



ArrayMasStor

J Series (19" Rack Model, Tower Model) **USER'S MANUAL**

P/N A208233

Revision 1.2e



Foreword

Thank you for purchasing ADTX's ArrayMasStor J Series subsystem.

This manual describes the operation, functions, and specifications of the ArrayMasStor J Series. Please read the manual before using this product.

Safety Notice

Throughout this manual the following symbols are used to highlight safety notice.

 WARNING	Indicates a potentially hazardous situation, which could result in death or serious injury to the user or severe damage to the product.
 CAUTION	Indicates a potentially hazardous situation, which could result in serious injury to the user or damage to the product.
<i>IMPORTANT !</i>	Indicates an important information, which could result in erroneous operation to the product.

- ArrayMasStor is a registered trademark of Advanced Technology and Systems Co., Ltd.
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WARNING

- The AC power cord must be connected to a grounded outlet. In case of a short-circuit, electrical shock or fire may occur.
- Do not use the ArrayMasStor in hot, humid or dusty environments. Usage under such conditions may result in a short circuit, electrical shock or fire.
- The ArrayMasStor's cover must be securely attached to the chassis. If the cover is not properly installed, ventilation could be impaired and this may cause a short circuit, electrical shock or fire.
- Do not block the ventilation opens. Without proper ventilation, the ArrayMasStor will malfunction or fail.
- Use the supplied AC power cord. In case of a short circuit, electrical shock or fire may occur.



CAUTION

- Rapid temperature changes may cause condensation of humidity to form on the ArrayMasStor. Do not use the subsystem where it will not evaporate.
- Do not install the ArrayMasStor near electronic components with strong electromagnetic fields, such as televisions or loud speakers.
- Turn off the power before moving, connecting or disconnecting the ArrayMasStor. This will prevent vibrations or mechanical shocks from damaging the hard disk drives (HDD) and other internal components.
- Do not remove the drive unit during normal operation, as this may cause damage, malfunction or data loss. The drive unit should be removed when they have failed and need to be replaced.
- Use the appropriate SCSI host card for ArrayMasStor in accordance with single-ended or low voltage differential (LVD) SCSI interface. Using the wrong card may damage the subsystem or cause a malfunction to occur.
- Use only the approved replacement drive unit in the ArrayMasStor. Please see Appendix D for a list of approved replacement parts.

- Do not turn on and off in a rapid succession manner. Leave at least 15 seconds between turning on and off. This may avoid damage or malfunction. The HDD requires about 15 seconds to completely stop after turning off the ArrayMasStor.
- Insert to push the drive unit firmly. A loose connection may damage the ArrayMasStor or cause it to malfunction.
- Do not turn the ArrayMasStor off by unplugging the AC power cord from the rear panel. This may result in data loss. The ArrayMasStor's firmware is designed to detect the status of the power switch and synchronize the data in the cache and the drives before shutdown. To control the power from the AC line, send a 'synchronize cache'¹ command from the host computer to the ArrayMasStor.
- When unplugging the AC power cord, leave one minute further before plugging it again. This may prevent fuse damage.

IMPORTANT !

- For optimum performance, the total length of the SCSI bus should be as short as possible. The total cable length must be less than 1.5 m for single-ended mode and 12m for LVD mode.
- A maximum of two host computers can be connected to the ArrayMasStor in a dual host configuration.
- Set the ArrayMasStor's UNIX² C/H/S mode before connecting it to the operating systems shown below. Changing the UNIX C/H/S mode after installation may cause data loss.

Solaris ³ (SPARC)	2.X
IRIX ⁴	5.X
- The backlight on the liquid crystal display (LCD) turns off automatically when the operation buttons are not used for a period of time. The backlight will turn on when the operation button is pressed. The backlight will stay on when a drive fails, when the ArrayMasStor is in data reconstruction mode, and during data initialization.

¹ A SCSI command which ensures that logical blocks in the cache have their most recent data value recorded in the drives.

² UNIX has two known standards, *System V* by AT&T and *BSD4.x* by Berkeley University.

³ SolarisTM and SparkTM is a Trademark of SUN Microsystems.

⁴ IRIXTM is a Trademark of Silicon Graphics Inc.

- It is strongly recommended that up to two ArrayMasStors be connected to the same bus in the single-ended SCSI.
- It is strongly recommended that the data be regularly backed up. In RAID levels 1 and 5, the ArrayMasStor will be operative when a drive fails. However, if two or more drives fail, all of the data may not be recoverable. And, if any other parts of the ArrayMasStor malfunction, there is possibility of data loss.
- It is strongly recommended that the surface verification check implement before dynamic data reallocation.
- It is strongly recommended that an interruptible power supply (UPS) be used with the ArrayMasStor to avoid data loss when the power line is unstable and power outage happens.

Table of Contents

Foreword	I
Safety Notice	I
WARNING.....	II
CAUTION.....	II
IMPORTANT.....	III
1 INTRODUCTION TO THE ARRAYMASSTOR J SERIES.....	1
1.1 FEATURES.....	1
1.2 ABOUT RAID LEVELS	2
1.2.1 RAID Level 0.....	2
1.2.2 RAID Level 1.....	3
1.2.3 RAID Level 5.....	4
1.3 MIXED RAID LEVELS	5
1.4 HOT SPARE FEATURE	6
1.5 WRITE BACK CACHE FUNCTION	7
1.6 DYNAMIC DATA REALLOCATION.....	8
2 NAMING CONVENTION.....	9
2.1 FRONT VIEW	9
2.2 REAR VIEW.....	13
3 INSTALLING THE ARRAYMASSTOR J SERIES.....	15
3.1 CONNECTING THE POWER LINE CORD.....	15
3.2 CONNECTING THE SCSI CABLE	15
3.3 TURNING THE POWER ON	15
3.4 SETTING THE PASSWORD	16
3.5 SETTING THE TIME & DATE.....	16
3.6 SETTING THE SCSI ID.....	16
3.7 SETTING THE SPARE MODE AND RECONFIGURING THE LUN	16
3.8 FORMATTING	16
3.9 CONNECTION TO A MACINTOSH	16
3.10 CONNECTION TO THE UNIX SYSTEMS.....	17
4 ARRAYMASSTOR J SERIES OPERATIONS	18
4.1 OPERATION BUTTONS	18
4.2 STATUS DISPLAY (MAIN MENU)	19
4.2.1 Normal Mode	19
4.2.2 Degraded Mode (drive failure).....	20
4.2.3 Drive Replacement	21
4.2.4 Data Reconstruction.....	21
4.2.5 Data Initialization	22
4.2.6 Data Reallocation.....	22
4.2.7 Double Fault (Failure of two or more drives).....	23
4.2.8 Forced Data Reconstruction.....	24
4.2.9 System Halt	25
4.2.10 Fan Failure.....	26
4.2.11 Power Supply Failure.....	27
4.2.12 Surface Check.....	28
4.3 LUN CONFIGURATION	29
4.4 CHS INFORMATION.....	29
4.5 SCSI ID INFORMATION	30
4.6 DISPLAY SYSTEM CONFIGURATION.....	30

4.6.1	<i>Number of Drives</i>	30
4.6.2	<i>Hot Spare Drive</i>	30
4.6.3	<i>Buzzer Mode</i>	30
4.6.4	<i>Automatic Reconstruction Mode</i>	30
4.6.5	<i>Write Cache Mode</i>	31
4.6.6	<i>AIX Error Notice Mode</i>	31
4.6.7	<i>UNIX C/H/S Mode</i>	31
4.6.8	<i>Ultra SCSI Mode</i>	31
4.6.9	<i>Initiator Mode</i>	31
4.6.10	<i>Background Surface Check</i>	31
4.6.11	<i>DPO/FUA Bit</i>	32
4.7	SYSTEM STATUS	33
4.7.1	<i>System Status</i>	33
4.7.2	<i>Serial Number</i>	34
4.7.3	<i>Microcode Revision</i>	34
4.7.4	<i>System Status Code</i>	34
4.7.5	<i>System Status Time and Date</i>	34
4.8	DRIVE STATUS	35
4.9	CHANGING SYSTEM CONFIGURATION	36
4.9.1	<i>Entering the Password</i>	36
4.9.2	<i>Changing the Date and Time Setting</i>	37
4.9.3	<i>Changing the SCSI ID</i>	38
4.9.4	<i>Reconfigure</i>	39
4.9.5	<i>Buzzer Test</i>	41
4.9.6	<i>Changing the Buzzer Mode</i>	41
4.9.7	<i>Configuring the Write Cache Mode</i>	42
4.9.8	<i>Changing the Automatic Reconstruction Mode</i>	43
4.9.9	<i>Maximum SCSI Transfer Rate</i>	44
4.9.10	<i>DPO/FUA Bit</i>	45
4.9.11	<i>Changing the AIX Error Notice Mode</i>	46
4.9.12	<i>Changing the UNIX C/H/S Mode</i>	47
4.9.13	<i>Performing Surface Check</i>	48
4.9.14	<i>Stopping Surface Check</i>	49
4.9.15	<i>Background Surface Check</i>	50
4.9.16	<i>Setting Initiator Mode</i>	51
4.9.17	<i>Error Insertion</i>	52
4.9.18	<i>Displaying the System Trace Data</i>	53
4.9.19	<i>Erasing the System Trace Data</i>	53
4.10	ADDING DRIVE UNITS	54
4.10.1	<i>Adding Unit as Hot Spare Drive</i>	55
4.10.2	<i>Adding Unit as Data Drive</i>	56
4.10.3	<i>Adding Unit as New LUN</i>	57
4.11	REMOVING ON-LINE DRIVES	58
5	TROUBLESHOOTING	59
5.1	DRIVE FAILURE	59
5.2	POWER SUPPLY MODULE FAILURE	60
5.3	FAN MODULE FAILURE	61
5.4	OTHER FAILURES	62
APPENDIX A SPECIFICATIONS		63
APPENDIX B ACCESSORIES		65
APPENDIX C DEFAULT CONFIGURATION		66

APPENDIX D REPLACEMENT PARTS67

APPENDIX E FEATURE SETTING68

ELECTRONIC EMISSION NOTICES.....69

 FEDERAL COMMUNICATIONS COMMISSION (FCC) STATEMENT69

 FCC WARNING69

INFORMATION.....70

 - MANUFACTURER.....70

1 Introduction to the ArrayMasStor J Series

The ArrayMasStor J Series is a compact, high performance, redundant array of independent disks. The subsystem includes up to four hard disk drives (HDD) and offers high availability and an excellent data transfer rate. The subsystem is easy to install and use, and has a unique interoperability feature that allows it to work through a simple SCSI interface and be recognized as a single drive by a host computer.

1.1 Features

The ArrayMasStor J Series

- Stores a large capacity data securely with excellent performance and data availability.
- Allows a failed drive to replace without interrupting system operation. Data reconstruction starts automatically upon drive replacement.
- Data reconstruction onto the spare drive starts immediately when a drive fails. (hot spare mode)
- Improves write performance with large-capacity cache buffer.
- Recognized as a single drive on the SCSI bus. The 'daisy chained' SCSI connection can be extended extremely a large storage capacity.
- Complies with the standard SCSI-3 interface.
- Provides dynamic data reallocation and background surface verification for maximum system availability.
- Allows mixed RAID levels within the one product.

1.2 About RAID levels

The ArrayMasStor J Series supports three RAID levels, so you can choose the optimal level for your application. The default setting is RAID Level 5 if at least 3 hard disk drives are online. The default setting is RAID Level 1 if 2 hard disk drives are online. In the following examples, four drives are assumed to be online.

<i>IMPORTANT !</i>	All stored data will be erased when the RAID level is changed. Back-up the data before changing the RAID level.
---------------------------	---

1.2.1 RAID Level 0

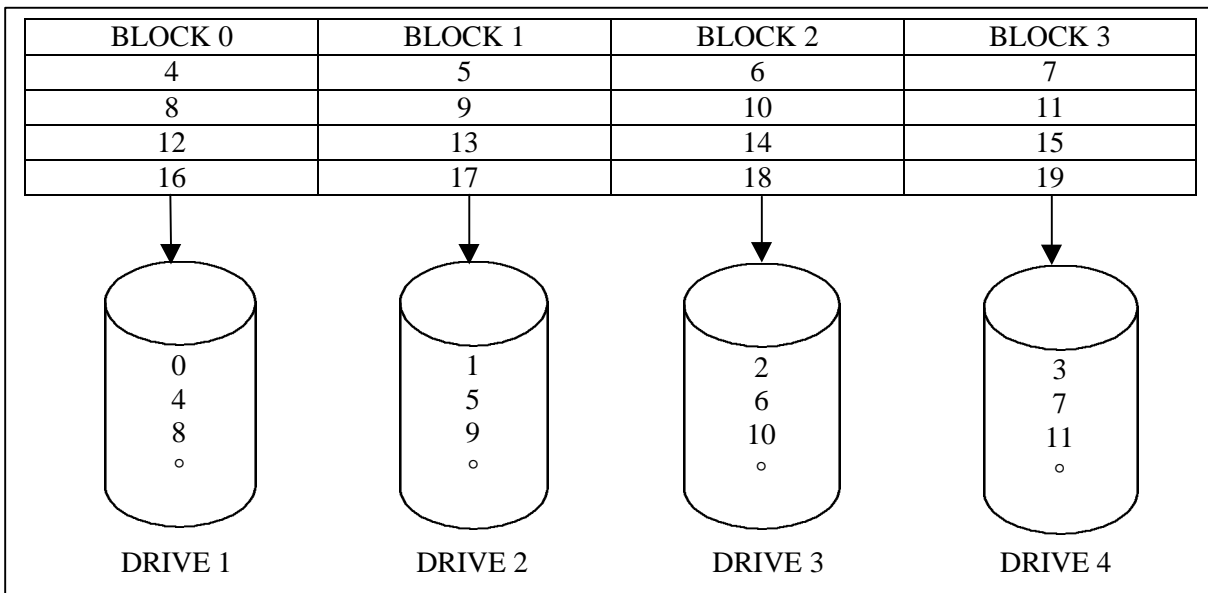
In this level, data is striped over all of the drives in the array. This provides the maximum storage capacity, since the entire array is used solely for data storage, and the ArrayMasStor's input/output performance is maximized because of the drives' parallel processing ability.

<i>IMPORTANT !</i>	In RAID Level 0, there is no data redundancy. Data will be lost if a drive fails.
---------------------------	---

The effective storage capacity of this RAID level is as follows:

(Effective storage capacity) = (Capacity of one drive) x (Number of drives)

This RAID level is suitable for applications that require high performance and the largest available storage capacity, without the need for data protection.



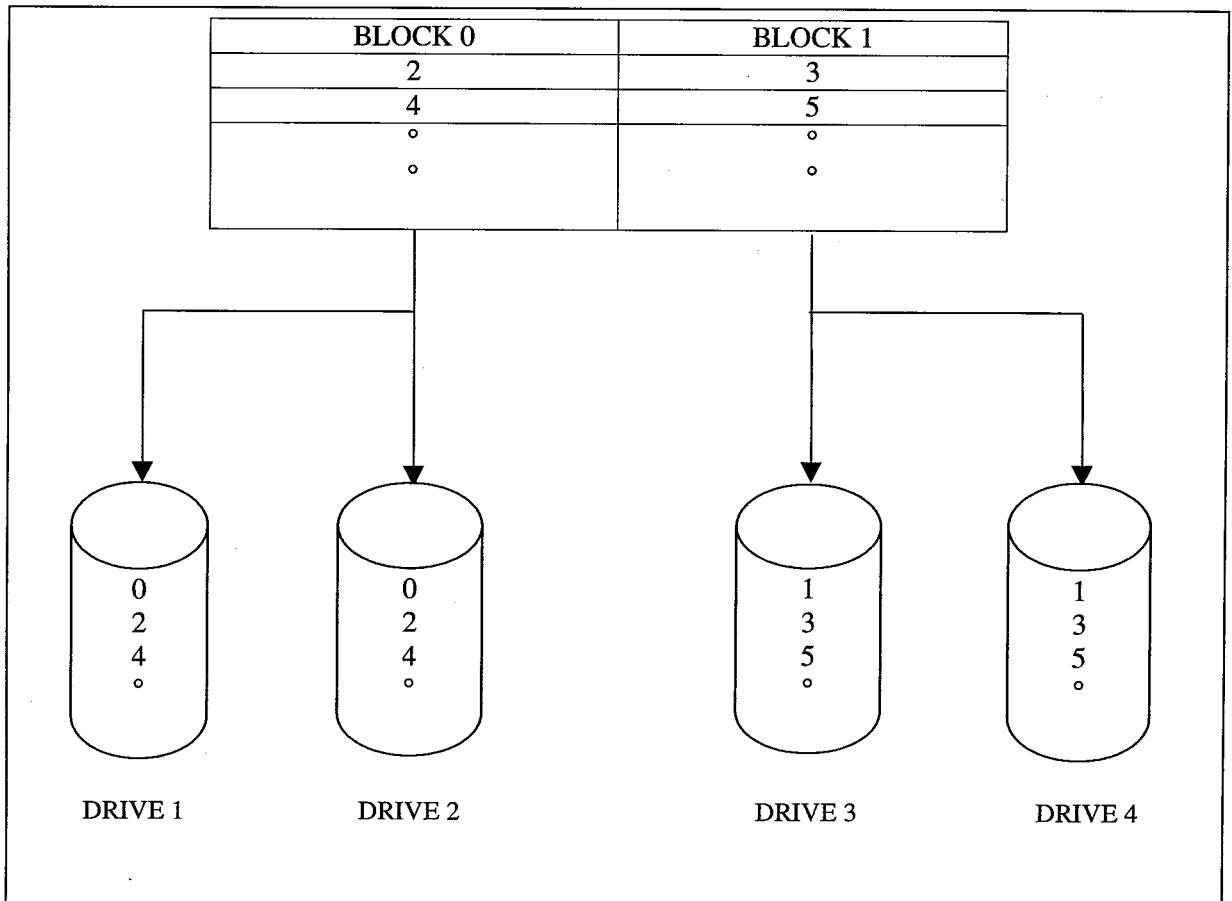
1.2.2 RAID Level 1

In RAID Level 1, which is also called mirroring mode, the same data is written to a pair of drives. As a result, if one drive fails, data can still be retrieved from the mirrored drive. The effective storage capacity of the ArrayMasStor in RAID Level 1 is smaller than in RAID levels 0 or 5. However, random write performance of small data blocks improves considerably. In addition, there is no performance degradation when one of the drives actually fails.

The effective storage capacity of this RAID level is as follows:

$$\text{(Effective storage capacity)} = (\text{Capacity of one drive} \times \text{Number of drives}) \div 2$$

This RAID level is best for applications that access small data blocks in a random write pattern.



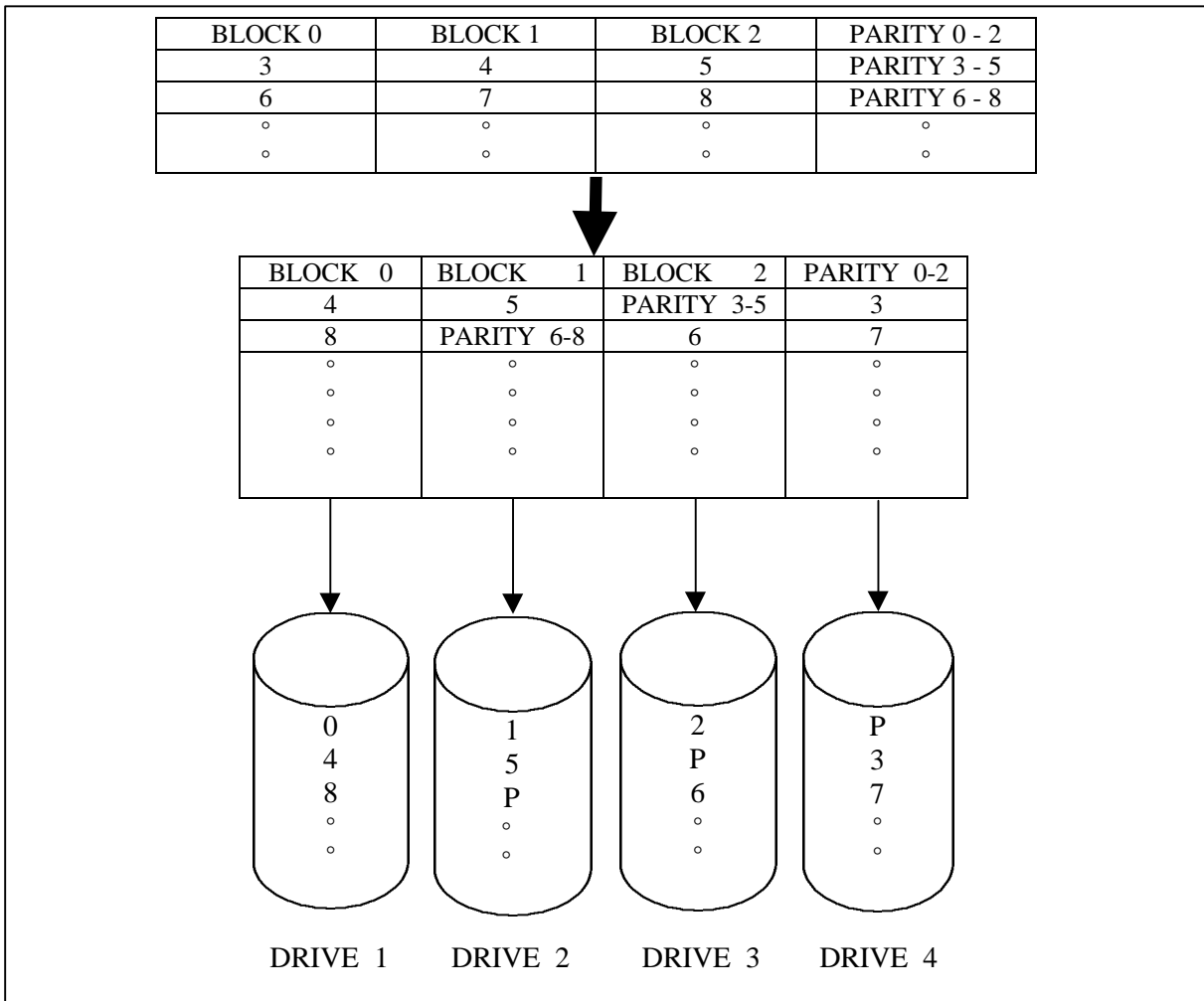
1.2.3 RAID Level 5

In RAID Level 5, parity data is generated and stored on the equivalent of one drive. If one drive fails, the lost data can be reconstructed using data recorded on the other drives and the parity data. Parity data is written on all of the drives in order to avoid performance degradation due to the intensive access requirements that would result from using a single or specific parity drive.

