



Intel® Integrated Mirroring / Integrated Striping RAID for Intel® Server Boards SE7520JR2, SE7520AF2, SE7520BD2

Configuration Guide

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Revision History

Date	Revision Number	Modifications
January 2005	1.0	Initial release.
April 2005	1.1	Updated release
July 2005	1.2	Additional instruction on Bios setup
Aug 2005	1.3	Add instruction on IM initialization

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1. Integrated RAID Overview

The integrated RAID solution provides cost benefits for the server or workstation market where the extra performance, storage capacity, and/or redundancy of a RAID configuration are required. The two components of integrated RAID are:

- Integrated Mirroring (IM) provides features of RAID 1
- Integrated Striping (IS) provides features of RAID 0

By simplifying the IM and IS configuration options and by providing firmware support in its host adapters, integrated RAID can offer the integrated RAID solution at a lower cost than a full-blown RAID implementation.

This document provides a reference to expedite the configuration of integrated RAID.

Notes:

- Integrated RAID offers advanced features including I/O performance with additional data security; however, there are several considerations of which to be aware.
- Only one RAID configuration (logical drive) is allowed.
- Integrated RAID may take an extended period of time to complete the initialization after the RAID setup. The amount of time required depends whether the initialization is completed within the BIOS-based utility or completed with the operating system-based utility. The amount of time required also depends on the complexity of the configuration and capability of the system being configured.
- Unlike a hardware controller, integrated RAID consumes system resources such as CPU cycles and system memory to handle I/O requests; in a situation where the CPU is heavily loaded, the I/O performance may drop significantly.

2. Integrated RAID Implementation Guidelines

2.1 Integrated Mirroring

Integrated Mirroring (IM) provides data protection for the system volume. The purpose is to safeguard critical information, such as the operating system.

IM can be set up with two hard disk drives to maintain high performance, as well as data availability and fault tolerance. If one disk drive fails, the hot swap drive mechanism allows the system to maintain operation while the failed disk drive can be replaced. In addition, the hot spare capability enables the system to automatically replace the defective drive with a standby disk.

IM requires extra time synchronization in BIOS mode as compared to the synchronization time in operating system mode. In BIOS mode (<Ctrl>+<C>), 1 hour for each 5 gigabytes of hard drive capacity is typically required to complete initializing the mirror. For example, for two 100 gigabyte drives configured in a RAID 1 mirroring, 18-20 hours should be allowed for the initialization to complete.

The IM firmware uses queue tagged I/Os to allow SCSI I/Os to continue on the IM volume while the volume is re-synchronized in the background. The host driver may optionally suspend the resynchronization operation while performing domain validation or while configuring Ultra320 SCSI expanders.

2.2 Integrated Striping

Integrated Striping (IS) is available for applications that require faster I/O performance and higher storage capacity for non critical data. With this option there is no drive failover. Failure of a drive results in a loss of all data on the drives holding the data stripe. By reading and writing data concurrently across several disks, IS offers excellent performance as compared to a single physical disk. However, the risk of data loss increases because a single disk failure will cause the loss of the entire logical drive.

The IS configuration is available only for new installations. Migration of data with existing disks is not supported.

3. Quick Configuration Guide

Note: Only one IM or IS logical drive can be created per controller; the two modes are mutually exclusive. Make sure the SCSI mode option in the system BIOS is set up correctly to support the Raid level mode needed before implementing an IS or IM configuration.

3.1 Enable IM or IS in System Bios setup

Prior to configuring IM or IS, users are required to set related system Bios options correctly. To do so, during the system POST, press F2 to enter Bios setup, ensure the on Board SCSI Option ROM Mode option is set to desired mode, then save the configuration and reboot. Please refer to Intel® Server Board users guide on how to modify system Bios configuration. Figure 1 demonstrates that the SCSI Option ROM Mode is set to IM.

```
Onboard SCSI           [Enabled]
Onboard SCSI Option ROM Mode [IM/IME <RAID 1/1e>]
IOP ROMB <SROMB42E>      Not Installed

Onboard Video          [Enabled]
Dual Monitor Video     [Disabled]
Onboard NIC             [Enabled]
Onboard NIC ROM         [Enabled]
```

Figure 1. SCSI Option ROM mode set to IM

Figure 2 shows that the SCSI Option ROM Mode is set to IS.

```
Onboard SCSI           [Enabled]
Onboard SCSI Option ROM Mode [IS <RAID 0>]
IOP ROMB <SROMB42E>      Not Installed

Onboard Video          [Enabled]
Dual Monitor Video     [Disabled]
Onboard NIC             [Enabled]
Onboard NIC ROM         [Enabled]
```

Figure 2. SCSI Option ROM mode set to IS

3.2 Integrated Mirroring Configuration Procedure

Follow the steps listed below to set up the IM volume.

