



Release Notes

RAID Array 7000

Version 7.7 for Novell NetWare 4.2

This document summarizes features and characteristics of the RAID Array 7000 and Enterprise Storage Array solution software Version 7.3 for Novell Netware 4.2 systems that are not covered elsewhere in the documentation.

Visit our Web Site for the Latest Information

Check our website for the latest drivers, technical tips and documentation for the RAID Array 7000. We can be found in the technical area of our web page:

www.compaq.com/products/storageworks

CAUTION

The SWCC options menu has an item that allows you to select controller code loading. HSZ70 does **not** currently support this code load method. Do **not** attempt to select this item.

About these Release Notes

This document should be used by individuals who are responsible for configuring, installing and using the RAID Array 7000 (RA7000) or enterprise Storage Array 10000 (ESA10000) and for Multivendor Customer Services personnel responsible for maintaining those systems.

These Release Notes Cover the following topics:

- 1.0 Supported Novell Netware Configurations
- 2.0 Contents of the Solution Software Kit for Netware 4.2
- 3.0 Solution Software Version Identification
- 4.0 Software and Hardware (supported in a RAID/Netware environment)
- 5.0 Storage Device Configuration Rules
- 6.0 Clarifications
- 7.0 Operating Constraints
- 8.0 Documentation Additions or Corrections
- 9.0 Software Installation

1.0 SUPPORTED NOVELL NETWARE CONFIGURATIONS

This section describes specific configuration requirements and high availability options applicable to a Novell NetWare RAID environment.

- **Novell NetWare requires host functionality = B**
- Your RAID Array 7000 can be configured in a single or dual controller configuration. Dual controller support requires the Adaptec AIC7870.DSK, Version d4.10S41 feb 8, 1999, supplier in this kit. Installation instructions for this driver are included in the HSZ70 Solutions Software Installation Guide. A ReadMe.txt file with additional Adaptec-specific information is available in the NetWare folder or directory.
- To support the dual-controller functionality and multiple LUN support, you must load the Adaptec driver in the STARTUP.NCF, with the following switches:

```
Load AIC7870.DSK lun_enable=ff multilun_targets=ff io_timeout=30
io_retries=10
```

Refer to the *Getting Started* guide for more information.

- supports many operating systems. You have purchased support for the Novell NetWare operating system version 4.11. The only supported PCI host adapter is the Digital SWXA3-BD differential PCI host adapter.
- By default, the virtual LUN (Command Console LUN target 0, lun 1) is enabled for the Command Console Software. To support 7.3 Solution Software for Novell NetWare 4.11, you must disable this setting through the CLI by typing the following command:

```
HSZ70> SET THIS_CONTROLLER NOCOMMAND_CONSOLE_LUN
```

1.1 Novell Netware High Availability Solutions

A RAID Novell Netware High Availability system enables two host servers of the same architecture to share an RA7000 or ESA10000 storage subsystem through an ultraSCSI bus, with Novell Netware High Availability software. Should a failure on a server occur, the failure is detected and the I/O is re-routed through to the functioning server. This process, called failover, requires no resource downtime – ensuring the high availability of data. The failed component(s) can be warm-swapped or services while functioning components remain active.

The *RA7000/ESA10000 High Availability Solutions Software for Novell Netware Installation Reference Guide* (AA-RHTFA-TE) provides more detailed information on configurations and setup.

2.0 CONTENTS OF THE SOLUTION SOFTWARE KIT FOR NETWARE 4.2

The *StorageWorks Solutions Software (V7.7) Kit for Novell Netware* consists of the following:

A cover letter

A PCMCIA program card containing HSOF software Version 7.3

The RAID Array 7000/Enterprise Storage Array 10000 documentation set:

Getting Started – RAID Array 7000/Enterprise Storage Array 10000 For Novell NetWare

HSZ70 Array Controller HSOF Version 7.3 CLI Reference Manual

HSZ70 Array Controller HSOF Version 7.3 Service Manual

HSZ70 Array Controller HSOF Version 7.3 Configuration Manual

HSZ70 Array Controller HSOF Version 7.3 CLI Reference Card

HSZ70 Array Controller HSOF Version 7.3 Fault LED Codes Reference Card

HSZ70 Solutions Software Version 7.3 Software Product Description

Release Notes – RAID Array 7000/Enterprise Storage Array 10000 for Novell NetWare 4.11

HSZ70 Solutions Software V7.7 for Novell Netware –CDROM containing documentation and OS Specification files.