The effective storage capacity of this RAID level is as follows:

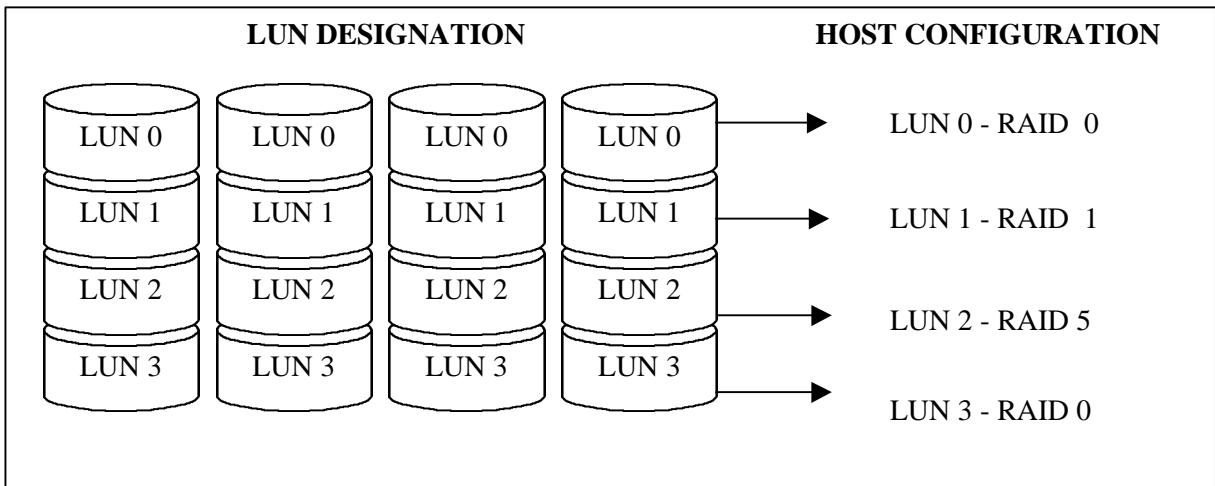
$$(\text{Effective storage capacity}) = (\text{Capacity of one drive}) \times (\text{Number of drives} - 1)$$

This RAID level is most appropriate when data protection is the primary consideration.



1.3 Mixed RAID Levels

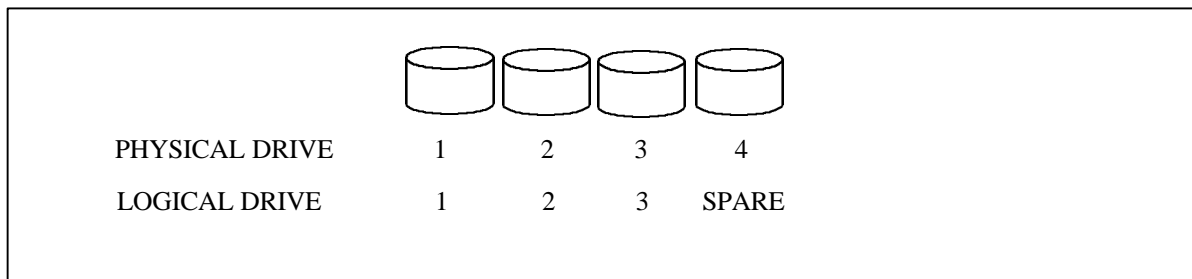
The ArrayMasStor supports mixed RAID levels. This means that the ArrayMasStor can be configured to handle multiple logical units (LU), and that a different RAID level can be assigned to each LU. The ArrayMasStor can support up to seven separate LU (0 – 6) and separate RAID levels. A sample configuration is shown below:



1.4 Hot Spare Feature

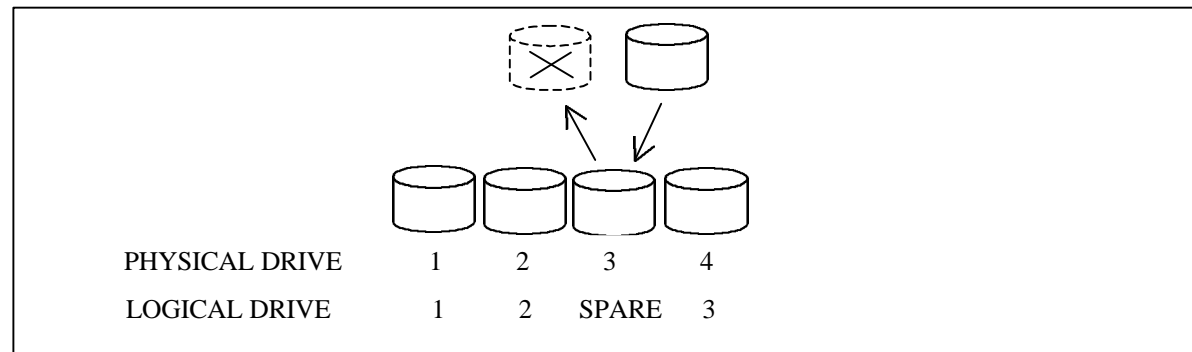
When the hot spare feature is activated, background data recovery onto the spare drive starts immediately after the failure of an on-line drive. This feature reduces the effective storage capacity of the ArrayMasStor, since one drive is reserved as a hot spare. However, the hot spare feature improves the ArrayMasStor's reliability and its ability to protect data. After the data recovery process is complete, the ArrayMasStor is redundant (fault tolerant) again.

In the following example, there are four drives in the ArrayMasStor. The hot spare feature is only available when more than three drives are used.



When one of the on-line drives fails, the data recorded on the failed drive is re-generated and written onto the spare drive. After the data recovery process is complete, the spare drive takes the place of failed drive. For example, if drive #3 fails, the hot spare drive (physical drive #4) becomes logical drive #3.

When the failed drive is replaced, the replacement drive becomes the spare drive.



1.5 Write Back Cache Function

When used in RAID Level 5, the write operation for small data blocks causes a data bottleneck. This is because, before it can write the new data, the ArrayMasStor must read the old data and parity, which are needed to generate the new parity⁵. This phenomenon, which is called the write penalty, impairs performance when the host computer accesses the ArrayMasStor in a random write pattern.

The ArrayMasStor uses a large buffer as a write-back cache to compensate for the write penalty problem. When data is acquired into the cache buffer by a 'write' command issued by the host computer, the ArrayMasStor returns a 'complete' command to the host computer. The ArrayMasStor gathers the small amounts of write data to the cache buffer and writes this data onto the drives at one time.

When shutting down the ArrayMasStor using the power switch on the front panel, the ArrayMasStor's firmware detects the power switch status, flushes the data in the cache to the drives, and then turns off the power. When powering down from the AC line, a 'synchronize cache' command must be sent from the host computer to the ArrayMasStor before the power is turned off. Failure to use the 'synchronize cache' command can result in data loss.

<i>IMPORTANT !</i>	Push Power Switch to turn off except for emergency. Turning off by pulling out Power Line Cord may cause data loss in the cache buffer.
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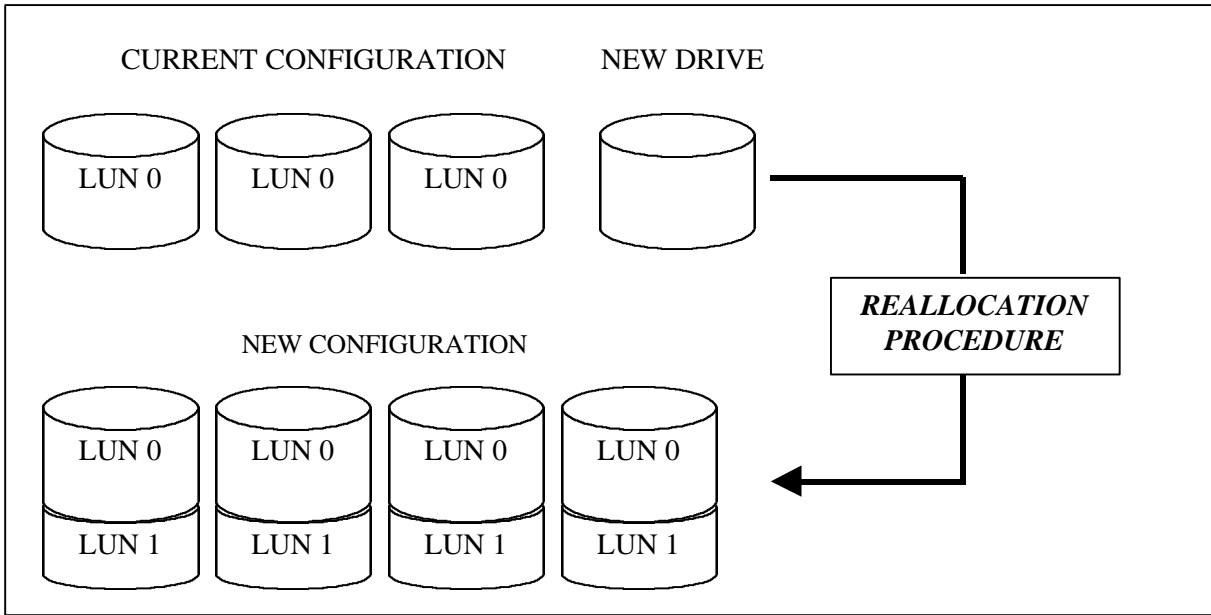
Plugging AC power cord can't be POWER-ON condition of ArrayMasStor J series.

<i>IMPORTANT !</i>	It is strongly recommended that an interruptible power supply (UPS) be used to avoid data loss when the power line is unstable and power outage happens.
---------------------------	--

⁵ This is called "Read Modify Write".

1.6 Dynamic Data Reallocation

The ArrayMasStor J Series supports dynamic data reallocation, which allows the expansion of the ArrayMasStor’s capacity by adding new drives without data loss. The additional storage capacity is assigned a new LUN.



The original data is reallocated to suitable locations, and the parity data (for RAID Level 5) is automatically regenerated. For RAID Level 1, the mirror data is written alongside the original data and the original drive information is re-striped over the new drives. RAID Level 0 also offers this feature, but there is no data redundancy when the re-stripping or reallocation procedure is executed.

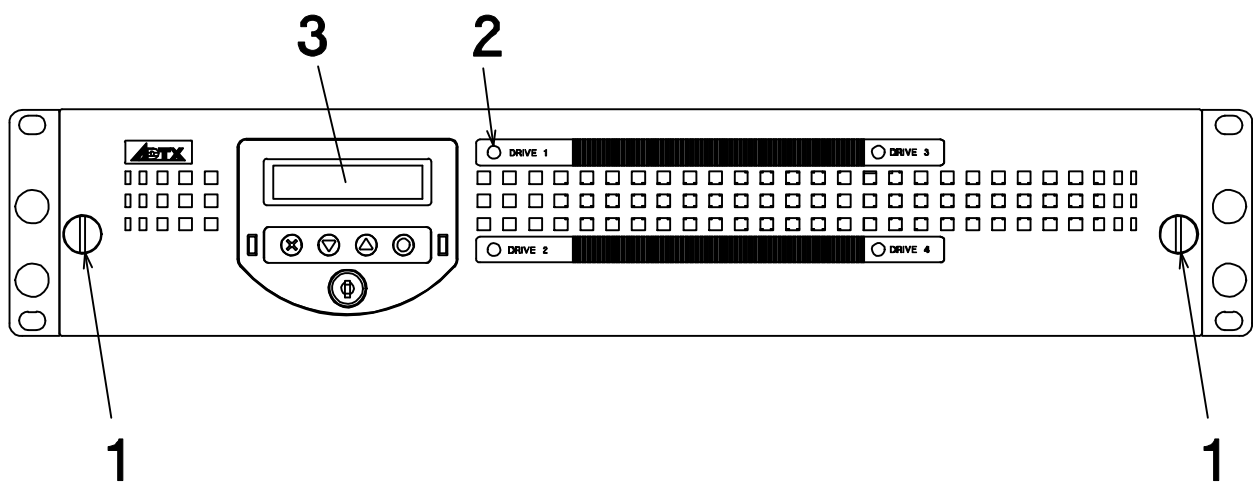
Increasing the number of drives allows the same total storage capacity to be accessed faster, because four (rather than three) drives are concurrently accessing the 40 MB of data in each LUN. Each new LUN is treated as an individual drive by the host computer, and is easily configured from the operating system for immediate use.

<i>IMPORTANT !</i>	It is strongly recommended that the surface verification check implement before dynamic data reallocation.
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<i>IMPORTANT !</i>	ArrayMasStor won’t permit to access from the host computer while carrying out dynamic data reallocation.
---------------------------	--

2 Naming Convention

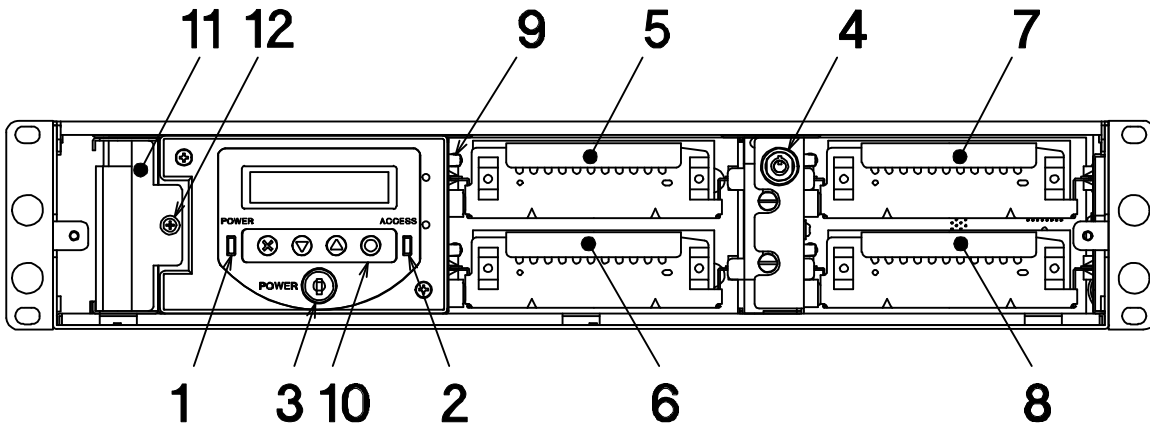
2.1 Front view



Front cover (rackmount type)

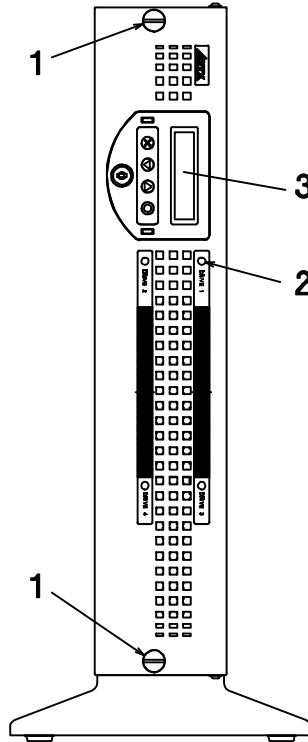
-
1. Screw for Front Cover
 2. Drive Access/Status LED
 3. Display Panel

Removal of Front cover (rackmount type)



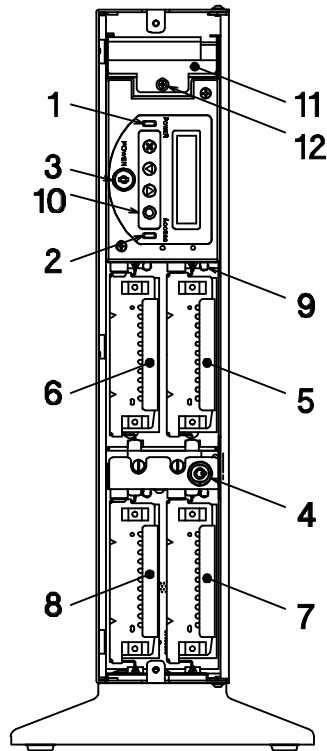
- | | |
|--------------------|-----------------------|
| 1. Power LED | 7. Drive unit #3 |
| 2. Host Access LED | 8. Drive unit #4 |
| 3. Power switch | 9. Drive access LED |
| 4. Drive lock | 10. Operation buttons |
| 5. Drive unit #1 | 11. Fan Module |
| 6. Drive unit #2 | 12. Fan module screw |

Front cover (tower type)



- 1. Screw for Front Cover
- 2. Drive Access/Status LED
- 3. Display Panel

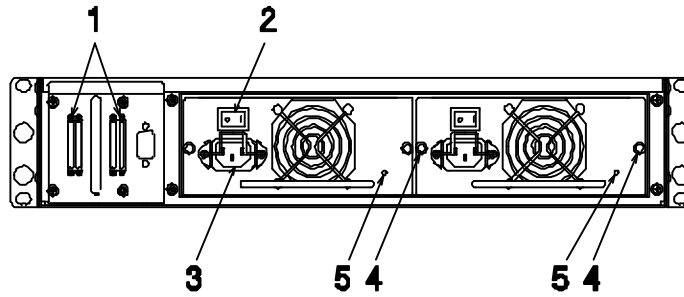
Removal of Front cover (tower type)



- | | |
|--------------------|-----------------------|
| 1. Power LED | 7. Drive unit #3 |
| 2. Host Access LED | 8. Drive unit #4 |
| 3. Power switch | 9. Drive access LED |
| 4. Drive lock | 10. Operation buttons |
| 5. Drive unit #1 | 11. Fan Module |
| 6. Drive unit #2 | 12. Fan module screw |

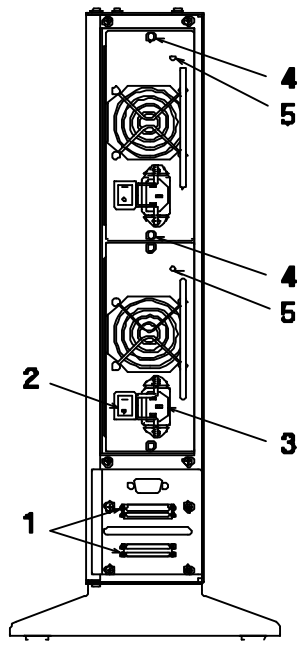
2.2 Rear view

rackmount type



1. SCSI connector (Dual channel, 68 pins, VHDCI connector)
2. Power supply switch: Normal "ON" ("I" is pressed in)
3. Power cord receptacle
4. Power Module screw
5. Power supply status indicator


Rear View (tower type)




1. SCSI connector (Dual channel, 68 pins, VHDCI connector)
2. Power supply switch: Normal "ON" ("I" is pressed in)
3. Power cord receptacle
4. Power Module screw
5. Power supply status indicator

3 Installing the ArrayMasStor J Series


First, position the ArrayMasStor J series in stable manner and attach the supplied Front cover. Then, follow these instructions to connect the ArrayMasStor to a host computer. Default settings are listed in Appendix C.

 CAUTION	Never carry the ArrayMasStor with holding the Front cover or the handle of Drive unit.
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 CAUTION	Be sure to attach the Front cover and to let it closed.
--	---

3.1 Connecting the Power Line Cord

Plug the supplied AC power cord to the receptacle and outlet. The ArrayMasStor uses a 100V~240VAC universal power supply with automatic voltage detection.

 CAUTION	Simply plugging the AC power cord will not mean that the ArrayMasStor is in POWER-ON condition.
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3.2 Connecting the SCSI Cable

Use a SCSI cable, meeting SCSI-2 or SCSI-3 specifications, to connect the ArrayMasStor to the host computer's SCSI interface. If the ArrayMasStor is located at the end of the SCSI bus, attach a SCSI terminator to the unused SCSI connectors on the back of the ArrayMasStor.

IMPORTANT !	For optimum performance, the total length of the SCSI bus should be as short as possible. For a single-ended SCSI card, the total cable length must be less than 1.5 m.
--------------------	---

3.3 Turning the Power On

Turn the power switch key clockwise to power on the ArrayMasStor. Before switching on the power, check that all drive units are inserted firmly. Switch on the ArrayMasStor before turning on the host computer.

3.4 Setting the Password

The ArrayMasStor has a default password that is used to change the configuration (see Appendix C). The procedure for changing the password can be found in section 4.9.1., Entering the Password.

3.5 Setting the Time & Date

The clock values in the configuration menu are set to a default value. To change the clock value, use the CHANGE CONFIG menu and follow the procedure in section 4.8.2, Changing the Date and Time Setting. Before using the ArrayMasStor, set the internal clock to the local time. The correct local time is required for proper operation of the background surface verify function.

3.6 Setting the SCSI ID

The SCSI ID should be set before starting the host computer. See section 4.8.3, Changing the SCSI ID for information about changing the SCSI ID. The ArrayMasStor must be restarted before changes to the SCSI ID will take effect.

