Version 5.2 behavior and allow the volume to be marked for dismount despite the fact that there are files open.

If you specify the qualifier /OVERRIDE=CHECKS, the DISMOUNT command reverts to the earlier behavior with the following exception. Informational messages are displayed to inform you of conditions that will prevent the volume from dismounting, immediately followed by an informational message indicating that the volume has been marked for dismount. The final status is success with a severity of informational (DISM$_MARKEDDMT). For example:

```
$ DISMOUNT/OVERRIDE=CHECKS $10$DJA100: [Return]

%DISM-I-INSWPGFIL, 2 swap or page files installed on volume
%DISM-I-SPOOLEDEV, 1 device spooled to volume
%DISM-I-INSTIMAGE, 5 images installed on volume
%DISM-I-OPENFILES, 3 user files open on volume
%DISM-I-MARKEDDMT, $10$DJA100: has been marked for dismount
```

You can specify the equivalent of the qualifier /OVERRIDE=CHECKS when using the $DISMOU system service by using the new DMT$M_OVR_CHECKS flag. You should specify this flag in the flags argument to the $DISMOU system service if you desire the behavior of previous versions of VMS.

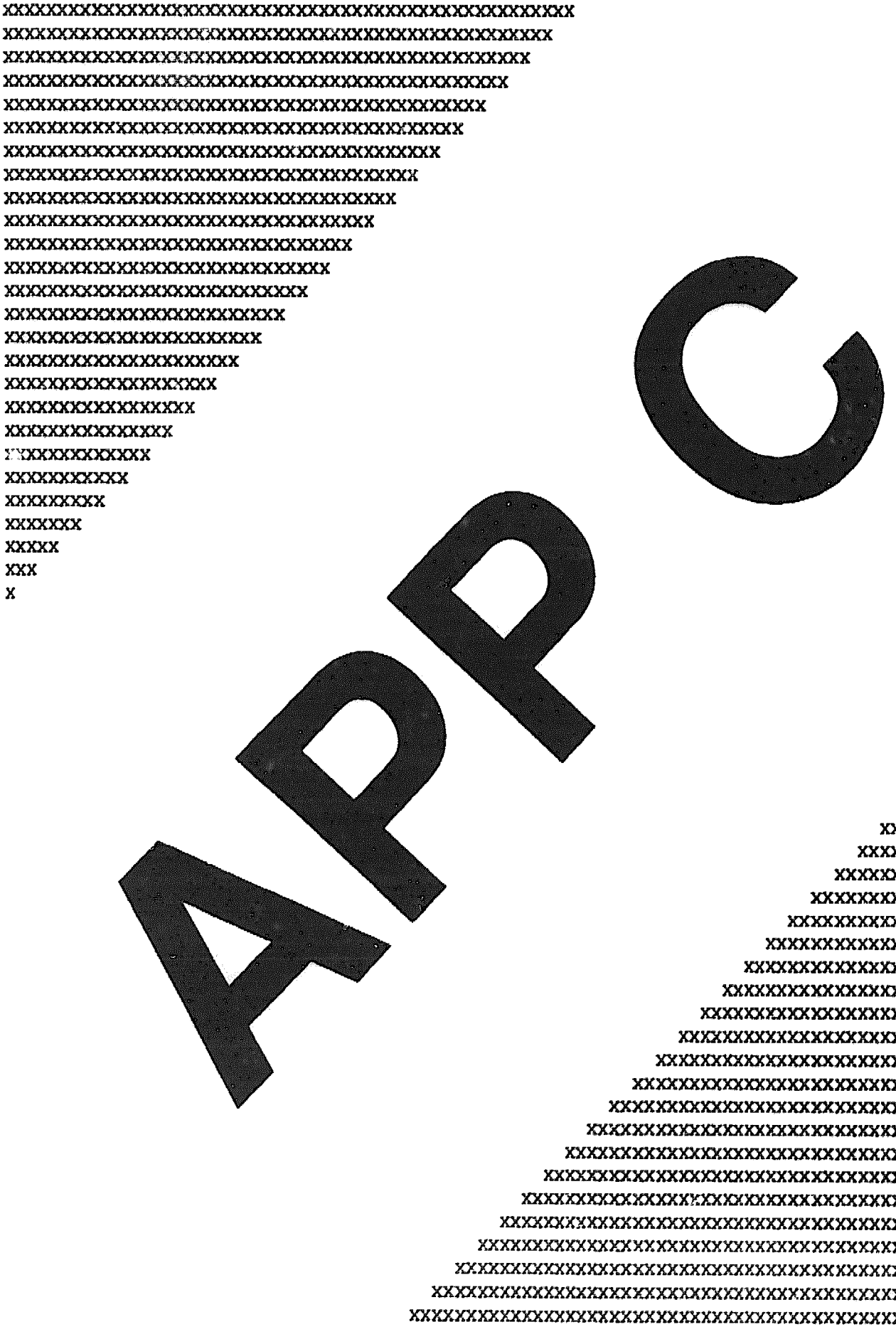
The command procedure SYS$SYSTEM:SHUTDOWN.COM was modified in VMS Version 5.2 to specify the /OVERRIDE=CHECKS qualifier when dismounting volumes.

You must dismount DIGITAL Distributed File Service (DFS) client pseudodevices (DFSCn:) using the command DISMOUNT /OVERRIDE=CHECKS DFSCn:. For example:

```
$ DISMOUNT/OVERRIDE=CHECKS DFSC1001: [Return]
```

The following informational message is displayed, and the device is dismounted:

```
%DISM-I-USERFILES, 1 user file open on volume
%DISM-I-MARKEDDMT, DFSC1001 has been marked for dismount
```


APPC

C

ISE Parameter Worksheets

This appendix contains several ISE worksheets that you can use and/or use to make copies.

Table C–1 Individual ISE Worksheet

Serial Number: _____

NODENAME: _____

SYSTEMID: _____

ALLCLASS: _____

UNITNUM: _____

FORCEUNI: _____

FORCENUM: _____

HISPEED: _____

Serial Number: _____

NODENAME: _____

SYSTEMID: _____

ALLCLASS: _____

UNITNUM: _____

FORCEUNI: _____

FORCENUM: _____

HISPEED: _____

Table C–2 Individual ISE Worksheet

Serial Number: _____

NODENAME: _____

SYSTEMID: _____

ALLCLASS: _____

UNITNUM: _____

FORCEUNI: _____

FORCENUM: _____

HISPEED: _____

Serial Number: _____

NODENAME: _____

SYSTEMID: _____

ALLCLASS: _____

UNITNUM: _____

FORCEUNI: _____

FORCENUM: _____

HISPEED: _____

Table C–3 Individual ISE Worksheet

Serial Number: _____

NODENAME: _____

SYSTEMID: _____

ALLCLASS: _____

UNITNUM: _____

FORCEUNI: _____

FORCENUM: _____

HISPEED: _____

Serial Number: _____

NODENAME: _____

SYSTEMID: _____

ALLCLASS: _____

UNITNUM: _____

FORCEUNI: _____

FORCENUM: _____

HISPEED: _____

Table C–4 Individual ISE Worksheet

Serial Number: _____

NODENAME: _____

SYSTEMID: _____

ALLCLASS: _____

UNITNUM: _____

FORCEUNI: _____

FORCENUM: _____

HISPEED: _____

Serial Number: _____

NODENAME: _____

SYSTEMID: _____

ALLCLASS: _____

UNITNUM: _____

FORCEUNI: _____

FORCENUM: _____

HISPEED: _____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