NOTE

Version 7.3 of the documents included in this kit applies to Version 7.7 of your Solutions Software.

3.0 SOLUTION SOFTWARE VERSION IDENTIFICATION

The Solution Software Release Kit you received includes A PCMCIA program card containing the new HSOF RAID controller software (StorageWorks Solution Software V7.7). Included in this section are instructions on a number of methods which may be used to determine if the RAID Array is running the correct revision of HSOF Software.

You can identify the specific version of HSOF Software by:

- using the HSZ70 Command Line Interpreter. Issue the command:

```
HSZ70> SHOW THIS_CONTROLLER
```

If the HSOF Version is not V77Z, contact your support provider for instructions on how to obtain the updated version.

4.0 SOFTWARE AND HARDWARE SUPPORT

This section lists the operating system revisions, hardware and devices that are compatible with HSOF software version 7.7.

4.1 Supported Operating System

Your RAID Array 7000/ESA10000 supports many operating systems. You have purchased support for the Novell Netware operating system Version 4.11 or V.2 running on an Intel PCI platform.

4.2 Supported Host Bus Adapter(s)

The PCI host adapter supported is the Fast Wide Differential SCSI adapter (Adaptec 2944UW).

4.3 Supported StorageWorks Hardware

This section lists the hardware, devices and operating system revisions that are compatible with HSOF software Version 7.1.

- DS-SW600-AA—600-mm wide cabinet 50/60 Hz, dual-redundant controllers, bolting kit for coupling (two SW600 cabinets)
- DS-SW370-AA—RAID pedestal, five 180-watt power supplies; eight universal 50/60 Hz 120/240V high-powered blowers; one AC input box; one enhanced EMU; one pedestal user's guide; six single-ended I/O modules
- DS-SW370-EA—RAID pedestal; five 180-watt power supplies; eight universal 50/60 Hz 120/240V high-powered blowers; one AC input box; one enhanced EMU; one pedestal user's guide; six single-ended I/O modules; metric mounting hardware
- DS-BA370-AA—RAID rackmount enclosure; five 180-watt power supplies; eight universal high-powered blowers; one AC input box, six single-ended I/O modules; one pedestal user's guide; one enhanced EMU; one PVA, metric mounting hardware
- DS-BA35X-HH—180-watt, 100 to 200 volt power supply, 240-volt, AC factor corrected power supply, blue color carrier.
- DS-BA35X-MK—High-powered blower for the SW370 and BA370
- DS-BA35X-MN—Single I/O termination module
- DS-BA35X-MP—Termination module
- DS-BA35X-BA—External cache battery shelf for SW370
- DS-BA35X-BC—Single battery in blue SBB
- DS-BA35X-BD—Double battery in blue SBB
- DS-BA35X-EB—Enhanced Environmental Monitor Unit of the SW370 and BA370
- DS-BA35X-MN—Single-ended, Ultra-SCSI I/O module
- DS-BA35X-EC—Power verification and addressing module
- DS-SW600-AA—600 mm wide cabinet, 50/60 Hz
- HS35X-BA—Single external cache battery in an SBB
- HS35X-BD—Dual external cache battery in an SBB
- DS-HSSIM-AB—64 MB SIMM cache upgrade (two 32 MB SIMMs)

4.4 Supported Disk Drives

Table 1 describes the supported disk devices that may be used with the HSOF V7.7 software. The “*Works With an HSZ70 in a*” column describes which type(s) of enclosures the HSZ70 may be mounted in to use the particular device. For example, the DS-RZ26L-VW disk is supported by the HSZ70 in a DS-BA370 Series Ultra SCSI RAID Enclosure or an HSZ70 mounted in a DS-BA350/356 “M-series” shelf.

NOTE

Not all operating systems support all device types. The following tables display the device types supported by HSOF software Version 7.1. The notes below each table indicate operating system specific restrictions. Generally, only disk drive devices are supported on all operating systems. Tape and CD-ROM devices are only supported under the Compaq Tru64 and OpenVMS operating systems. Furthermore, accidental use of the ADD TAPE command will result in conditions requiring reinitialization of the controller

Table 1 – Supported Disk Drives

Device			Minimum Microcode Version	Minimum Hardware Version
DS-RZ1FB-VW	BA370 BA350/356-Mx	36	3B01	A01
DS-RZ1EA-VW	BA370 BA350/356-Mx	18	3B05/B016	A01
DS-RZ1DA-VW	BA370 BA350/356-Mx	9	3B06/B016	A01
DS-RZ1DD-VW	BA370 BA350/356-Mx	9	0305/3B07	A01
DS-RZ1FC-VW	BA370 BA350/#56-Mx	36	3B07	A01