3.7 Setting the Spare Mode and Reconfiguring the LUN

All data will be erased when the spare mode or the LUN settings are changed. As a result, changes to these settings must be made before creating partitions or formatting the storage area. For information about setting the spare mode, see section 4.10.1, Add Drive as Hot Spare Drive. After setting the spare mode and the LUN configuration, restart the ArrayMasStor. The new settings will take effect after the initialization process is completed.

The spare mode does not need to be set if the default settings are used.

3.8 Formatting

Before using, the ArrayMasStor must be partitioned or formatted so that they will work with the host computer's operating system. Partitioning and formatting instructions can be found in your operating system manuals. In some cases, BIOS, file systems, or operating systems place limitations on the capacity of a single partition. If this occurs, divide the usable area of the ArrayMasStor into partitions that conform to the capacity limitations. In general, the format operation provided by some of device drivers and diagnostic programs is not needed in order to be able to use the ArrayMasStor.

3.9 Connection to a Macintosh ⁶

The following limitations apply when connecting the ArrayMasStor to a Macintosh computer:

- Supported Machines
CPU : 68040 or Power PC

⁶ Macintosh is a trademark of Apple Computer, Inc.

- OS : System 7.1 or above
- The drive formatter provided with Apple computers only recognizes drives supplied by Apple Computer. In order to format the ArrayMasStor for use with a Macintosh, a hard disk formatter from a third party is necessary. The Hard Disk Tool kit by FWB is recommended.
- The ArrayMasStor does not support blind transfer. Please set the transfer mode to non-blind transfer.
- Each partition has a maximum capacity of 2GB on a system 7.0 and 4GB on a system 7.5. If the ArrayMasStor's capacity exceeds these limitations, the entire storage capacity should be divided into several smaller partitions.

3.10 Connection to the UNIX Systems

- The UNIX C/H/S mode must be set before the ArrayMasStor is connected to the following operating systems:

Solaris (SPARC)	2.X
IRIX	5.X

- The configuration file in Sun OS (Solaris 2.5.1/2.6) must be edited to use the LUN.

Example (To set two LUNs to the ArrayMasStor J Series at SCSI ID 0)

SPARC station5 Turbo 170M

File name to edit : /kernel/dev/sd.conf

Before Edit	After Edit
name="sd" class="scsi"	name="sd" class="scsi"
target=0 lun=0;	target=0 lun=0;
:	name="sd" class="scsi"
:	target=0 lun=1;
:	:
name="sd" class="scsi"	name="sd" class="scsi"
target=15 lun=0;	target=15 lun=0;

PC-AT (for Intel) Adaptec AHA-2940UW

filename to edit : /kernel/dev/cmdk.conf

Before Edit	After Edit
name="cmdk" class="scsi"	name="cmdk" class="scsi"
target=0 lun=0;	target=0 lun=0;
:	name="cmdk"
:	class="scsi"
:	target=0 lun=1;
:	:
name="cmdk" class="scsi"	name="cmdk" class="scsi"
target=15 lun=0;	target=15 lun=0;

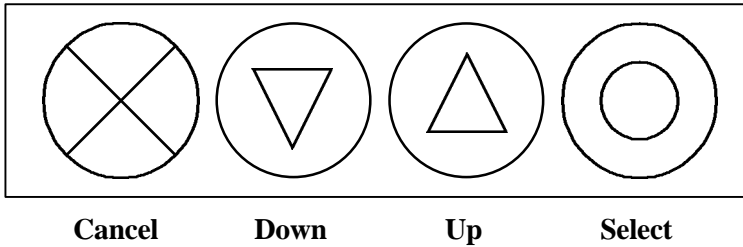
After editing the configuration file, re-boot the system with the boot option "-r".
If the file is change correctly, the new LUN will appear on the ArrayMasStor's display when it is restarted.

4 ArrayMasStor J Series Operations

The ArrayMasStor's status is displayed on the operation panel. By selecting menus using the operation buttons, you can review the ArrayMasStor's status information, or make changes to the ArrayMasStor's configuration.

4.1 Operation Buttons

There are four operation buttons. The up and down buttons scroll from one menu item to the next. The select button is used to activate the menu item shown on the display. The Cancel button returns the display to the previous menu.



4.2 Status Display (Main Menu)

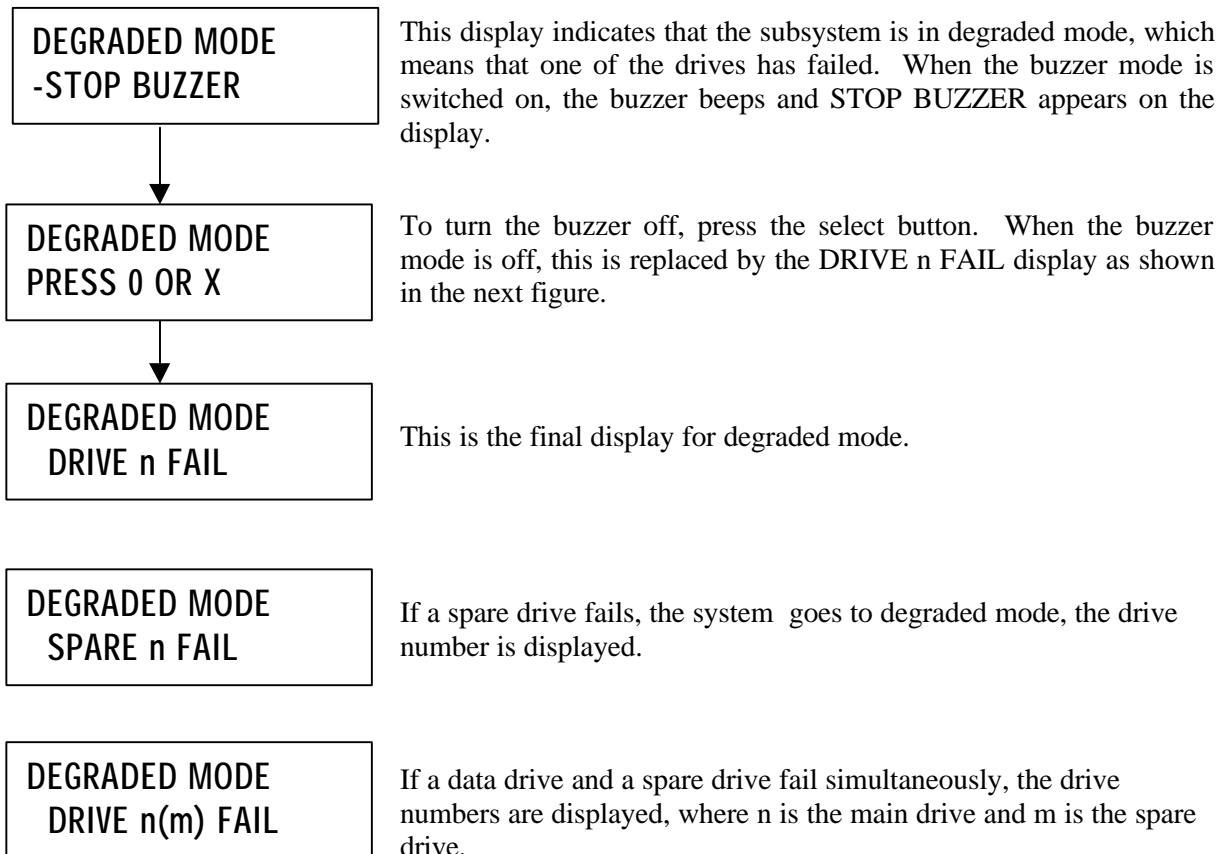
4.2.1 Normal Mode

When the ArrayMasStor is functioning normally, the SCSI ID, RAID level and the ArrayMasStor's capacity are displayed. To change the menu, press the up or down button. Press the select button to choose a menu item.

LCD DISPLAY	EXPLANATION
<p>RAID SUBSYSTEM - RAID5 XX . X GB</p>	<p>This message indicates that the ArrayMasStor is operating normally. The message shows the RAID Level and total storage capacity for the ArrayMasStor, assuming the use of a single-LUN configuration.</p>
OR	
<p>RAID SUBSYSTEM - 0 RAID5 XX . X GB</p>	<p>The message shows the logical unit number, the RAID Level and the total storage capacity for the ArrayMasStor, assuming the use of a multi-LUN configuration.</p>
↓	
<p>RAID SUBSYSTEM -SCSI ID 0/0</p>	<p>Selecting this option displays the ArrayMasStor's SCSI ID. The first number indicates SCSI ID of channel 1 while the latter number indicates SCSI ID of channel 2.</p>
↑	
<p>RAID SUBSYSTEM -CONFIGURATION</p>	<p>This option accesses the configuration window, which displays the current settings for the number of online drives; spare drives; buzzer; auto reconstruction mode; write cache; AIX error notice mode; UNIX C/H/S mode; ultra SCSI mode; initiator mode; periodic check; and DPO/FUA bit.</p>
↓	
<p>RAID SUBSYSTEM -SYSTEM STATUS</p>	<p>This option accesses the system status window, which displays the current system status; serial number; microcode level; system status code; current system time; and current system calendar status.</p>
↑	
<p>RAID SUBSYSTEM -DRIVE STATUS</p>	<p>This option displays information about the drives connected to the ArrayMasStor.</p>
↓	
<p>RAID SUBSYSTEM -CHANGE CONFIG</p>	<p>This option changes the ArrayMasStor's current configuration, after the correct password has been entered. The following settings can be changed: SCSI ID; RAID level; reconfigure; buzzer mode; auto reconstruction mode; AIX error notice; UNIX C/H/S mode; Write Cache mode; ultra SCSI mode; UPS mode; initiator mode; surface check; periodic check; DPO/FUA bit; buzzer test; password; error insertion; system trace; clear system trace; and change time.</p>
↑	

4.2.2 Degraded Mode (drive failure)

When a drive fails, the physical number of the defective drive is displayed on the operation panel and the status indicator next to the failed drive turns red. If the buzzer is switched on, it will beep. If a drive fails, it should be replaced as soon as possible.



4.2.3 Drive Replacement

When auto reconstruction mode is turned on, data reconstruction starts automatically after a failed drive is replaced. When auto reconstruction mode is turned off, a menu to start reconstruction is displayed after the failed drive is replaced, and data reconstruction must be initiated manually. The following example assumes that a drive has failed and auto reconstruction mode is turned off.

DEGRADED MODE
-START RECON

The display indicates that the failed drive has been replaced. Press the select button to start data reconstruction.

RECONSTRUCTION
0 TO START OR X

To confirm the start of data reconstruction, press the select button. If the cancel button is pressed, the display returns to the main menu without starting reconstruction.

RECON STARTED
PRESS 0

Press the select button to confirm.

RAID SUBSYSTEM
DRIVE X n%

The display indicates that data reconstruction has started, and indicates the drive that is being reconstructed, and the progress (in percent) of the reconstruction process. When data reconstruction is complete, the display returns to the main menu.

RAID SUBSYSTEM
SPARE n FAIL

The display indicates that reconstruction has finished with spare drive configuration. After the failed spare drive is being replaced, the display returns to the main menu.

4.2.4 Data Reconstruction

RECONSTRUCTION
DRIVE X n%

The target drive for data reconstruction and progress (in percent) of the reconstruction are displayed.

4.2.5 Data Initialization

When the RAID level or spare drive settings are changed, data initialization is necessary to ensure the consistency of the parity or mirror data. After changing the RAID level or spare drive settings, the ArrayMasStor should be turned off. After restarting the ArrayMasStor, data initialization starts automatically. Another method to start data initialization is to select the INITIALIZE option from the operation panel after the ArrayMasStor fails. The time required for data initialization depends on the configuration and storage capacity of the ArrayMasStor.

INITIALIZATION
DATA n%

During the data initialization, the progress (in percent) is displayed. When initialization is in progress, the ArrayMasStor will not accept SCSI commands from the host computer.



RAID SUBSYSTEM
-RAID5 XXGB

When data initialization is complete, the operation panel returns to the main menu and the ArrayMasStor accepts SCSI commands from the host computer.

4.2.6 Data Reallocation

REALLOCATION
LUN0 n%

During dynamic data reallocation, the progress (in percent) is displayed. When dynamic data reallocation is in progress, the ArrayMasStor will not accept SCSI commands from the host computer.

4.2.7 Double Fault (Failure of two or more drives)

When two or more drives fail, data stored on the ArrayMasStor cannot be reconstructed and some or all of the data will be permanently lost. To avoid double fault, failed drives should be replaced as soon as possible.

There are two ways to return to the normal mode.

- a) Replace only the first failed drive by following the procedures in section 4.2.8, Forced Data Reconstruction.
- b) During system halt, replace the failed drives by following the procedures in section 4.2.9, System Halt.

**RAID SUBSYSTEM
DEGRADED MODE-2**

The display indicates that the ArrayMasStor is in degraded mode 2, which means that two or more drives have failed.

**DEGRADED MODE-2
-STOP BUZZER**

This menu turns off the buzzer. Pressing the select button advances the display to the stop buzzer menu.

**DEGRADED MODE-2
DRIVE 1 2 FAIL**

The display indicates the physical numbers of the failed drives.

IMPORTANT !

When two or more drives fail, some or all of the data will be erased. If a drive fails, replace it as soon as possible

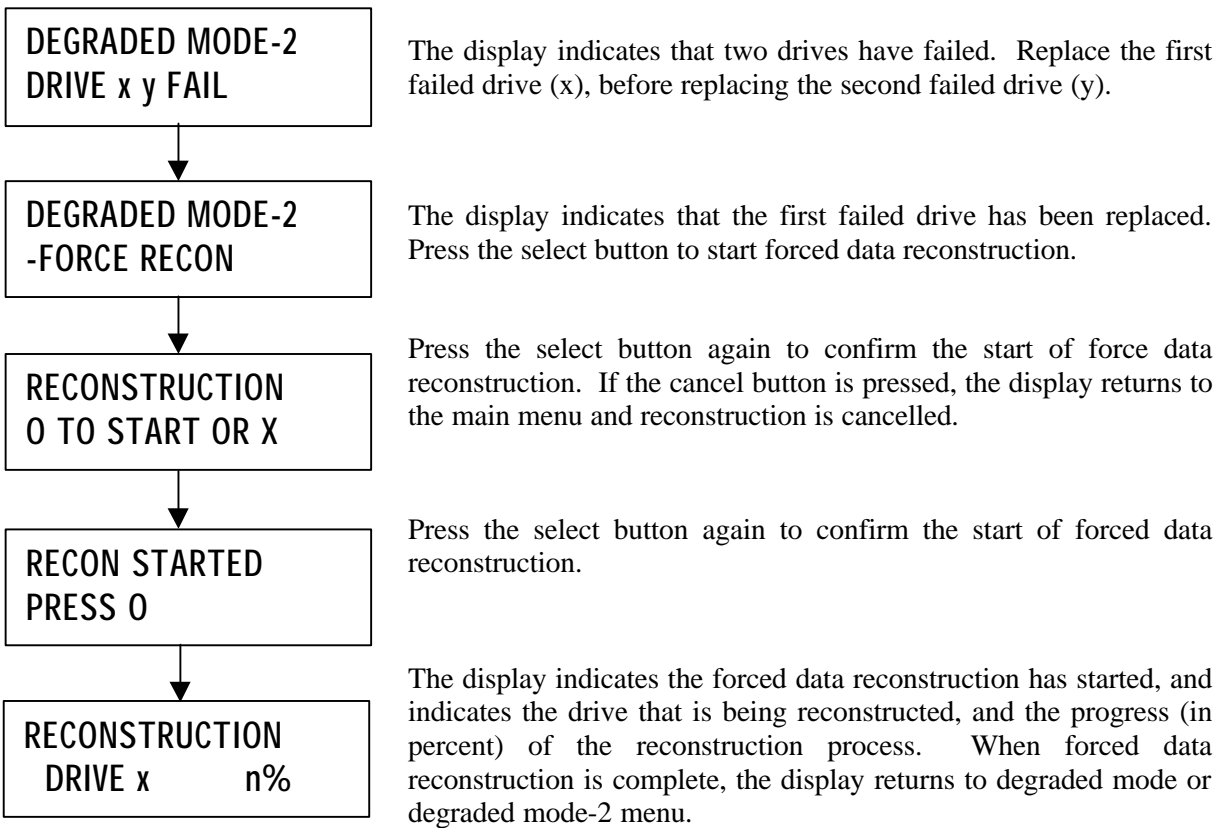
4.2.8 Forced Data Reconstruction

Normally, when two drives fail, it is necessary to save the remaining data onto back-up media (e.g. tape) and replace the failed drives. If back-up media are unavailable, the ArrayMasStor allows users to perform forced data reconstruction. During forced data reconstruction, the ArrayMasStor detects the unrecoverable read errors in the source drives, skips the damaged sector and continues to reconstruct from the next sector, until the last sector has been reconstructed. The data in the sector or sectors with unrecoverable errors are either damaged or lost.

When two drives fail, DRIVE X Y FAIL appears on LCD display, where X is the physical number of the first failed drive. Replace the first failed drive (X) before replacing the second failed drive (Y).

(Note: If the second failed drive (Y) is replaced before the first failed drive (X), the ArrayMasStor enters system halt mode and the host computer cannot access the data in the ArrayMasStor. If this happens, swap drives X and Y and then restart the ArrayMasStor.)

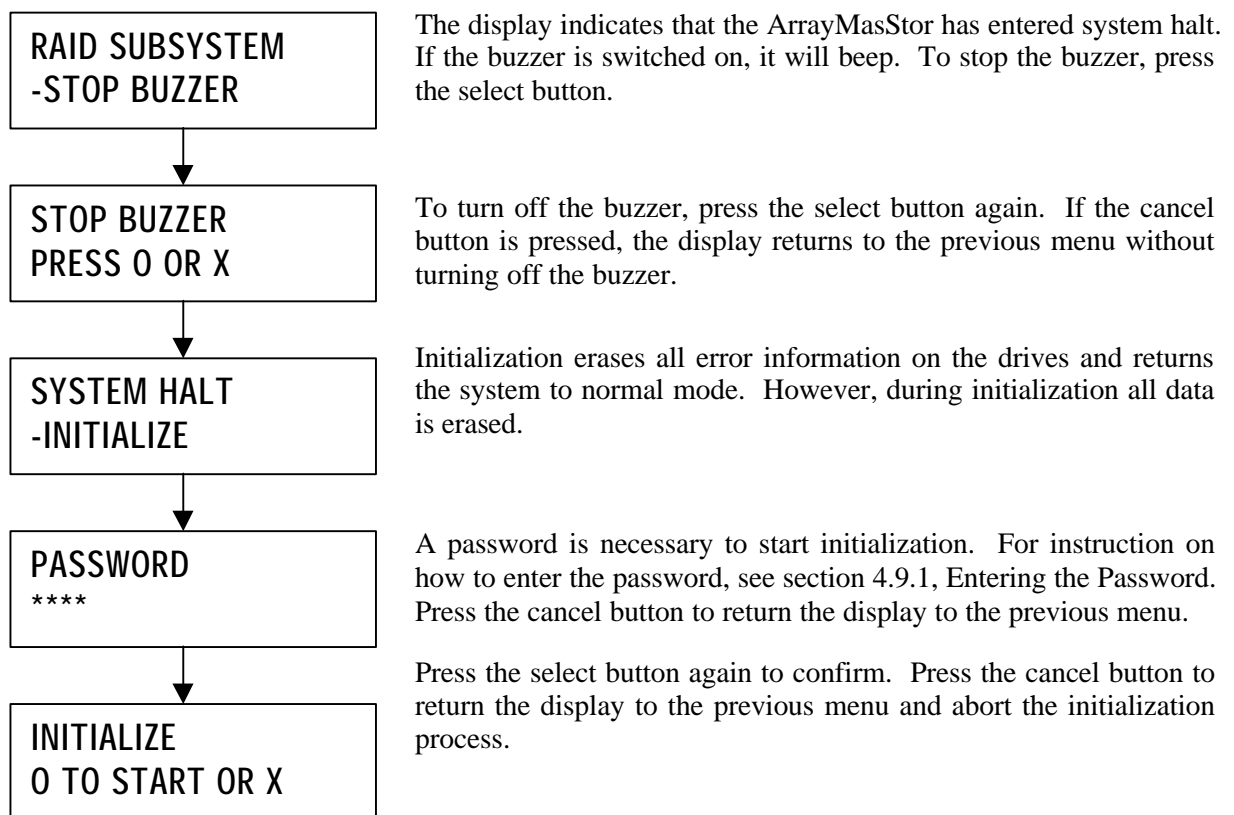
After replacing the first failed drive, FORCE RECON appears on the display. This menu appears when the source drive failed during normal reconstruction mode, without replacement of the first failed drive. Press the select button to start forced data reconstruction. When the data reconstruction is complete, the ArrayMasStor enters degrade mode (when only one failed drive is left), or degrade mode-2 (when more than one failed drives are left), except spare drive.