1. Press <Ctrl>+<C> during POST when prompted to do so by the RAID card BIOS. See the following figure.

```
LSI Logic Corp. MPT IS BIOS
Copyright 1995-2003 LSI Logic Corp.
MPTBIOS-IS-5.11.00

Press Ctrl-C to start LSI Logic Configuration Utility...
```

Figure 3. System Boot Screen

The main configuration screen is displayed, as shown below.

```
LSI Logic MPT SCSI Setup Utility  Version  MPTBIOS-IME-5.10.01
<Boot Adapter List>  <Global Properties>

LSI Logic Host Bus Adapters
Adapter  PCI  Dev/  Port  IRQ  NUM  Boot  LSI Logic  RAID
          Bus  Func  Number  NUM  Order  Control  Status
<LSI1030  2  29>  0000  ?  Yes  0  Enabled  --
<LSI1030  2  28>  0400  ?  Yes  1  Enabled  --
```

##

```
Esc=Abort/Exit  ArrowKeys=Select Item  -/+ =Change [Item]
Home/End =Select Item  Enter=Execute <Item>
F2 =Menu
```

Figure 4. Main Menu

2. On the Main Menu, use the up and down arrow keys to locate the adapter.

- Press <Enter> to view the Adaptor properties. See the figure below.

LSI Logic MPT SCSI Setup Utility										Version	MPTBIOS-IME-5.10.01
RAID Properties			Array:	--	SCSI ID:	--	Size(MB):	-----			
SCSI ID	Device	Identifier		Array Disk?	Hot Spare	Status	Predict Failure	Size (MB)			
0	MAXTOR	ATLAS10K4_36SCA	DFL0	[No]	[No]	-----	-----	35074			
1	MAXTOR	ATLAS10K4_36SCA	DFU0	[No]	[No]	-----	-----	35074			
2	MAXTOR	ATLAS10K4_36SCA	DFU0	[No]	[No]	-----	-----	35074			
3	MAXTOR	ATLAS10K4_36SCA	DFU0	[No]	[No]	-----	-----	35074			
4	MAXTOR	ATLAS10K4_36SCA	DFU0	[No]	[No]	-----	-----	35074			
5	-	-	-	[No]	[No]	-----	-----	-----			
6	ESG-SHU	-	-	[No]	[No]	-----	-----	-----			
7	LSI1030	-	-	[No]	[No]	-----	-----	-----			
8	-	-	-	[No]	[No]	-----	-----	-----			
9	-	-	-	[No]	[No]	-----	-----	-----			
10	-	-	-	[No]	[No]	-----	-----	-----			
11	-	-	-	[No]	[No]	-----	-----	-----			
12	-	-	-	[No]	[No]	-----	-----	-----			
13	-	-	-	[No]	[No]	-----	-----	-----			
14	-	-	-	[No]	[No]	-----	-----	-----			
15	-	-	-	[No]	[No]	-----	-----	-----			
Esc=Abort/Exit		ArrowKeys=Select		Item	-/+ =Change [Item]						
		Home/End =Select		Item	Enter=Execute <Item>						
										F4=Diagnostic	

Figure 5. Integrated Mirroring: Select Array Disk

Quick Configuration Guide

4. Use the arrow keys on the Select Array Disk screen to select the primary disk for IM.
5. Use the arrow keys to move to the “Array Disk?” column.
6. Press the <+> key to change the value in the “Array Disk?” column from “No” to “Yes”.
7. When the “Keep Data/Erase Disk” message appears, as shown below, press F3 to keep the data.