5.0 STORAGE DEVICE CONFIGURATION RULES

The following lists outlines the configuration rules for the controller:

- Maximum 64 assignable, host-visible LUNs (63 assignable when using the StorageWorks command Console) Host-visible LUNs consist of eight Targets with eight device LUNs each).
- Maximum 512 GB LUN Capacity.
- Maximum 72 physical devices.
- Maximum 20 RAID 5 storagesets.
- Maximum 20 RAID5 and RAID1 storagesets
- Maximum 45 RAID5, RAID1 and RAID0 storagesets.
- Maximum 8 partitions per storageset or individual disk.
- Maximum 6 members per mirrorset
- Maximum 14 members per RAIDset or stripeset
- Maximum 32 physical device members total for a unit.

The *HSZ70 Array Controller HSOF V7.3 Configuration Manual* (Chapter 2) has detailed information regarding the configuration rules.

6.0 CLARIFICATIONS

6.1 Reinitializing after HSUTIL Operations

After you are finished using the HSUTIL program, you must initialize the controller from which you ran HSUTIL before resuming normal operations.

7.0 OPERATING CONSTRAINTS

Paragraphs 8.1 through 8.5 describe the operating constraints for HSOF Software Version 7.7. An operating constraint is a limitation placed on the operation of the controller by the nature of its design. Other constraints of host adapters or other system components may also be described in this section. Keep these constraints in mind to avoid problems and to help achieve the maximum performance from your controller:

- Cache Module Memory
- Disk Geometry Limitations
- Creating a SUN Filesystem on a Large RAID0 or RAID5 Storageset
- CLONE Utility Constraints
- DILX Operation
- Partitioned Sets Constraint

Chunk Size and Writeback Cache

7.1 Cache Module Memory

The HSZ70 controller can operate with only 32 MB of memory on the cache module in nonmirrored mode. A minimum of 64 MB of memory is **required** on each cache module if the mirrored cache feature is to be used. The controller will **not** boot when the controller is set to operate in mirrored cache mode, and **any** cache module contains less than 64 MB of memory.

NOTE

Mirrored Write-Back Cache is disabled by default. Enable mirrored write-back cache with the CLI Command: *SET controller MIRRORED_CACHE*. Refer to the *HSZ70 Array Controller HSOF V7.3 CLI Reference Manual* (SET controller command description) and *HSZ70 Array Controller HSOF V7.3 Configuration Manual* (Chapter 2) for details.

7.2 Disk Geometry Limitations

Table 7 presents known limitations that certain operating systems have regarding storage unit size.

Table 7 – Operating System Storage Unit Limitations

Operating System and Version	Storageset Configuration	Disk Size	Error
Sun Solaris (Versions 2.4, 2.5.1, 2.6)	Large storagesets whose geometry for the storageset includes a virtual disk with a number of heads at 255 or greater	9GB and 18GB	Number of heads exceeds 64 when attempting to perform <i>newfs</i> (to create a new filesystem) ¹

¹**Sun Solaris Problem Resolution Note: Refer to the following paragraph for a description of creating a new filesystem.**

7.3 Clone Utility Constraints

The CLONE utility cannot be used with partitioned mirrorsets or partitioned striped mirrorsets.

7.4 DILX Operation

DILX is a controller/container diagnostic. DILX operates only on containers preferred to the controller with the serial line access to the CLI (this controller). For single controller configurations, preferred ID's must be set for DILX to report potential test containers. The setting of a preferred ID (or not) is of no consequence to other operating functions of single controller configurations.

CAUTION

DILX has been changed to operate on all storage containers (not ONLY JBODs). Do not answer Y (YES) to Autoconfigure in DILX because DILX will immediately overwrite your storagesets. Also, write protecting the storageset in the CLI will not prevent DILX from writing on a storageset

7.5 Partitioned Sets Constraint

Partitioned Disks that have been included in a logical volume group may retain system data even though the volume group has been removed and the partition destroyed. If the disks should become unusable in this manner, create a single disk (JBOD) for each of the problem disks. Using the CLI, run the disk utility

DILX on the single disk targets for about 10 minutes. The system data will be destroyed and the disks ready for use.

7.6 Chunk Size and Writeback Cache

Using the minimum chunk size setting of 16 with the writeback cache disabled could result in serious performance degradation for that storage set. Selecting the optimum chunk size and enabling the writeback cache will result in the best performance for the storage set.