4.2.9 System Halt

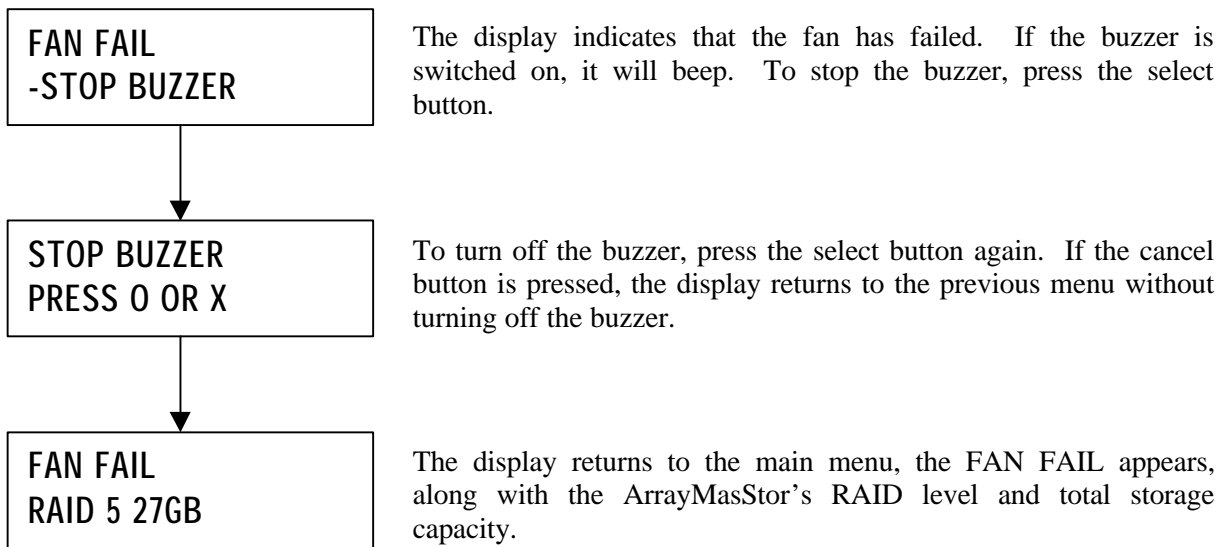
When an unrecoverable error occurs (due to the replacement of two or more drives, or to the failure of the RAID controller board), the ArrayMasStor enters system halt mode. In system halt mode, the ArrayMasStor prevents further data corruption by rejecting SCSI commands from host computer. If a system halt occurs for reasons other than those stated above, contact your service representative for assistance.

<i>IMPORTANT !</i>	During initialization all user data is erased.
---------------------------	--



4.2.10 Fan Failure

The ArrayMasStor is equipped with two fans that dissipate the heat generated by the drives. Without these fans, the drive may fail due to lack of ventilation. If the fan fails, contact your service representative for assistance.



4.2.11 Power Supply Failure

The ArrayMasStor is equipped with a dual power supply.

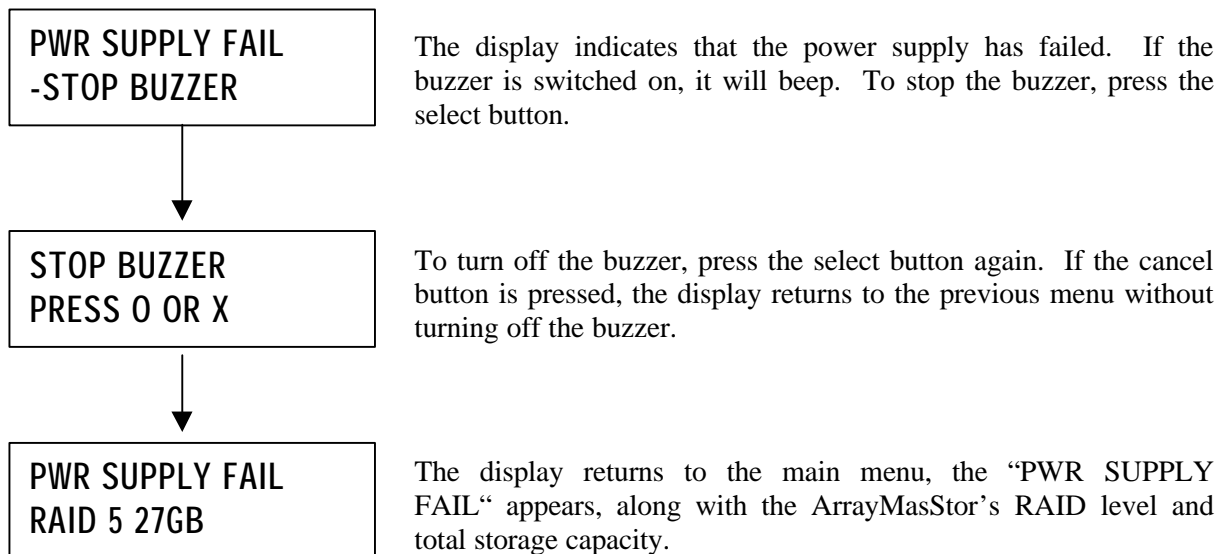
The "PWR SUPPLY FAIL" message will be displayed on the display panel if one of the power supply modules failed.

Make sure of the following items below if this message is displayed.

- (1) The two(2) main switch of the power supply module located on the rear side are turned "ON" ("I" is pressed in). (Refer to the drawing in section 2.2).
- (2) The two(2) power cords are connected properly.
- (3) The two(2) power supply modules are sealed properly.

Replace the power supply module if the three(3) items described above have been checked and the power supply failure still occurred. Call a trained personnel if the power supply module to be replaced is done while the machine is in operation.

Please follow the procedure described in section 5.2 to replace the power supply module with the machine powered down.



4.2.12 Surface Check

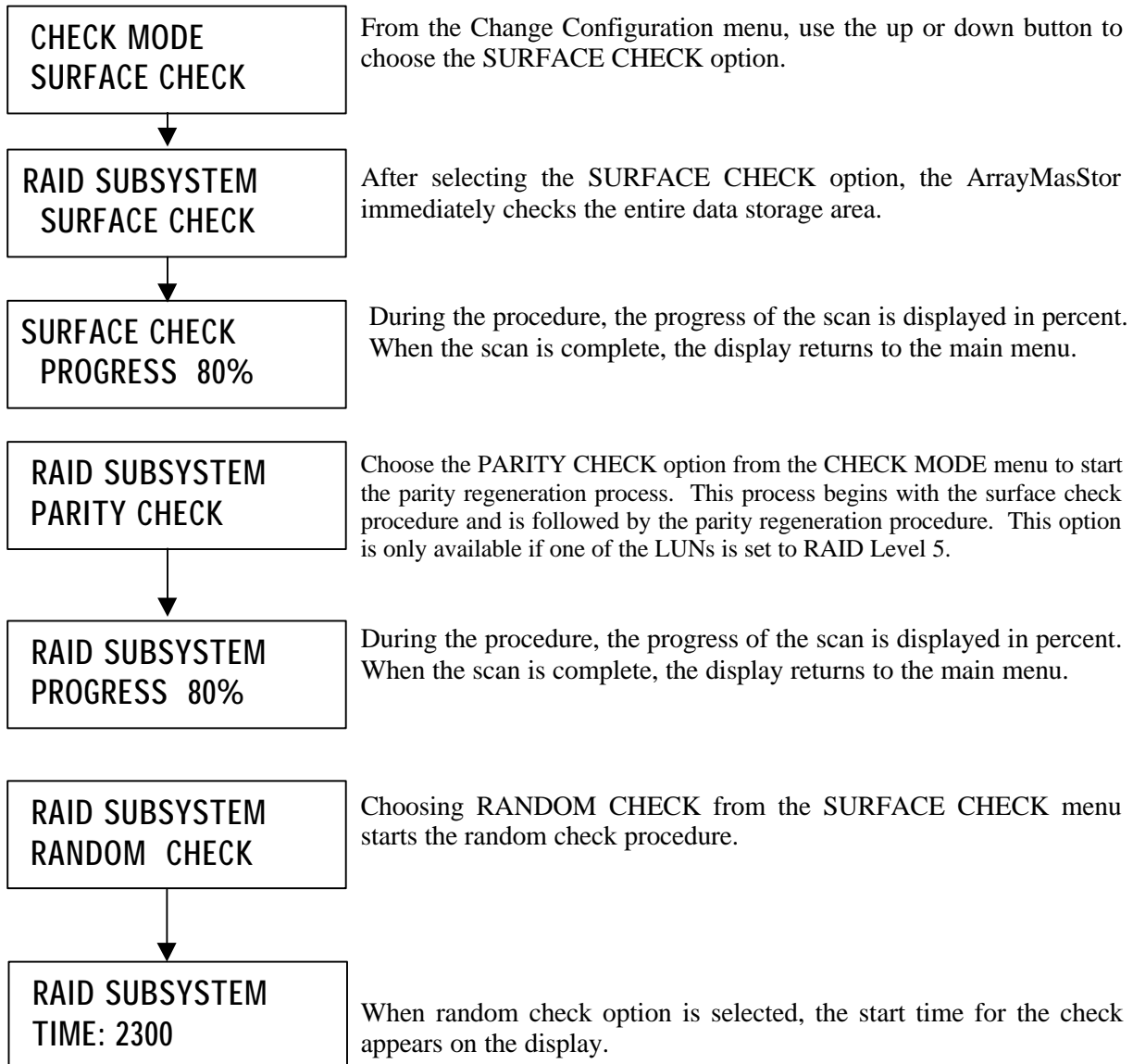
The Surface Check function prevents a double fault from occurring when an error correcting code (ECC) fault is encountered while the ArrayMasStor is operating in degraded mode. This function is not available in RAID Level 0, because the data are not redundant. In RAID Levels 1 and 5, the surface check scans the drives for ECC faults and fixes these errors by overwriting them with correct data generated from the mirror or parity data. The ArrayMasStor uses three selectable methods to check data:

Surface check: This scans the entire data area for ECC faults and reconstructs and overwrites errors.

Parity regeneration: In RAID Level 5, this regenerates each parity block and rewrites it to the drives.

Random Check: This scans random storage areas for ECC faults and fixes the errors.

All of these tests should be performed periodically to ensure data and parity consistency.



4.3 LUN Configuration

The LUN is shown through the Operation Panel.

RAID SUBSYSTEM
- 0 RAID5 XXGB

The information of LUN 0 is shown on the display. Press the up or down buttons to display other LUN information for multi-LUN configuration case.



RAID SUBSYSTEM
- 1 RAID5 XXGB

The information of LUN 1 is shown on the display by pressing the down button.

4.4 CHS Information

Each LUN can be assigned to a channel or to both channels.

Case 1: LUN0 are visible to both channels;

RAID SUBSYSTEM
- 0 RAID5 27GB

The LUN number, RAID level, and capacity information are shown on the display. Pressing the select button will show the CHS information.

LUN0 Ch1 & Ch2
CHS : 28086:16:63

Press the select button to display the CHS information of LUN 0.

Case 2: LUN0 is visible to channel n only;

RAID SUBSYSTEM
- 0 RAID5 27GB

The LUN number, RAID level, and capacity information are shown on the display. Pressing the select button will show the CHS information.

LUN0 Ch n
CHS : 28086:16:63

Press x to return to the previous menu.

4.5 SCSI ID Information

RAID SUBSYSTEM
SCSI ID 0/0

SCSI ID information can be seen at the main menu by pressing the up and down buttons.

4.6 Display System Configuration

RAID SUBSYSTEM
-CONFIGURATION

From the main menu, use the up or down button to display the configuration menu. Press the select button to choose the configuration menu, and then use the up or down button to select the items to be displayed.

4.6.1 Number of Drives

CONFIGURATION
4 DRIVES ONLINE

This displays the number of drives installed in the ArrayMasStor.

4.6.2 Hot Spare Drive

CONFIGURATION
NO SPARE DRIVE

When a spare drive is installed and configured, SPARE ASSIGNED appears. If the spare drive is not installed and configured, NO SPARE DRIVE appears.

4.6.3 Buzzer Mode

CONFIGURATION
BUZZER ON

The on/off status of the buzzer is displayed. When the buzzer is on, it beeps when a failure occurs.

4.6.4 Automatic Reconstruction Mode

CONFIGURATION
AUTO RECON ON

When automatic reconstruction mode is turned on, data reconstruction starts automatically when a replacement drive is installed. If both the hot spare drive and auto reconstruction mode are enabled, data reconstruction on the spare drives starts automatically after a drive fails. When automatic reconstruction mode is turned off, after a failed drive has been replaced, DRIVE REPLACED – START RECON appears on the display. Data reconstruction can now be started (see section 4.2.4, Data Reconstruction).

4.6.5 Write Cache Mode

CONFIGURATION WRITE CACHE ON

The Write Cache Mode controls the ArrayMasStor's controller card and drive cache. Disabling the write cache mode bypasses the drive cache and causes data to be written directly to the drives. This degrades the ArrayMasStor's performance.

4.6.6 AIX Error Notice Mode

CONFIGURATION ERR NOTICE OFF

If the ArrayMasStor is used with an RS/6000 machine that uses AIX operating system, the AIX error notice mode should be turned on. This will allow the ArrayMasStor to receive logged data through the AIX "errpt" command. If the ArrayMasStor is used with a non-AIX operating system, the AIX error notice mode should be turned off.

<i>IMPORTANT !</i>

<p>Turn off the AIX error notice mode when using the ArrayMasStor with non-AIX operating system. Failure to do so may cause the ArrayMasStor to malfunction.</p>
--

4.6.7 UNIX C/H/S Mode

CONFIGURATION UNIX C/H/S OFF

The UNIX C/H/S status is displayed. When the ArrayMasStor is used with host computers using the UNIX operating system, the C/H/S mode should be turned on.

4.6.8 Ultra SCSI Mode

CONFIGURATION ULTRA SCSI ON
--

When the ultra SCSI mode is turned on, a maximum data transfer rate of 40MB/second can be achieved. If it is turned off, the maximum transfer rate is 20MB/s.

4.6.9 Initiator Mode

CONFIGURATION INITIATOR OFF
--

When the initiator mode is turned on, the ArrayMasStor can copy its data to another storage device, such as a SCSI drive or another ArrayMasStor. The new storage device must have a capacity that is equal to or greater than the ArrayMasStor's.

4.6.10 Background Surface Check

**CONFIGURATION
PERIODIC CHK ON**

When the background surface check is turned on, the ArrayMasStor automatically performs surface checks. The default setting is on, with checks starting at 00:00 each Sunday. The execution time is 60 minutes and, for proper operation, the ArrayMasStor's internal clock must be set to the correct local time.

**CONFIGURATION
WEEKLY (SUN)**

The check interval (weekly each Sunday) is displayed. The ArrayMasStor supports three user-selectable intervals: once, twice and three times per week.

**CONFIGURATION
00:00 (60 MIN)**

The start time (00:00) and execution time (60 minutes) are displayed.

4.6.11 DPO/FUA Bit

**CONFIGURATION
DPO/FUA BIT OFF**

The DPO/FUA (disable page out/force unit access) is used only when the host computer's operating system issues the FUA command for every read/write command. Use of this command⁷ degrades the ArrayMasStor's performance. To prevent this from happening, the DPO/FUA bit should be turned off.

IMPORTANT !

Only turn on the DPO/FUA bit if your operating system uses the force unit accesses command with its read and writes operations. For additional information, see your operating system manual.

⁷ When a FUA read/write command is sent to the ArrayMasStor, the cache is bypassed and the read and write operations are sent directly to the drives. This results in impaired performance.

4.7 System Status

**RAID SUBSYSTEM
-SYSTEM STATUS**

From the main menu, use the up or down button to display SYSTEM STATUS. Then press the select button to access the system status menu. Press the up or down button to access the following information.

4.7.1 System Status

**SYSTEM STATUS
XXXXXXXXXXXX**

The system status is displayed. System status has the following meanings.

STATUS	DESCRIPTION
NORMAL MODE	The ArrayMasStor is operating without errors.
DEGRADED MODE	One of the drives has failed. Replace the failed drive as soon as possible.
RECONSTRUCTION	Data reconstruction is in progress.
REPLACED	A failed drive has been replaced. Reconstruction has not started because the auto reconstruction mode is turned off. Use the operation buttons to start data reconstruction.
DEGRADE MODE-2	Two or more drives have failed. Save all data onto backup media and replace the failed drives.
RECONSTRUCTION-2	Forced data reconstruction is in progress. If a sector of the source drive cannot be read, data reconstruction skips that sector and proceeds to the next sector.
REALLOCATION	Data reallocation is in process. In reallocation mode, ArrayMasStor ignores commands from the host computer.
INITIALIZING	Data initialization is in process because the RAID level or spare setting has been changed. During initialization, ArrayMasStor ignores commands from the host computer.
SYSTEM HALT	Two drives have failed, an unrecoverable error has occurred or drives have been replaced incorrectly.

4.7.2 Serial Number

```
SYSTEM STATUS  
S/N: XXXXXXXX
```

The ArrayMasStor's serial number is displayed.

4.7.3 Microcode Revision

```
SYSTEM STATUS  
MICRO: JXXX
```

This message shows the version number of the microcode.

4.7.4 System Status Code

```
SYSTEM STATUS  
CODE: XXXXXX
```

The first four digits of the system status code are displayed. For additional information about system status codes, see section 4.7.1, System Status.

```
SYSTEM STATUS  
MORE: XXXXXX
```

The last four digits of the system status code are displayed.

4.7.5 System Status Time and Date

```
SYSTEM STATUS  
TIME: 10:10
```

Displays the time.

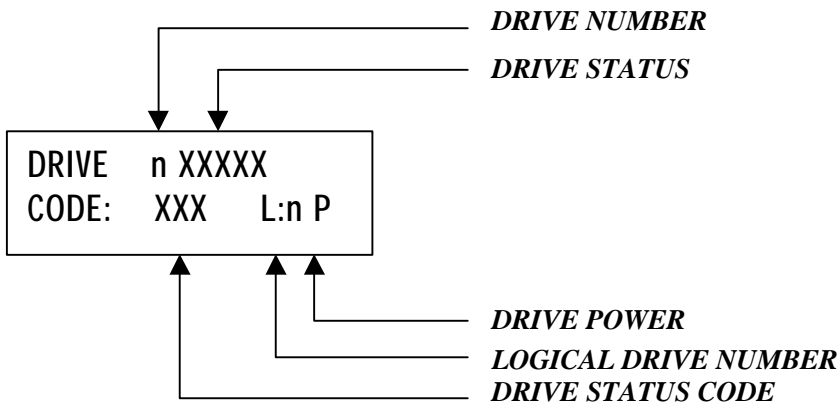
```
SYSTEM STATUS  
2001 06/30 (WED)
```

Displays the day and date.

4.8 Drive Status

**RAID SUBSYSTEM
-DRIVE STATUS**

From the main menu, use the up or down button to display DRIVE STATUS. Then press the select button to access the drive status menu. Press the up or down button to choose the desired drive. Press the cancel button to return the display to the main menu.

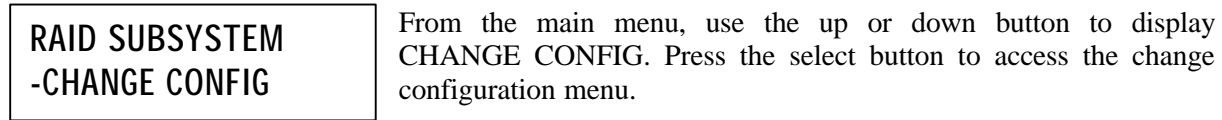


DRIVE NUMBER	Physical location of the drive
DRIVE STATUS	Status of the drive. (See next table for details.)
DRIVE POWER	1 means that drive is powered on. 0 means power off.
LOGICAL DRIVE NUMBER	Usually corresponds to the physical drive number. However, after data reconstruction on a spare drive, the logical drive numbers of the failed and spare drives are swapped. In this case, the logical drive number will be different from the physical number.

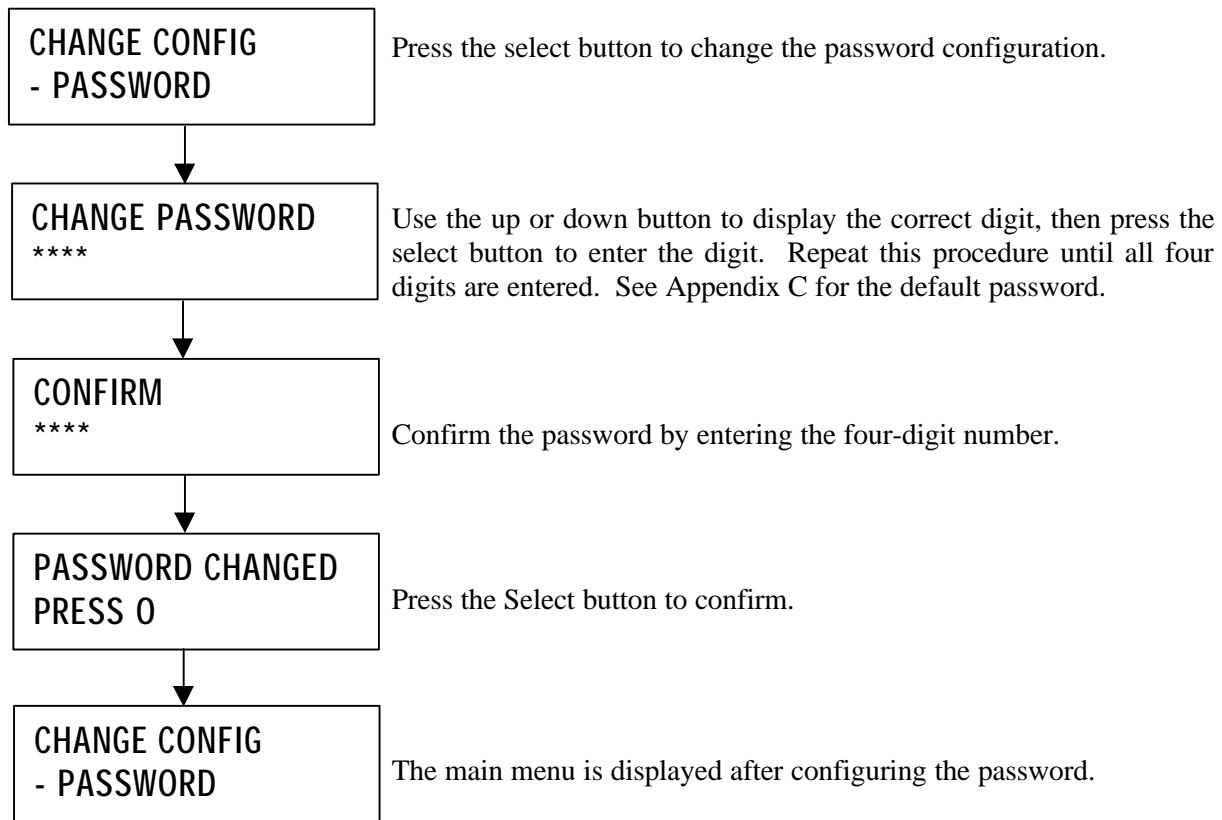
DRIVE STATUS AND STATUS CODE

DRIVE STATUS	STATUS CODE	Meaning
ON-LINE	000	The drive is operating normally.
FAIL	010	The drive has failed and should be replaced as soon as possible.
NO DMA33	010	The drive does not support Ultra DMA 33MB. It should be replaced with a drive that supports Ultra DMA 33MB.
Too Small	010	The drive is smaller than other drives in the ArrayMasStor.
RECONST	022	Data reconstruction is in progress.
REPLACED	002	The failed drive was replaced, but data reconstruction has not started because auto reconstruction mode is turned off.
MISSING	011	The drive has been removed.
SPARE	300	The drive is reserved as a spare.
BLANK	101	There is no drive in this location.
EXTRA	100	A drive is installed but is not recognized by the firmware.

4.9 Changing System Configuration

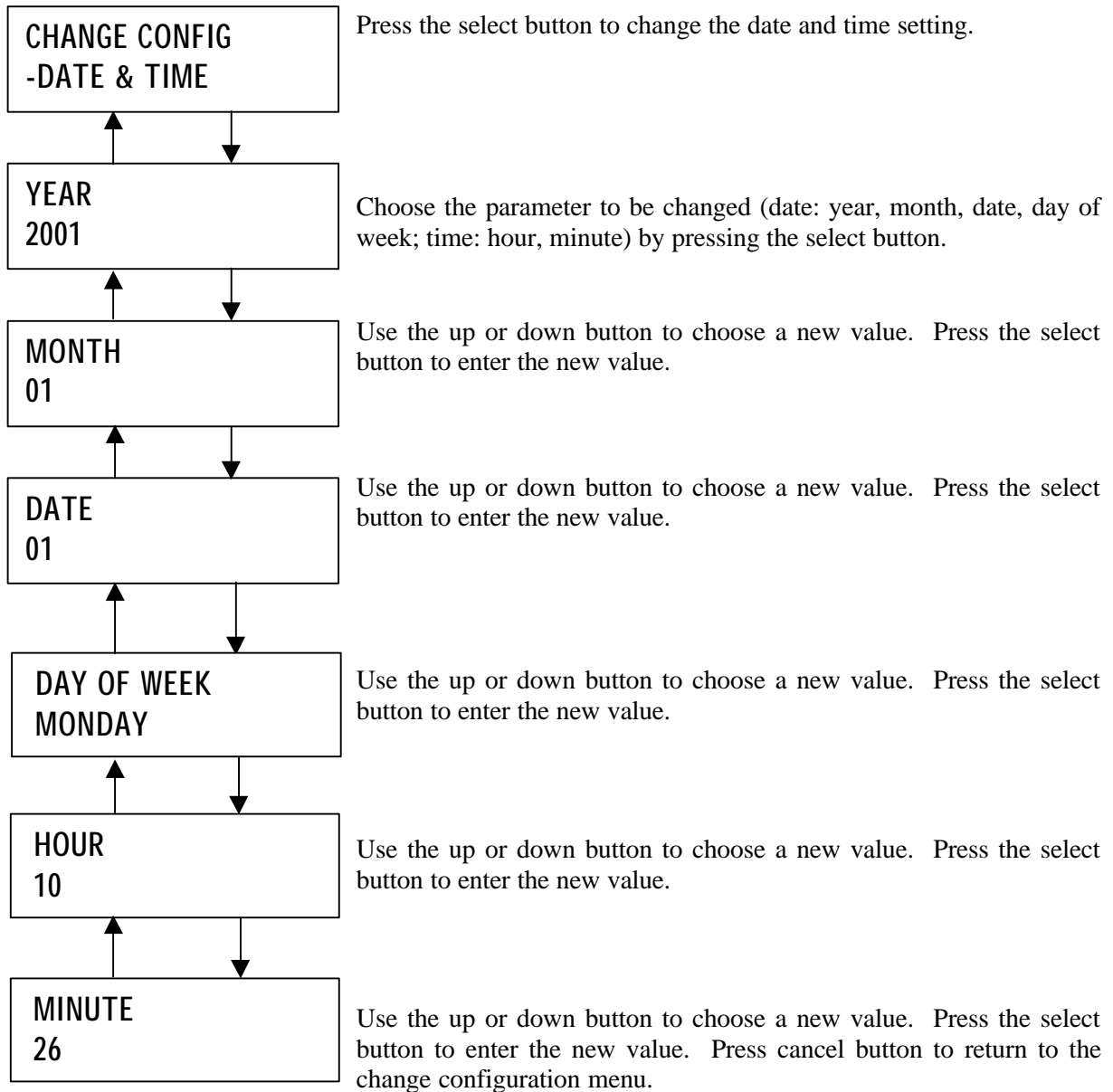


4.9.1 Entering the Password

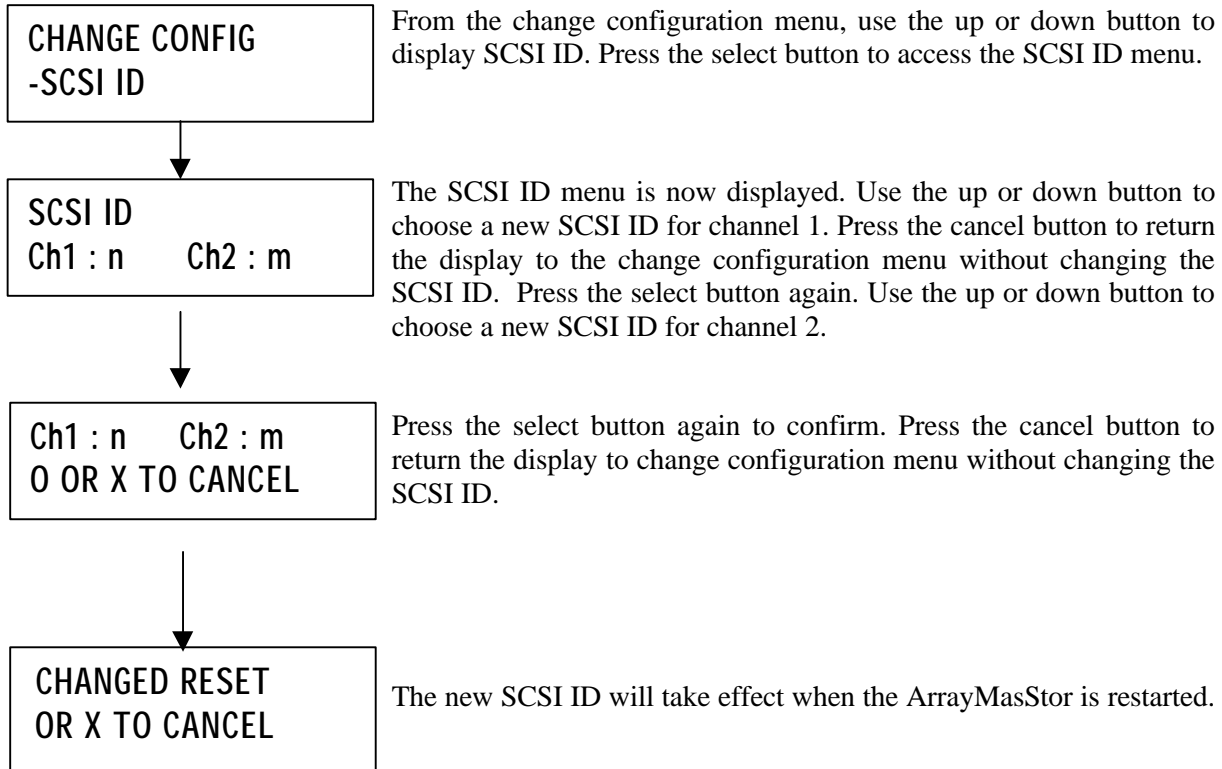


4.9.2 Changing the Date and Time Setting

The ArrayMasStor's system clock has been set before shipment. It is usually not necessary to reconfigure the date and time setting.



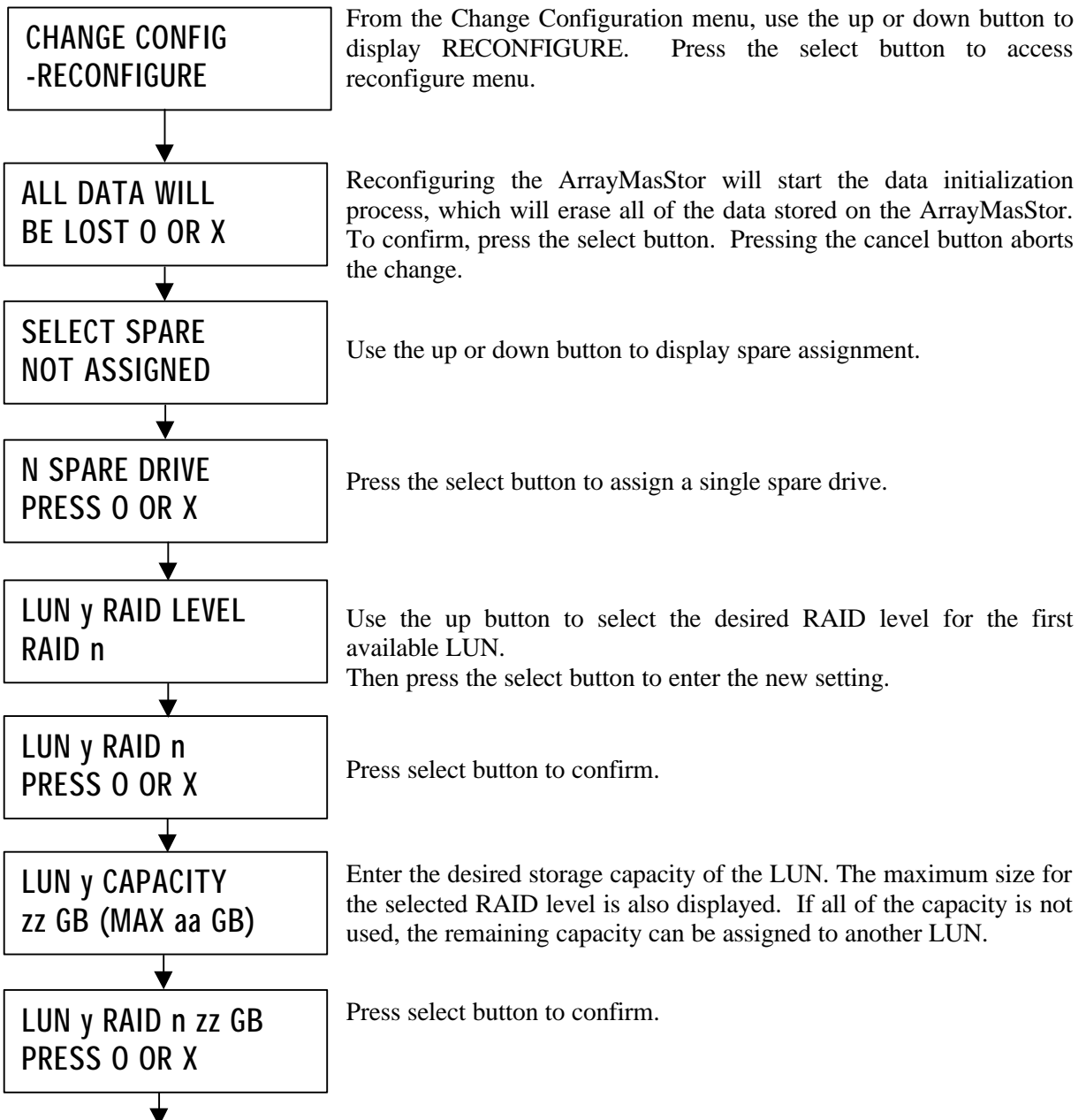
4.9.3 Changing the SCSI ID



4.9.4 Reconfigure

Using reconfigure, it is possible to alter the number of LUN to be configured, assign individual RAID levels to each LUN, and set the capacity (in reference to the ArrayMasStor's total capacity) for each RAID Level.

<i>IMPORTANT !</i>	The reconfigure function will erase all of the data stored on the ArrayMasStor. It is strongly recommended that data be regularly backed up.
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LUN ASSIGN SET
HOST Ch1 & Ch2

Press the up and down buttons to assign channel(s) to this LUN. The display on the left side shows that both channels have been assigned to the same LUN number. Press select button to continue.

LUN ASSIGN SET
HOST Ch1 & Ch2

Press the select button to confirm.

MORE LUN?
PRESS 0 OR X

Press the select button to configure additional LUN for multiple-LUN configuration.

OR

n LUNS CONFIGURED
PRESS 0 OR X

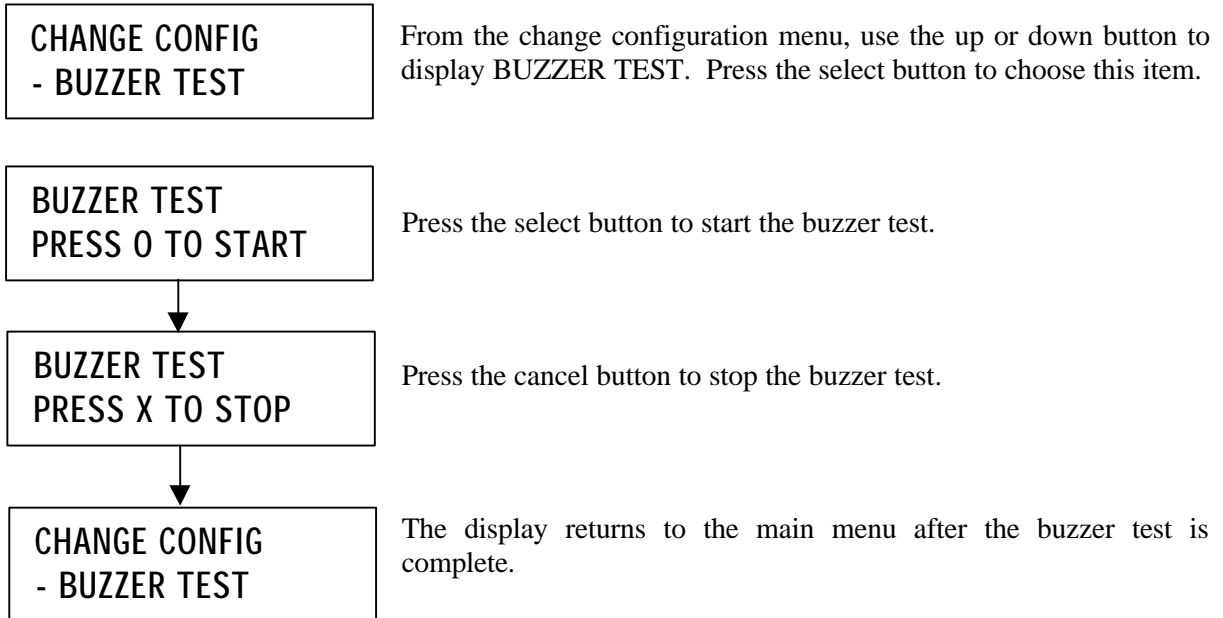
This displays the total number of LUN configured. Press the select button to confirm.

CHANGED RESET
OR X TO CANCEL

The changes will take effect after the ArrayMasStor is restarted.

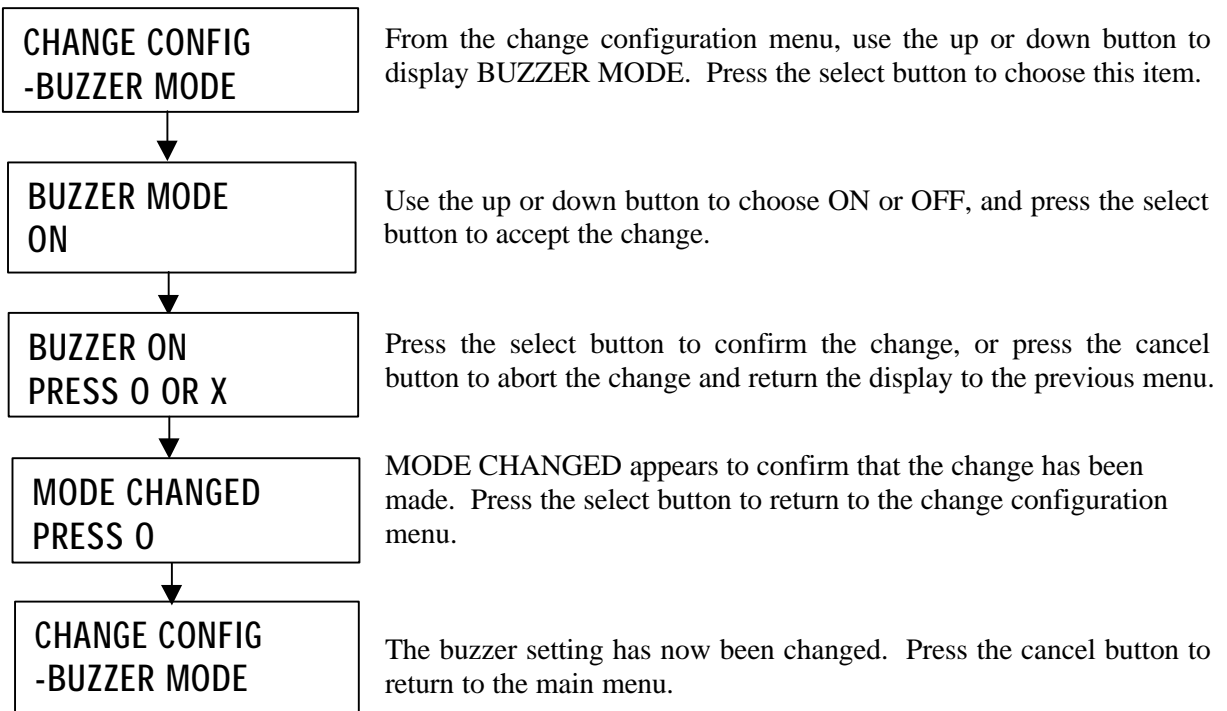
4.9.5 Buzzer Test

The Buzzer can be tested through the operator panel display under the 'CHANGE CONFIG' option.



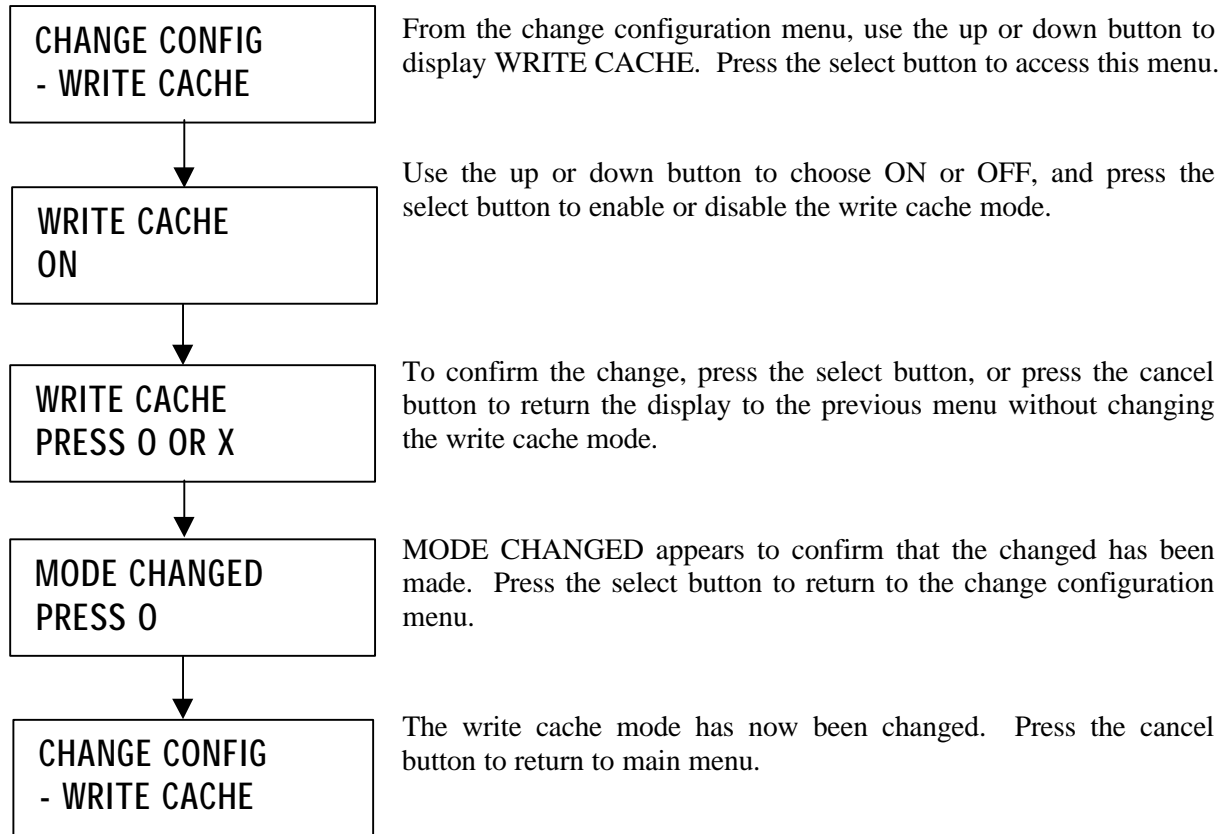
4.9.6 Changing the Buzzer Mode

When the buzzer mode is switched on, the buzzer will beep if there is a failure. When the buzzer mode is switched off, it will not sound if a failure occurs.