8.0 DOCUMENTATION ADDITIONS OR CORRECTIONS

The documentation updates described in this section are as follows:

- Replacing a PVA
- CLI Console Messages
- Removing /Replacing Controller Module and/or Program Card
- FRUTIL Main Menu
- Chunk Size

8.1 Replacing a PVA

Replace the procedure found in the *RA7000 and ESA10000 Storage Subsystems User's Guide* (EK-SMCP-UG) Section 5.10 "Replacing a PVA" with the following:

1. Halt all I/O activity to the controller using the appropriate procedures for your operating system.
2. Invoke the shutdown command from the maintenance terminal:
 - For dual-redundant configurations, shutdown each controller one at a time. From the maintenance terminal connected to the maintenance port of one controller, use both of the following commands:

```
HSZ70> SHUTDOWN OTHER_CONTROLLER
```

```
HSZ70> SHUTDOWN THIS_CONTROLLER
```

- In a single controller configuration, you need only use the command:

```
HSZ70> SHUTDOWN THIS_CONTROLLER
```

3. To ensure the controller has shutdown cleanly, verify that the Reset (//) light on the controller's OCP is lit continuously.
4. Rotate the left-hand and right-hand levers outward from the unit.
5. Pull the PVA straight out to disconnect it from the backplane and clear of the subsystem.

Perform the following procedure to install a PVA module.

1. Insert the replacement PVA into the guide slots and push it in against the backplane connector. Be sure the two levers are straight out from the unit to allow engagement with the brackets.
2. Rotate the levers in toward the unit to fully seat the PVA.
3. Properly set the SCSI bus address using the SCSI bus address switch on the front panel of the PVA. The addresses must match the addresses that were set on the original PVA module.

NOTE

Compaq supports enclosure addresses 0, 2, and 3. Address 0 is for the master unit and only addresses 2 and 3 are allowed for the expansion units. The use of these addresses in combination depends on the number of enclosures.

4. Restart the controller(s) by pressing and releasing the RESET button on the controller(s) OCP.
5. To verify if the controller(s) have initialized correctly, observe the RESET light on the controller's OCP. It should be flashing, not ON continuously."

The next documentation update of the *RA7000 and ESA10000 Storage Subsystems User's Guide* (EK-SMCP-UG) will incorporate the following change to the PVA (Power Verification and Addressing module) replacement procedure.

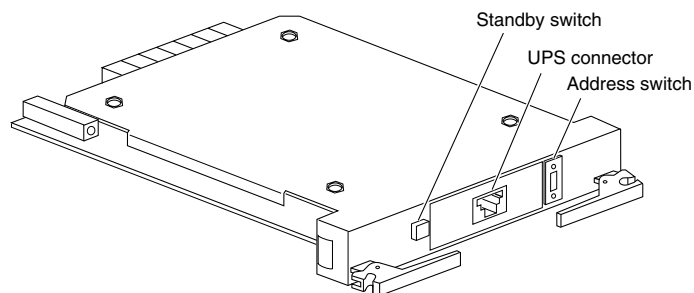
8.2 CLI Console Messages

CLI console messages are subject to change without prior notification.

8.3 Removing/Replacing Controller Module or PCMCIA Card

In the *HSZ70 Array Controller HSOF V7.3 Service Manual*, a CAUTION statement should be added to the removal/replacement sections of the controller module and the PCMCIA program cards regarding the PVA SCSI ID switch (associated with the illustration that follows).

Figure 1 PVA SCSI ID Switch



CXO5953A

CAUTION

The SCSI ID switch on the PVA module is extremely close to the PCMCIA card ESD cover. When removing the cover (or the controller module), take precautions not to accidentally bump the switch thereby changing the switch value. Note the switch value before removing the PCMCIA Program Card or the controller module so that it can be returned to its configured position if moved.

8.4 FRUTIL Main Menu Selections

The *HSZ70 Array Controller HSOF V7.3 Service Manual* (EK-HSZ70-SV.B01), in the section “*Replacing an I/O Module*” on page 3-37, currently displays the following example as a FRUTIL Main Menu:

FRUTIL displays the FRUTIL Main menu:

```
FRUTIL Main Menu:
1. Replace or remove a controller or cache module
2. Install a controller or cache module
3. Replace a PVA module
4. Replace an I/O module
5. Exit
Enter choice: 1, 2, 3, 4, or 5 ->
```

HSOF Software V7.x does not support line items 3 or 4 from the list above. The correct display should read:

FRUTIL displays the FRUTIL Main menu:

```
FRUTIL Main Menu:
1. Replace or remove a controller or cache module
2. Install a controller or cache module
3. Replace Other Battery
4. Exit
Enter choice: 1, 2, 3, or 4 ->
```

8.5 Chunk Size

Cautionary information on using the default chunk size as well as information on calculating chunk size, increasing the request rate, increasing the data transfer rate and increasing sequential write performance are described in paragraphs 12.5.1 through 12.5.4 and are to be added to the documents referenced.