4.9.7 Configuring the Write Cache Mode

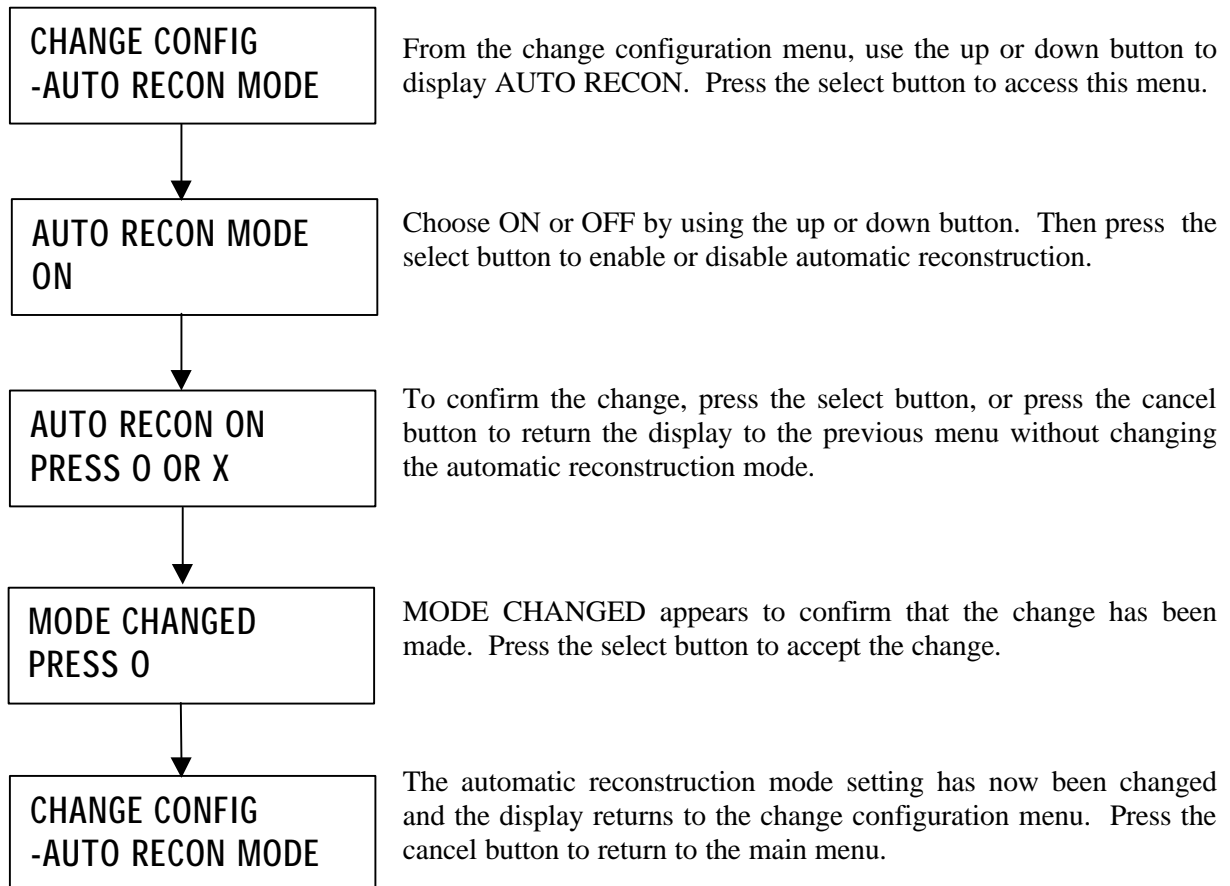
The write cache mode turns the ArrayMasStor's cache on and off. When the write cache mode is switched on, the ArrayMasStor's speed and input/output performance are enhanced. Disabling the write cache bypasses the drive cache and degrades the ArrayMasStor's performance.



4.9.8 Changing the Automatic Reconstruction Mode

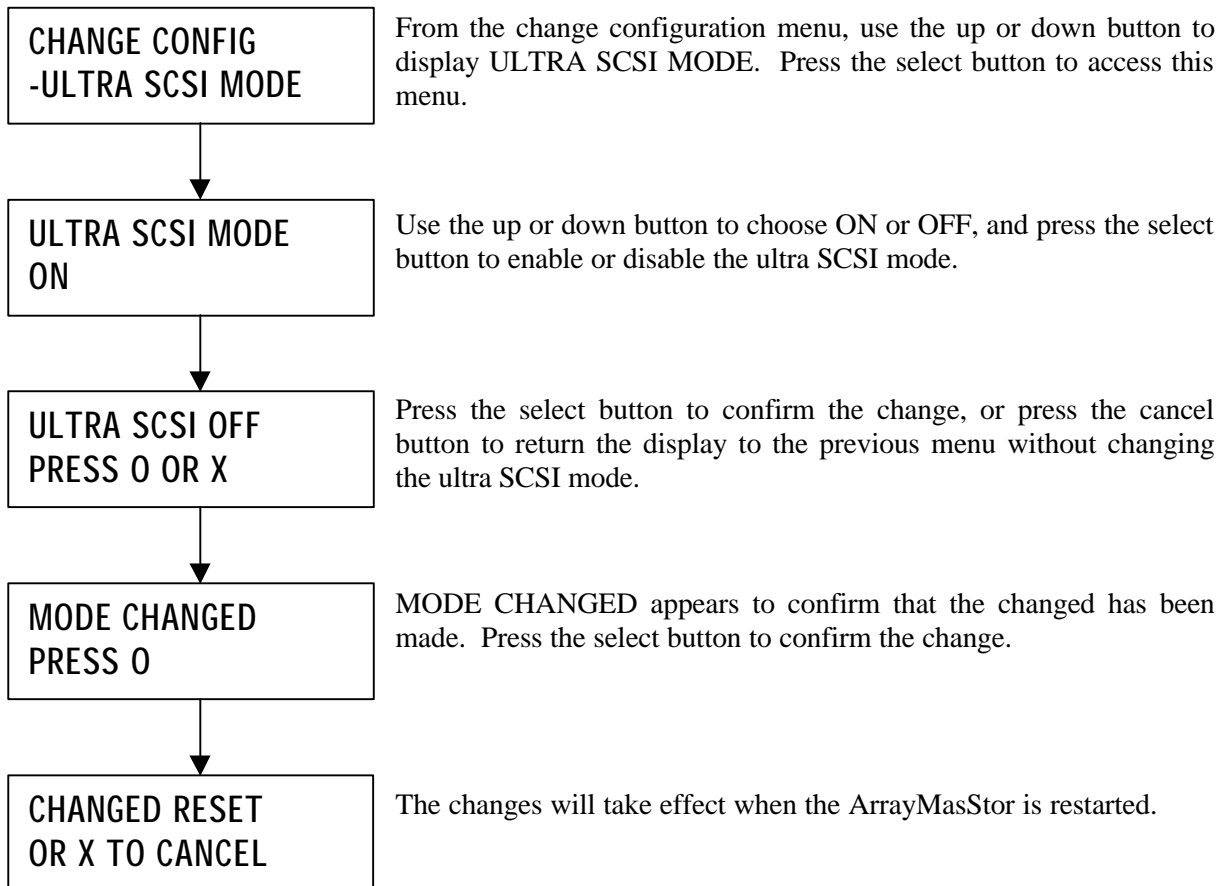
When automatic reconstruction mode is switched on, data reconstruction starts automatically after a drive is replaced. If a hot spare drive is configured and a drive fails, auto reconstruction and data reconstruction on the spare drive start automatically.

When automatic reconstruction mode is turned off, data reconstruction must be initiated manually. For information on manually initiating data reconstruction, see section 4.2.4, Data Reconstruction.



4.9.9 Maximum SCSI Transfer Rate

A maximum transfer rate of 40MB/second (SCSI-3) is supported between the ArrayMasStor and the host computer. However, some host computers cannot handle the SCSI-3 transfer rate or experience problems with long or poor quality cables. These problems can often be corrected by switching off the ultra SCSI mode.



4.9.10 DPO/FUA Bit

The DPO/FUA (disable page out/force unit access) is used only when the host computer's operating system issues the FUA command for every read/write command. Use of this command⁸ degrades the ArrayMasStor's performance. To prevent this from happening, the DPO/FUA bit should be turned off.

<i>IMPORTANT !</i>	Only switch on the DPO/FUA bit if your operating system uses the force unit access command with its read/write operations. For additional information, see your operating system manual.
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CHANGE CONFIG
-DPO/FUA BIT

From the change configuration menu, use the up or down button to display DPO/FUA BIT. Press the select button to access this menu.

DPO/FUA BIT
ON

Use the up or down button to choose ON or OFF, or press the select button to enable or disable the DPO/FUA bit.

DPO/FUA BIT ON
PRESS 0 OR X

Press the select button to confirm the change, or press the cancel button to return the display to the previous menu without changing the DPO/FUA bit.

MODE CHANGED
PRESS 0

MODE CHANGED appears to confirm that the change has been made. Press the select button to return to the change configuration menu..

CHANGE CONFIG
-DPO/FUA BIT

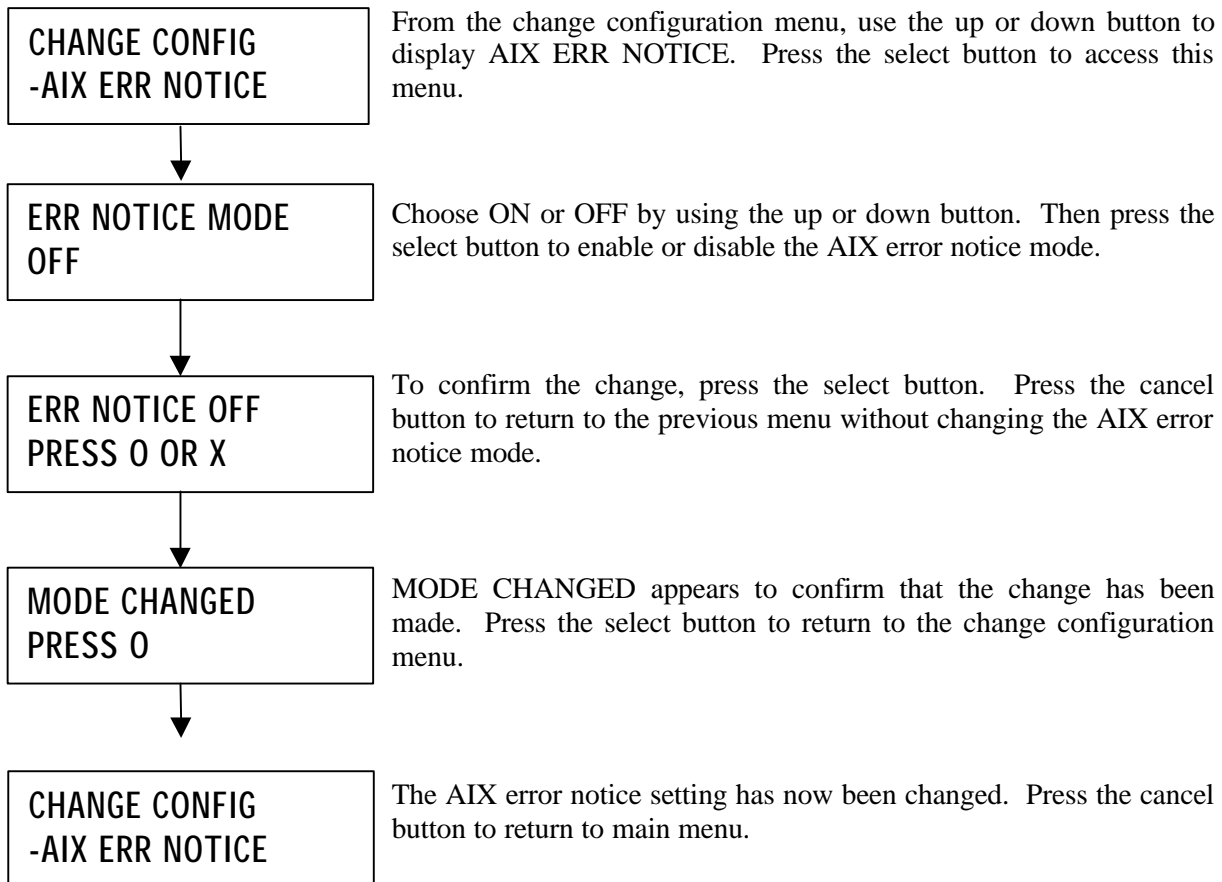
The DPO/FUA bit setting has now been changed. Press the cancel button to return to the main menu.

⁸ When a FUA read/write command is sent to the ArrayMasStor, the cache is bypassed and the read and write operations are sent directly to the drives. This results in impaired performance.

4.9.11 Changing the AIX Error Notice Mode

The AIX error notice mode is turned on for host systems such as the IBM RS-6000 computer, which use the AIX operating system. This function allows the operating system to access logged data on the status of the ArrayMasStor. When other operating systems are used with the ArrayMasStor, this mode should be turned off.

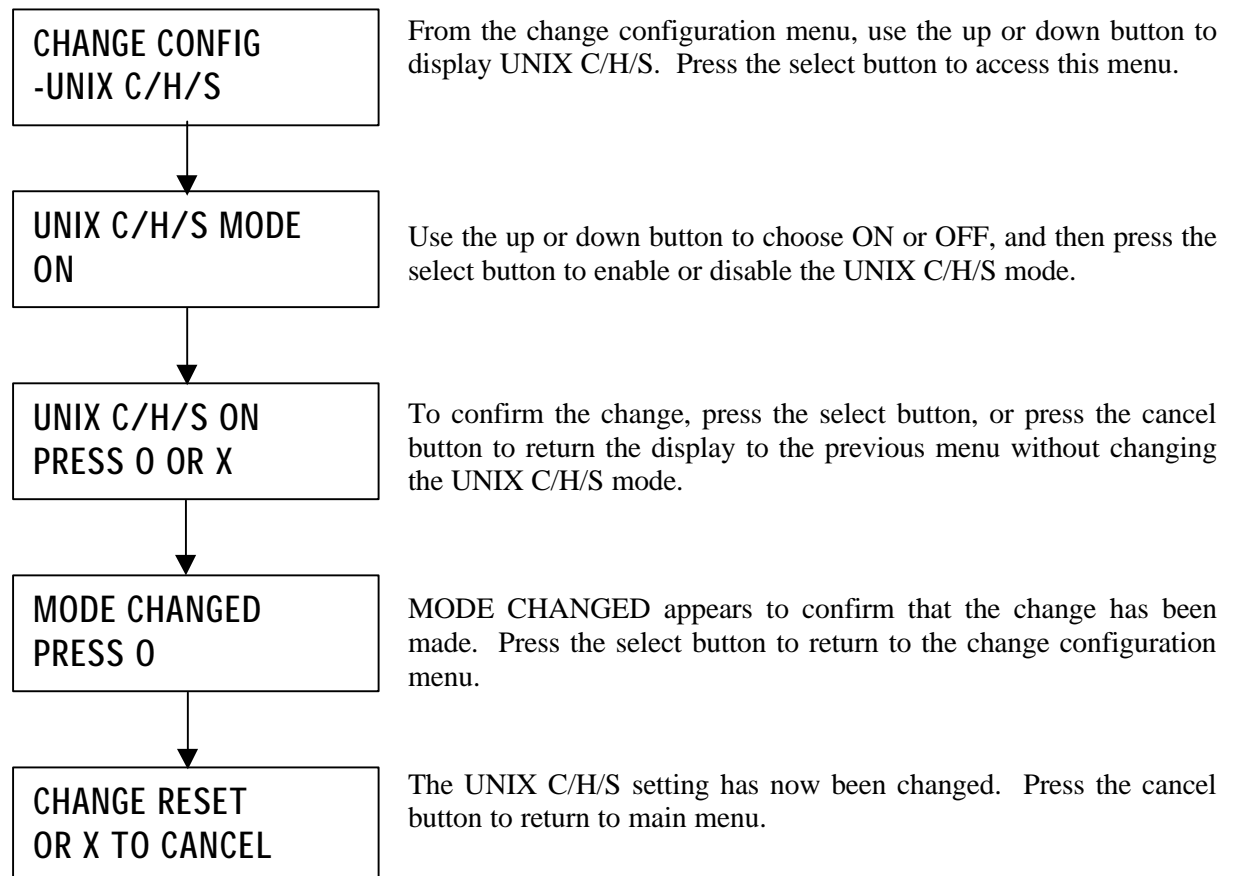
<i>IMPORTANT !</i>	Set off 'AIX error notice mode' when using the ArrayMasStor with non-AIX operating systems. Setting on this mode may halt the system or cause a malfunction to occur.
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4.9.12 Changing the UNIX C/H/S Mode

The UNIX C/H/S mode corrects errors encountered with UNIX operating systems that incorrectly recognize the total capacity of the ArrayMasStor. This error causes the operating system to recognize a storage capacity of less than the actual 53.94 GB that is available in RAID Level 5. To access the full capacity of the ArrayMasStor in a UNIX environment, set this mode on.

<i>IMPORTANT !</i>	Back-up all data on the ArrayMasStor before changing the UNIX C/H/S mode. Changing this mode might result in data loss.
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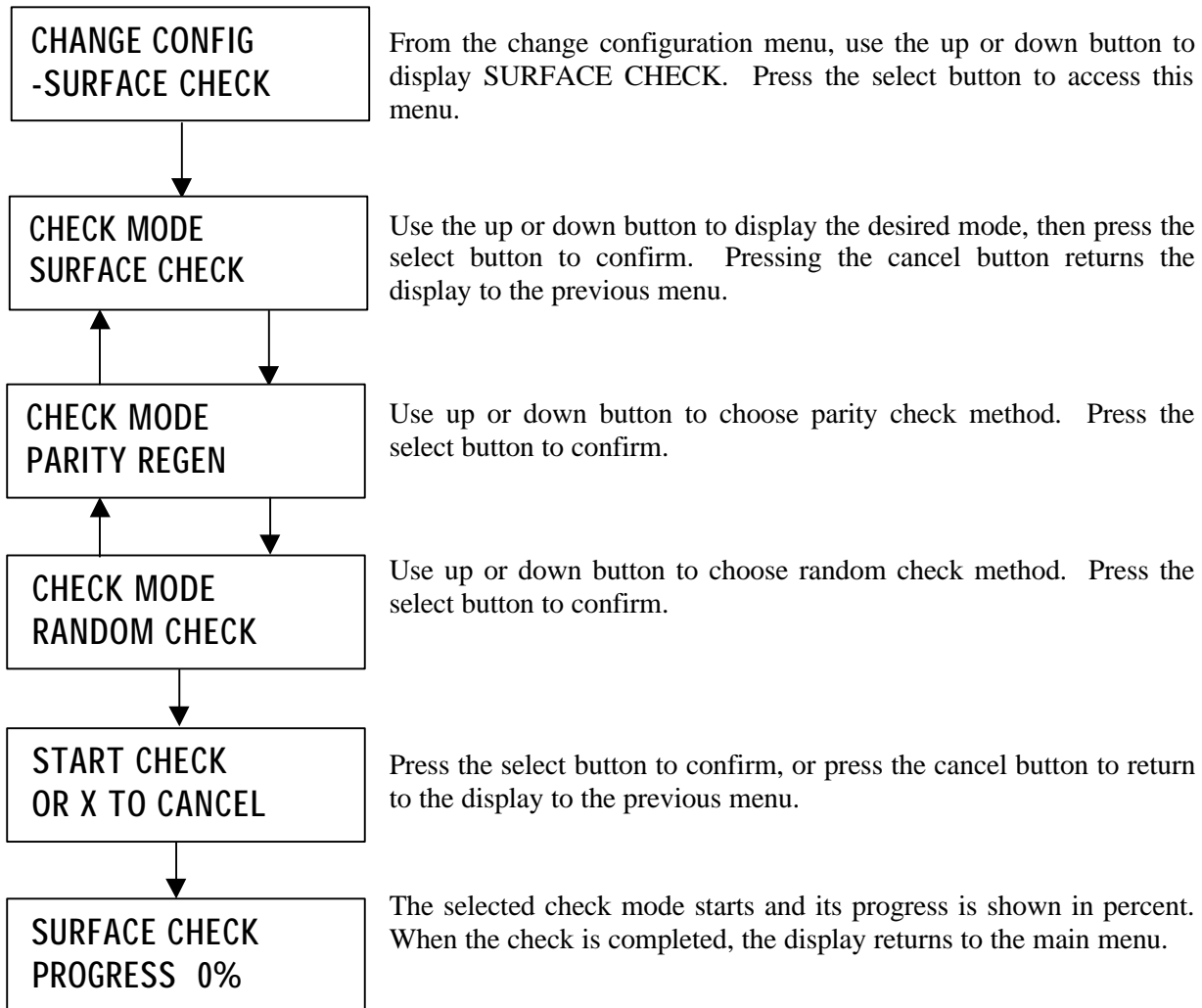


4.9.13 Performing Surface Check

The surface check function, which is only available in RAID levels 1 and 5, prevents double faults from occurring when an error correcting code (ECC) fault is encountered while the ArrayMasStor is operating in degraded mode. The ArrayMasStor has a function that corrects ECC faults by overwriting the area containing the fault. The ArrayMasStor uses three methods to check data.

- Surface check: This scans the entire data area for ECC faults and reconstructs and overwrites errors
- Parity regeneration: In RAID Level 5, this regenerates each parity-block and rewrites it to the drives
- Random check: This scans random storage areas for ECC faults and fixes the errors.

<i>IMPORTANT !</i>	It is strongly recommended that these checks implement to ensure data and parity consistency.
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4.9.14 Stopping Surface Check

An ongoing Surface check, Parity regeneration, or Random check can be stopped under the 'CHANGE CONFIG' Menu.

CHANGE CONFIG
-SURFACE CHECK

From the change configuration menu, use the up or down button to display SURFACE CHECK. Press the select button to choose this item.

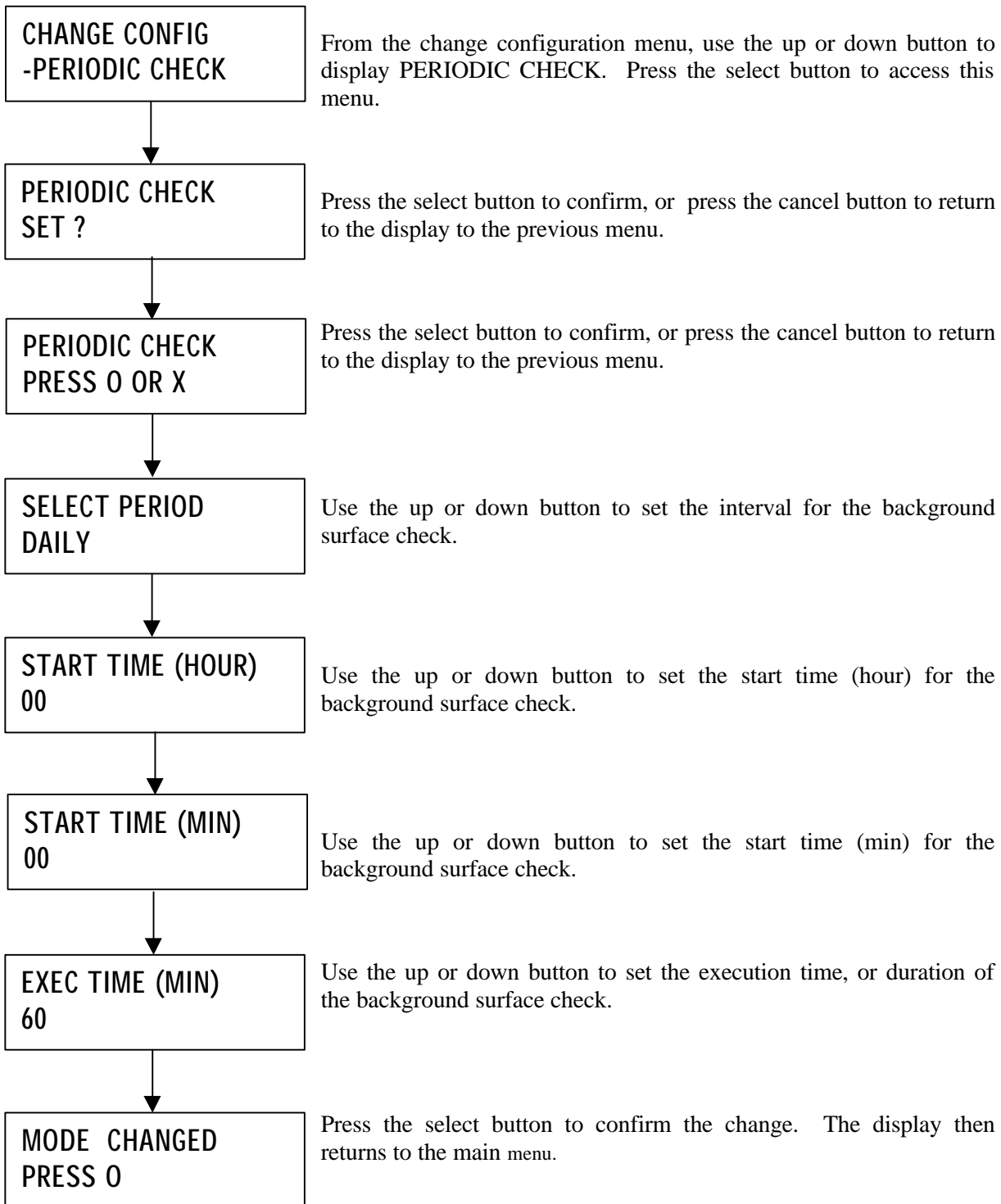


CHECK MODE
CANCEL CHECK

Press the select button to stop the surface check. The display return to the main menu after the select button is pressed.

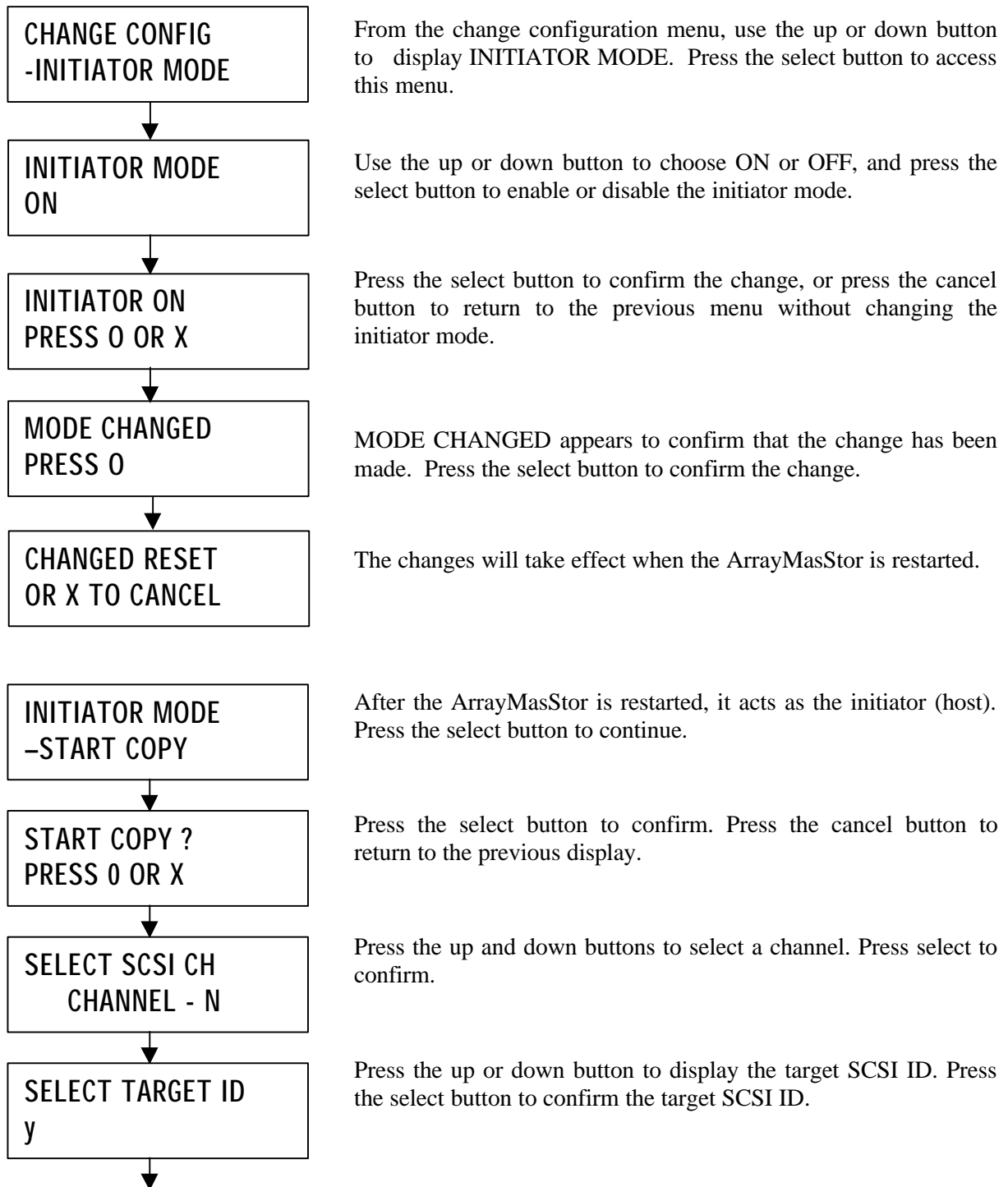
4.9.15 Background Surface Check

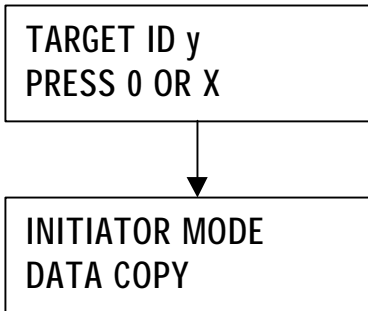
Using its internal clock, the ArrayMasStor can perform daily, weekly, or monthly automatic background surface check. The default setting for this function is on, with surface checks starting automatically at 00:00 each Sunday. The surface check normally takes 60 minutes to execute. The ArrayMasStor's internal clock must be set to the local time for this function to operate properly. (See section 4.8.2, Changing the Date and Time Setting)



4.9.16 Setting Initiator Mode

The ArrayMasStor J Series supports initiator mode, which allows the ArrayMasStor to copy all of its data to another SCSI drive or ArrayMasStor with an equal or larger capacity.



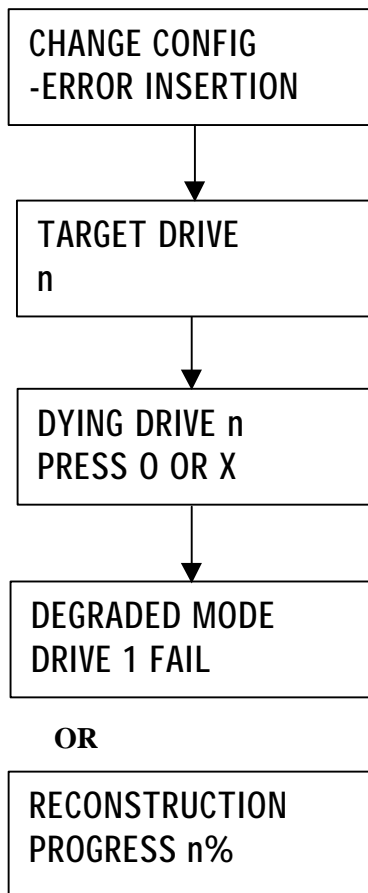


Press the select button to start the data copy. Press the cancel button to return to the previous display.

While in initiator mode, the ArrayMasStor will copy all of its data to the target SCSI ID and display the copying progress in percent. When the data has been copied, initiator mode should be switched off using the procedure shown above. Press the up button to display the progress in percentage.

4.9.17 Error Insertion

The error insertion function tests the ArrayMasStor by simulating the failure of one drive and causing the ArrayMasStor to enter degraded mode. This function does not cause data loss and is not available when one of the drives has failed.



From the change configuration menu, use the up or down button to display ERROR INSERTION. Press the select button to access this menu.

Use the up or down button to choose the drive number that will be used in the simulated failure. Press the select button to confirm the choice of drive. The hot spare drive cannot be used as the target drive for the simulated failure.

The selected drive number will be displayed. Press the select button to confirm.

The selected drive's status changes from normal to fail.

When hot spare drive is configured and Automatic Reconstruction mode is on, data reconstruction on the spare drive will start automatically.

4.9.18 Displaying the System Trace Data

System trace data contains information about the ArrayMasStor's operating status.

CHANGE CONFIG
-SYSTEM TRACE

From the change configuration menu, use the up or down button to display SYSTEM TRACE. Press the select button to access this menu. Press the up or down button to scroll through the system trace data that is shown on the display. Press the cancel button to return the display to the previous menu.

4.9.19 Erasing the System Trace Data

This function, which deletes the system trace data, should only be performed on the advice of qualified service personnel.

CHANGE CONFIG
-CLEAR TRACE

From the change configuration menu, use the up or down button to display CLEAR TRACE. Press the select button to erase the system trace data.

CLEAR TRACE LOG
PRESS 0 OR X

Press the select button to confirm. Press the cancel button to return to the previous display.

TRACE LOG
CLEARED PRESS 0

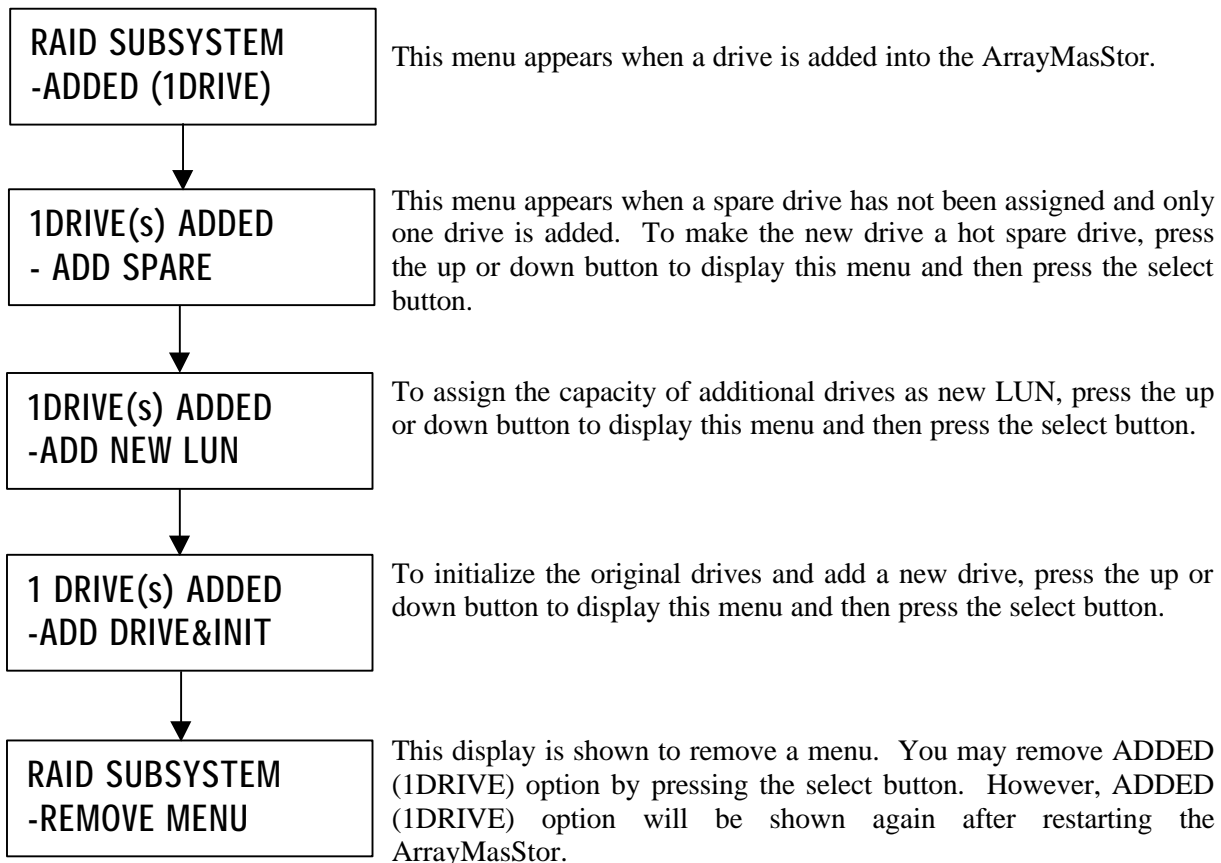
Press the select button to return to the main menu.

4.10 Adding Drive Units

Adding a drive unit can increase the capacity of an ArrayMasStor configured with one, two or three units. If the ArrayMasStor is turned off, the new drive unit can be installed in normal system status. The ArrayMasStor will enter 'system halt mode' when new drive units are added.

There are three ways to increase the capacity of ArrayMasStor.

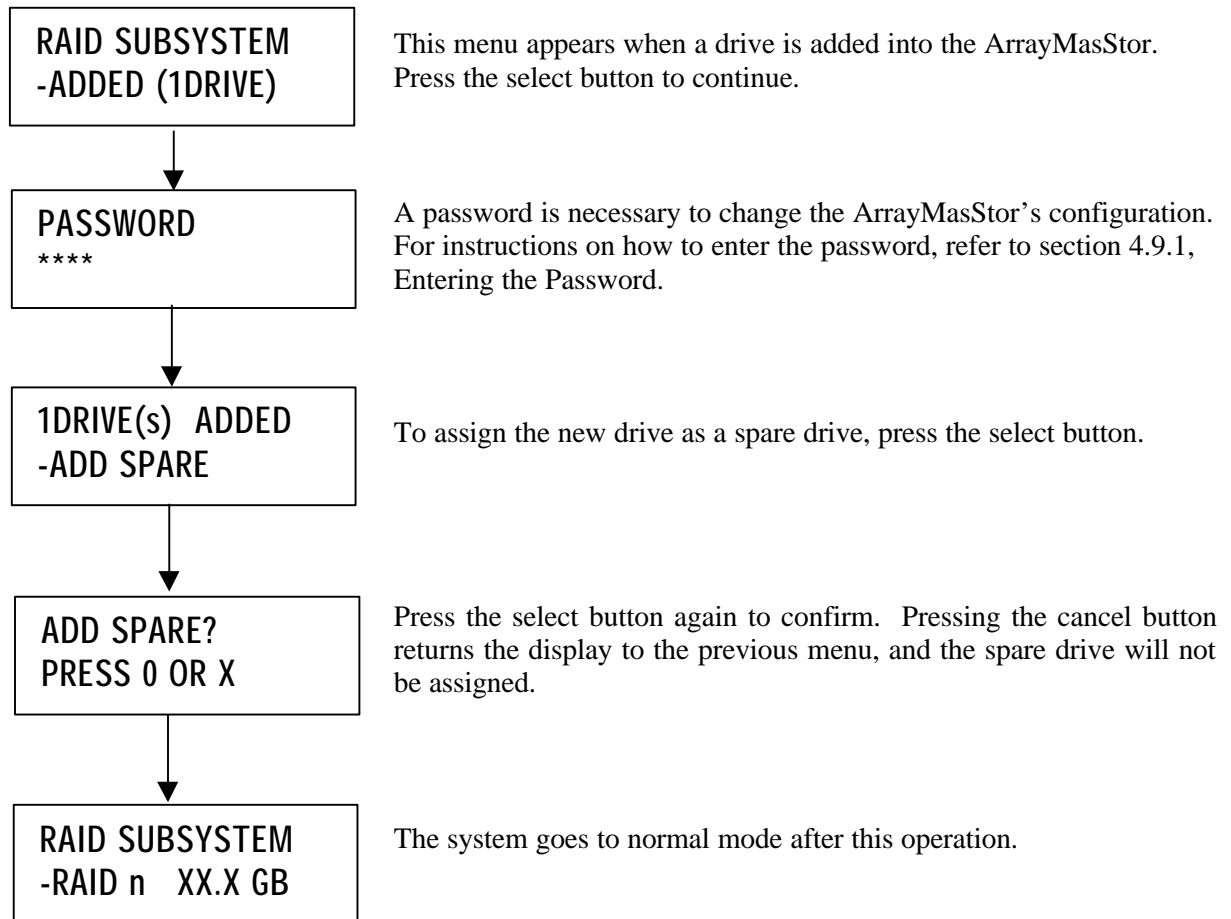
1. Adding Unit as Hot Spare Drive
2. Adding Unit as Data Drive
3. Adding Unit as New LUN



<i>IMPORTANT !</i>	Insert a new drive on the vacant slot below the last online drive unit. Unless 'INVALID DRIVE LOCATION' message will be displayed.
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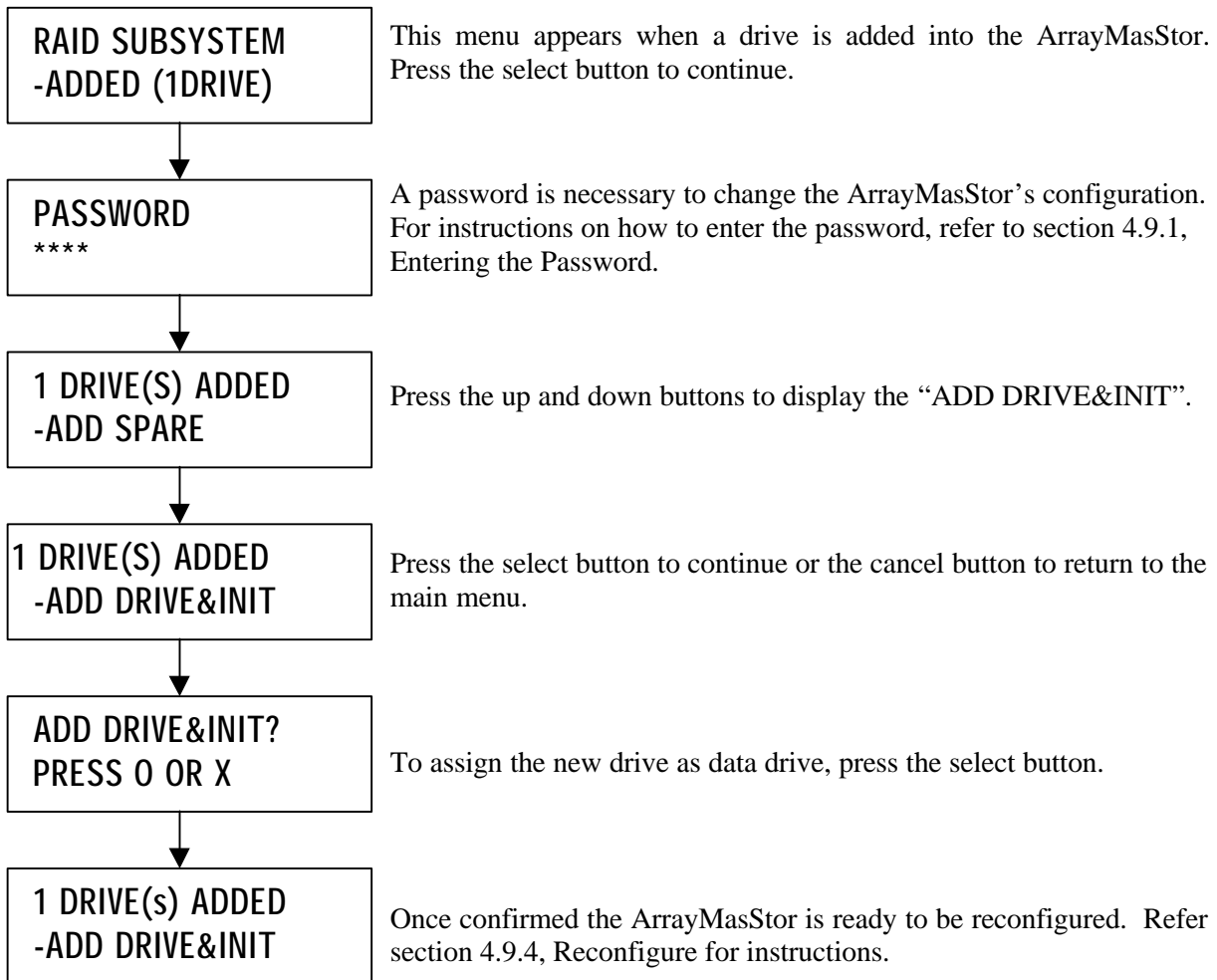
4.10.1 Adding Unit as Hot Spare Drive

After adding a drive in a three-drive system in which a spare has not been assigned, the following menu will appear. Initialization will not occur if the new drive is assigned as a spare drive.