The sections in the *HSZ70 Array Controller HSOF Version 7.3 CLI Reference Manual*, page 2-38 and in the *HSZ70 Array Controller HSOF Version 7.3 Configuration Manual*, pages 3-18 through 3-20 regarding chunk size should be replaced with the following:

Specifying Chunk Size

Specify the Chunksize of the data to be stored to control the stripesize used in RAIDsets and stripesets:

Chunksize = Default

This lets the controller set the Chunksize based on the number of disk drives (d) in a stripeset or RAID-set.

If $d \leq 9$ then Chunksize = 256. Or 128 kilobytes (K)

If $d > 9$ then Chunksize = 128. Or 64 kilobytes (K)

CAUTION

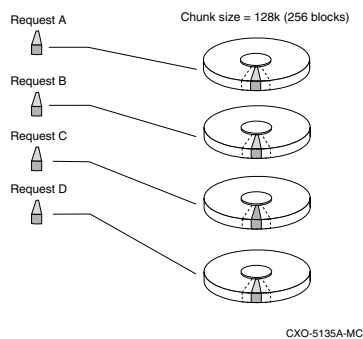
The default chunk size should be used with caution. It is imperative that you analyze the i/o transfers being used with your application to determine the proper chunk size. An improper value used as a chunk size may cause serious performance problems with the subsystem.

Chunksize = n

This lets you specify a chunksize in blocks. The relationship between chunksize and request size determines whether striping increases the request rate or the data-transfer rate.

Increasing the Request Rate

A large chunk size (relative to the average request size) increases the request rate by allowing multiple disk drives to respond to multiple requests. If one disk drive contains all of the data for one request, then the other disk drives in the storageset are available to handle other requests. Thus, in principle, separate I/O requests can be handled in parallel, thereby increasing the request rate. This concept is shown in Figure 2.

Figure 2 Chunk Size Larger than the Request Size

Applications such as interactive transaction processing, office automation, and file services for general timesharing tend to require high I/O request rates.

Large chunk sizes also tend to increase the performance of random reads and writes. It is recommended that you use a chunk size of 10 to 20 times the average request size, rounded to the closest prime number. In general, a chunk size of 239 works well for UNIX systems with a transfer size of 16 sectors; and a chunk size of 113 works well for *OpenVMS* systems with a transfer size of 8 sectors.

To calculate the chunk size that should be used for your subsystem, you first must analyze the types of requests that are being made to the subsystem:

- Lots of parallel I/O that use a small area of disk should use a chunk size at 10 times the average transfer request rate.
- Random I/Os that are scattered over all the areas of the disks should use a chunk size of 20 times the average transfer request rate.
- If you don't know, then you should use a chunk size of 15 times the average transfer request rate.
- If you have mostly sequential reads or writes (like those needed to work with large graphic files), then make the chunk size a small number (i.e. 17 sectors in Table 8 shows a few examples of chunk size selection).

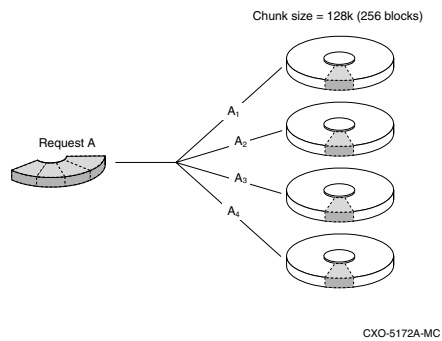
Table 1 Example Chunk Sizes

Transfer Size (KB)	High-Locality	Unknown Locality	Low Locality
2	41	59	79
4	79	113	163
8	157	239	317

Increasing the Data Transfer Rate

A small chunk size relative to the average request size increases the data transfer rate by allowing multiple disk drives to participate in one I/O request. This concept is shown in Figure 3.

Figure 3 Chunk Size Smaller than the Request Size



Applications such as CAD, image processing, data collection and reduction, and sequential file processing tend to require high data-transfer rates.