4.10.2 Adding Unit as Data Drive

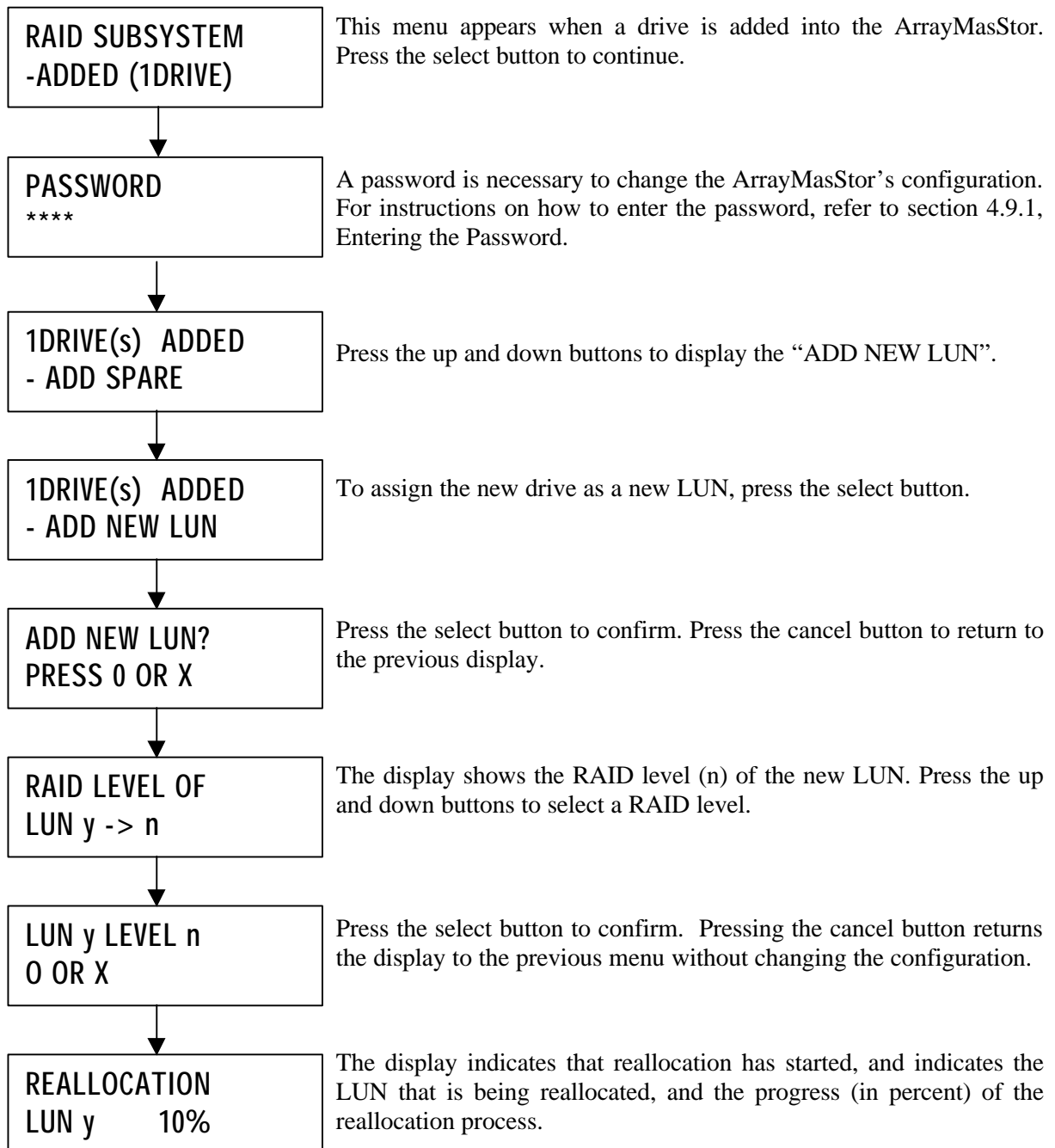
System initialization is required when adding a new drive as a data drive in a current ArrayMasStor configuration. Adding a data drive is possible when a spare drive is already assigned and one or two drives are added into the system.



<i>IMPORTANT !</i>	During initialization all user data is erased. It is strongly recommended that data be backed up before initialization.
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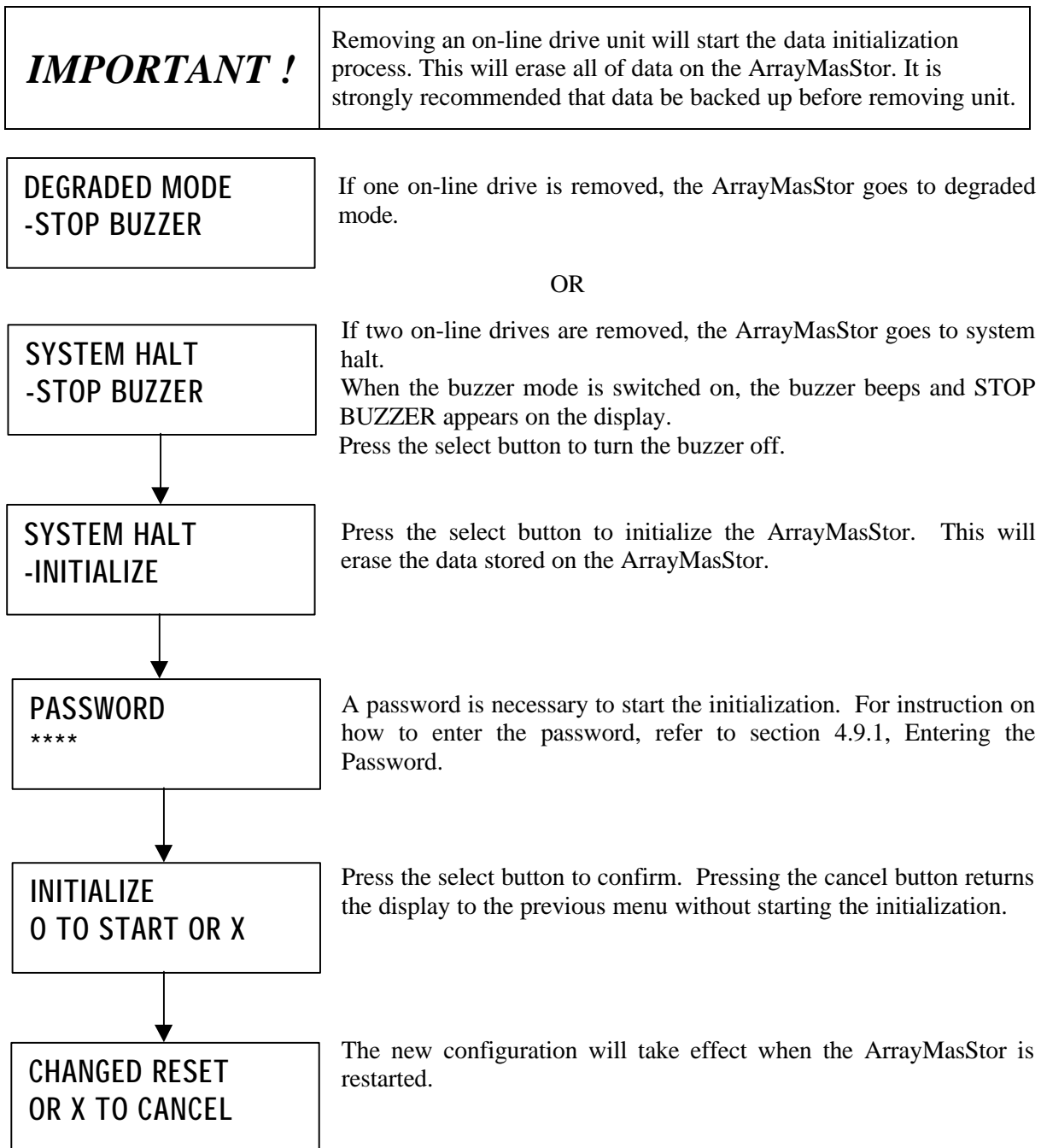
4.10.3 Adding Unit as New LUN

When a new drive is assigned as a new LUN, the original data are reassigned to suitable locations, and the new parity data (in RAID Level 5) are regenerated using dynamic data reallocation. There is no need to backup data to increase the capacity of the ArrayMasStor, but backing-up is strongly recommended to prevent the loss of data that may occur during dynamic data reallocation. The host computer cannot access the ArrayMasStor while dynamic data reallocation is in process.



4.11 Removing On-line Drives

The remove on-line drive function decreases the number of active drives in the ArrayMasStor. In RAID Level 5, the minimum number of drives is three.



5 Troubleshooting

5.1 Drive Failure

When a drive fails, the number of the failed drive is displayed on the operation panel (RAID 0/1/5) and its status indicator turns red(RAID 1/5). The ArrayMasStor can be recovered by replacing it with a new drive unit while the power is even on.

Note: When replacing the failed drive unit, prepare a new drive unit in Appendix D.

IMPORTANT !

Do not touch internal components of the ArrayMasStor while the power is on.

(Procedure)


1. Check the number of the failed drive unit displayed on the panel.
2. Open the front cover.
3. Unlock with the supplied key.
4. Hold the handle of Drive Unit to pull the unit out.
5. Insert to push a new drive unit firmly.
6. Lock with the key.

Note:

- When the automatic reconstruction mode is on, data reconstruction will start immediately after the ArrayMasStor recognize a new drive unit.
- When the mode is off, the panel will display "DRIVE REPLACED - START RECON". Then, press the select button to start data reconstruction process.
- If "DRIVE FAIL" is still displayed, check unit's connection.

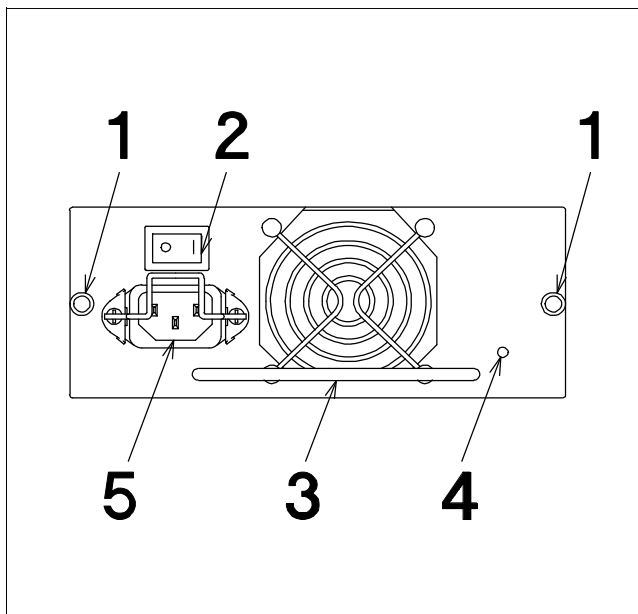
5.2 Power Supply Module Failure

The “PWR SUPPLY FAIL” message will be displayed on the display panel if one of the dual power supply failed and the power supply’s status indicator has turned off. This indicates a power supply module failure. Replace the power supply module by following the procedure indicated below.

 WARNING	Replace the power supply module while power off. Do not put your hands into the removed area of the power supply.
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Replacement Procedure

1. Switch off the power switch on the front panel.
2. Set the power switch to “0” of the power supply module located on the rear side.
3. Disconnect all the cables (Power cable X 2, SCSI cable and etc.)
4. Unscrew the failed power supply module.
5. Pull out the failed power supply module.
6. Install the replacement power supply module.
7. Screw the fix screws (2X) of the power supply.
8. Reconnect all the cables that were disconnected in procedure no.3.
9. Set the power switch to “1” of the power supply module located on the rear side.
10. Switch on the power switch on the front panel.
11. Make sure that the “PWR SUPPLY FAIL” is not displayed anymore. Contact your sales representative for repair if “PWR SUPPLY FAIL” message is still displayed after the power supply module has been replaced.




1. Power supply module screws
2. Power supply switch
3. Power supply module handle.
4. Power supply status indicator
5. Connector for power cable.

5.3 Fan Module Failure

The “FAN FAIL” message will be displayed on the display panel, if one of the fans failed in the fan module. Replace the fan module immediately.

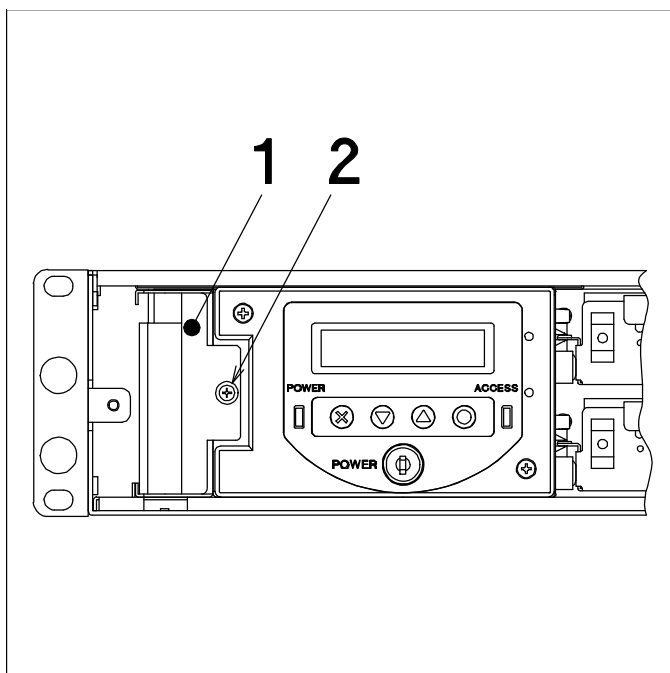
It is possible to replace the fan module while the subsystem is in operation, however, it should in a short period of time since the cooling in the system is not enough.

 WARNING	Do not enter the fingers into the removed area.
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Replacement Procedure

1. Unscrew and remove the front cover. (See 2.1 Front side)
2. Unscrew the fan module. (refer below)
3. Pull out the fan module.
4. Install the replacement fan module.
5. Fasten the fan module using the fix screws.
6. Install the front cover.

<i>IMPORTANT !</i>	<ul style="list-style-type: none"> • The “FAN FAIL “ indication will be erased within one (1) minute. Call your sales representative for repair if “FAN FAIL” is still displayed after one (1) minute. • The “P/S and FAN FAIL” indication will be displayed if both power supply and fan modules have failed.
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Without front cover

1. Fan module
2. Fan module fix screw

5.4 Other Failures

If replacing new drive unit, fan module or power supply module doesn't solve any troubles, contact your sales representative.

Appendix A Specifications

	AXRR-J182S(-T)	AXRR-J183S(-T)	AXRR-J184S(-T)
RAID 0 capacity	36GB	54GB	72.1GB
RAID 1 capacity	17.9GB	26.9GB	36GB
RAID 5 capacity	N/A	36GB	54GB
RAID level	0,1 ¹	0,1,5 ²	0,1,5
Host interface	SCSI-3(Single Ended/LVD)		
Max. transfer rate	40MB/s		
Cache buffer	64MB		
Max. number of drives	2	3	4
HDD Capacity	18GB	18GB	18GB

	AXRR-J462S(-T)	AXRR-J463S(-T)	AXRR-J464S(-T)
RAID 0 capacity	92GB	138GB	184GB
RAID 1 capacity	46GB	69GB	92GB
RAID 5 capacity	N/A	92GB	138GB
RAID level	0,1 ¹	0,1,5 ²	0,1,5
Host interface	SCSI-3(Single Ended/LVD)		
Max. transfer rate	40MB/s		
Cache buffer	64MB		
Max. number of drives	2	3	4
HDD Capacity	46GB	46GB	46GB

	AXRR-J762S(-T)	AXRR-J763S(-T)	AXRR-J764S(-T)
RAID 0 capacity	153GB	230GB	307GB
RAID 1 capacity	76.8GB	115GB	153GB
RAID 5 capacity	N/A	153GB	230GB
RAID level	0,1 ¹	0,1,5 ²	0,1,5
Host interface	SCSI-3(Single Ended/LVD)		
Max. transfer rate	40MB/s		
Cache buffer	64MB		
Max. number of drives	2	3	4
HDD Capacity	76.8GB	76.8GB	76.8GB

*1 RAID Level 5 can be configured if drive unit is added.

*2 RAID Level 0 and 1 , if set as spare drive.

	All Models
Size (WxHxD)	483 x 88 x 509 mm (Rack model) 200 x 489 x 509 mm (Tower model)
Weight	18.5 kg (4 hard disks included)
Environment	Temperature : 5 – 40°C / Humidity : 10-90% (non-condense)
Power	100 ~ 240 V AC (50/60Hz)
Current	1.0 A (100V)

Capacity refers to the approximate storage capacity when used in RAID levels 0,1 and 5, without a spare drive.

The actual capacity depends on the operating system, the number of drives and the configuration.

The specifications or physical appearance of the ArrayMasStor may change without prior notice.

Appendix B Accessories

Accessories for the ArrayMasStor (AXRR-JxxxS-(T)).

- Support Angle for installation to cabinet (with M6 screws and floating knot) 1 set
 * shipped only with Rack model (not included with AXRR-JxxxS-T model)
 * may not fit on some of the EIA 19" cabinet
- SCSI Terminator (Part No.: A208243) x 1
- Power Cable (Part No.: A208079) x 2
- Drive Lock Key (Part No.: A200213) x 2
- Power On/Off Key (Part No.: A207183) x 2
- ArrayMasStor J series User's Manual (this booklet) (Part No.: A208233) x 1

Appendix C Default Configuration

The ArrayMasStor's default configuration is as follows.

	DEFAULT VALUE
SCSI ID	0
Number of LUN	1
RAID level	More than 3Drive Model: 5 2Drive Model: 1
Hot spare drive	No
Buzzer mode	On
Auto reconstruction mode	On
Cache buffer mode	On
AIX	Off
UNIX C/H/S	Off
Ultra SCSI	On
Initiator mode	Off
Background surface verify	On
Period of surface verify	Weekly
Start time	Sunday at 00:00
Execution time	60 minutes
DPO/FUA bit	OFF
Password	1 2 3 4

Appendix D Replacement Parts

The following items are defined as field replaceable parts.

Parts Name	Parts Number	Description
18GB drive unit	A208084	Replacement/addition for AXRR-J18*S/drives
46GB drive unit	A208218	Replacement/addition for AXRR-J46*S/drives
76GB drive unit	A208263	Replacement/addition for AXRR-J76*S/drives
Replacement Box for AXRR-JxxxS	A208244	Replacement for AXRR-JxxxS (except drive units and RAID controller card)
Replacement Box for AXRR-JxxxS-T	A208245	Replacement for AXRR-JxxxS-T (except drive units and RAID controller card)
Replacement RAID controller card	A208246	
Support angle for installation to cabinet	A208224	Shipped with rackmount type machine only
Replacement power supply module	A207620	
Replacement fan module	A208248	
Power Cable	A208079	
Terminator	A208243	
Drive lock/key	A200213	Replacement for all J Series
Power On/Off key	A207183	

Appendix E Feature Setting

Setting ArrayMasStor's features depends on the number of drives configured. Refer the chart when changing the ArrayMasStor configuration.

Feature		No. of Drives			
		1	2	3	4
RAID Level	Spare				
5	Assigned	X	X	X	O
5	Not assigned	X	X	O	O
1	Assigned	X	X	O	O
1	Not assigned	X	O	O	O
0	Assigned	X	X	X	X
0	Not assigned	X	O	O	O

Where:

O – means configuration is ALLOWED.

X – means configuration is NOT ALLOWED.

Electronic Emission Notices

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC WARNING

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from ADTX authorized dealers or contributor. ADTX is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

Information

For more information about this product, please contact your distributor.

Distributor's information

- Product Records

Product Name : _____
Model/Type : _____
Serial Number : _____

- *Manufacturer*



This product is manufactured by
Advanced Technology and Systems Co., Ltd.
in Japan.