Increasing Sequential Write Performance

Sequential write and read requests on stripesets (or striped mirrorsets) should use a small chunk size relative to the I/O size to increase the performance. A chunk size of 17 generally works well

9.0 SOFTWARE INSTALLATION

Upgrading the HSZ70 controller software (or firmware) from V7.0 to V7.1 may be accomplished by using one of the following two procedures dependent upon whether you are upgrading a single controller or dual-redundant controller installation configuration.

NOTE

Before installing the software, ensure that all applicable software patches, if any, are installed (on the one if a single controller, or both controllers if a dual-redundant configuration). The installation may not work properly if the applicable patches are not installed prior to installing the major release (this applies to upgrading the software as well as reverting back to an older code release).

Refer to the web page at: <http://www.storage.digital.com>. Select “support” and then “array controllers” to display the web page that contains the patch descriptions and procedures for downloading the appropriate patch(es).

9.1 Single Controller Software Installation

You must shutdown and restart the controller during this upgrade, meaning the units will be unavailable to the host system. Before upgrading the controller software, prepare the host system for this situation. Use the following procedure to upgrade the HSOF software to V7.1:

1. Halt all host I/O activity to the controller and prepare the host system for a controller shutdown using the appropriate procedures for your operating system.
2. Establish a local connection to the controller through the maintenance port of the controller.
3. Shut down “this controller” by using the following command:

```
SHUTDOWN THIS_CONTROLLER
```

CAUTION

Ensure you wait until the Reset button stops flashing and stays lit continuously. This indicates that unwritten data is flushed from the cache module.

4. Remove the PCMCIA program card ESD cover.
5. Press and hold the HSZ70 Controller Reset button while ejecting the old program card (release the button after the card is ejected).
6. Press and hold the Reset button while inserting the new program card (release the button after the new card is inserted.).
7. Replace the ESD cover and push the locking pins to secure it.

NOTE

The controller will initialize and the reset button will flash at an approximate once per second rate when ready for operation.

9.2 Dual-Redundant Controller Rolling Upgrade Software Installation

The upgrade procedure for the dual-redundant configuration involves a “rolling upgrade” procedure. A rolling upgrade is one in which the disk subsystem does not have to be shutdown to upgrade the software. Using the failover capabilities of the controllers, only one controller at a time need be shutdown, allowing the host system to have disk drive availability from the disk subsystem being upgraded.

Use the following procedure to install the HSOF V7.1 software:

1. Establish a local connection to the controller through the maintenance port of the controller.
2. Remove the preferred target IDs from “other controller” by using the following command:

```
SET OTHER_CONTROLLER NOPREFERRED
```

NOTE

Ensure you have the preferred target IDs written down before clearing them out with the `SET OTHER_CONTROLLER NOPREFERRED` command. This will speed up the process at the end of the installation procedure.

3. Wait for the CLI prompt, and then shut down “other controller” by using the following command:

```
SHUTDOWN OTHER_CONTROLLER
```

NOTE

If the EMU alarm is turned on, then it will “sound” when the controller is shut down. The alarm may be turned off by pressing the lit EMU “fault” button.

CAUTION

Before continuing, wait until the Reset button stops flashing and stays lit continuously. This indicates that unwritten data is flushed from the cache module.

4. Remove the PCMCIA program card ESD cover from “other controller”.
5. Press and hold the HSZ70 Controller Reset button while ejecting the old program card (release the button after the card is ejected).
6. Press and hold the Reset button while inserting the new program card in “other controller” (release the button after the new card is inserted).

NOTE

Wait for the following to happen before continuing:

The reset button flashes at an approximate once per second rate.

The maintenance terminal displays a message that finishes with:

```
other controller restarted
```

7. Read the status of “other controller” by issuing the following command:

```
SHOW OTHER_CONTROLLER
```

When the **SHOW OTHER_CONTROLLER** command verifies that the `other controller restarted`, it is safe to continue.

8. Replace the ESD cover on “other controller” and push the locking pins to secure it.
9. First pass through this procedure?
 - YES—move the maintenance port cable from “this controller” to “other controller” maintenance port and repeat procedure from step 3 through step 8 to replace the other program card. “Other controller” switches with “this controller”—the controller that the maintenance port cable was plugged into originally (“this controller”) becomes “other controller” for the 2nd pass through steps 2–8.
 - NO—go to step 10.
10. Re-establish the preferred target ID list in the two controllers by issuing the following commands:

```
SET OTHER_CONTROLLER PREFERRED_ID=  
SET THIS_CONTROLLER PREFERRED_ID=
```