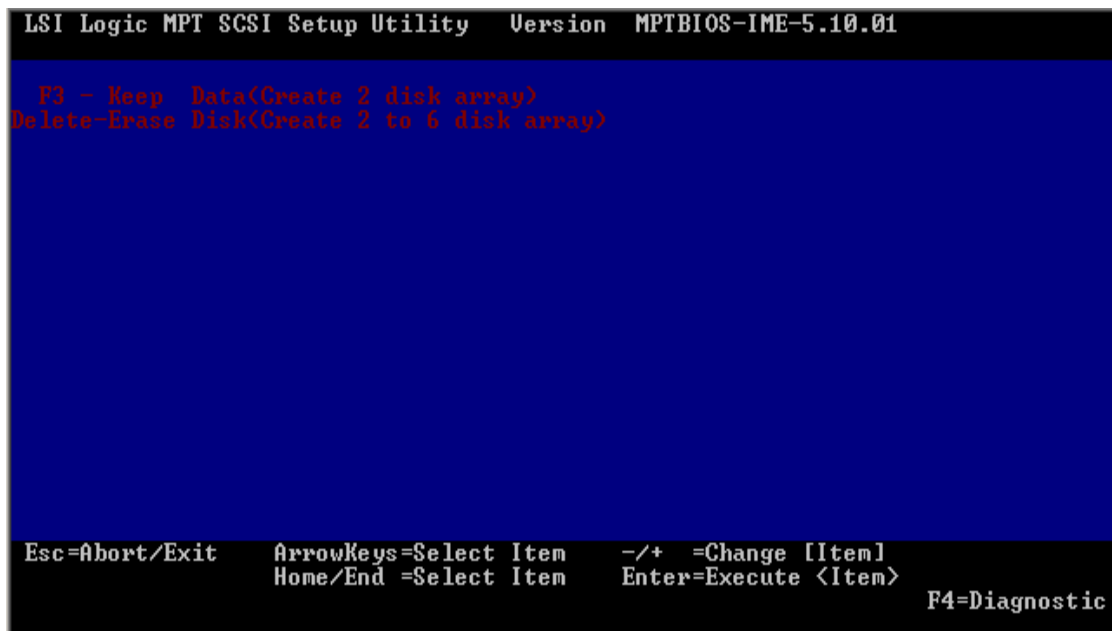


Figure 6. Integrated Mirroring: Keep or Erase Data Query

The hard disk drive is now the first disk of the array and the Status is changed to Primary. See the figure below.

LSI Logic MPT SCSI Setup Utility Version MPTBIOS-IME-5.10.01									
RAID Properties			Array:	--	SCSI ID:	--	Size(MB):	-----	
SCSI ID	Device	Identifier	Array Disk?	Hot Spare	Status	Predict Failure	Size (MB)		
0	MAXTOR	ATLAS10K4_36SCA	DFL0	[Yes]	Primary	---	35074		
1	MAXTOR	ATLAS10K4_36SCA	DFU0	[No]	---	---	35074		
2	MAXTOR	ATLAS10K4_36SCA	DFU0	[No]	---	---	35074		
3	MAXTOR	ATLAS10K4_36SCA	DFU0	[No]	---	---	35074		
4	MAXTOR	ATLAS10K4_36SCA	DFU0	[No]	---	---	35074		
5	-	-	[No]	[---]	---	---	---		
6	ESG-SHU	-	[No]	[---]	---	---	---		
7	LSI1030	-	[No]	[---]	---	---	---		
8	-	-	[No]	[---]	---	---	---		
9	-	-	[No]	[---]	---	---	---		
10	-	-	[No]	[---]	---	---	---		
11	-	-	[No]	[---]	---	---	---		
12	-	-	[No]	[---]	---	---	---		
13	-	-	[No]	[---]	---	---	---		
14	-	-	[No]	[---]	---	---	---		
15	-	-	[No]	[---]	---	---	---		
Esc=Abort/Exit ArrowKeys=Select Item -/+ =Change [Item] Enter=Execute <Item> F4=Diagnostic									

Figure 7. Integrated Mirroring: Create Primary Disk

- Repeat steps 2 through 7 to select the second disk drive for IM.
- (Optional) To set up a hot spare disk, use the arrow key to select the hard drive. Highlight the Hot Spare column and use the <+> key to change the value to "Yes". See the figure below.

LSI Logic MPT SCSI Setup Utility Version MPTBIOS-IME-5.10.01								
RAID Properties		Array: IM		SCSI ID: 0	Size(MB): 35068			
SCSI ID	Device	Identifier	Array Disk?	Hot Spare	Status	Predict Failure	Size (MB)	
0	MAXTOR	ATLAS10K4_36SCA	DFL0	[Yes]	[No]	Primary	---	35074
1	MAXTOR	ATLAS10K4_36SCA	DFU0	[Yes]	[No]	-----	---	35074
2	MAXTOR	ATLAS10K4_36SCA	DFU0	[No]	[No]	-----	---	35074
3	MAXTOR	ATLAS10K4_36SCA	DFU0	[No]	[No]	-----	---	35074
4	MAXTOR	ATLAS10K4_36SCA	DFU0	[No]	[Yes]	-----	---	35074
5	-	-	[No]	[---]	-----	---	---	
6	ESG-SHU	-	[No]	[---]	-----	---	---	
7	LSI1030	-	[No]	[---]	-----	---	---	
8	-	-	[No]	[---]	-----	---	---	
9	-	-	[No]	[---]	-----	---	---	
10	-	-	[No]	[---]	-----	---	---	
11	-	-	[No]	[---]	-----	---	---	
12	-	-	[No]	[---]	-----	---	---	
13	-	-	[No]	[---]	-----	---	---	
14	-	-	[No]	[---]	-----	---	---	
15	-	-	[No]	[---]	-----	---	---	
Esc=Abort/Exit ArrowKeys=Select Item -/+ =Change [Item] Enter=Execute <Item> F4=Diagnostic								

Figure 8. Integrated Mirroring: Create Hot Spare Disk

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10. Press the <Esc> key to exit the configuration screen.
11. Select "<Save changes then exit this menu>" and press <Enter> to confirm the change to return to the main menu, or select "<Cancel Exit>" to continue the configuration.

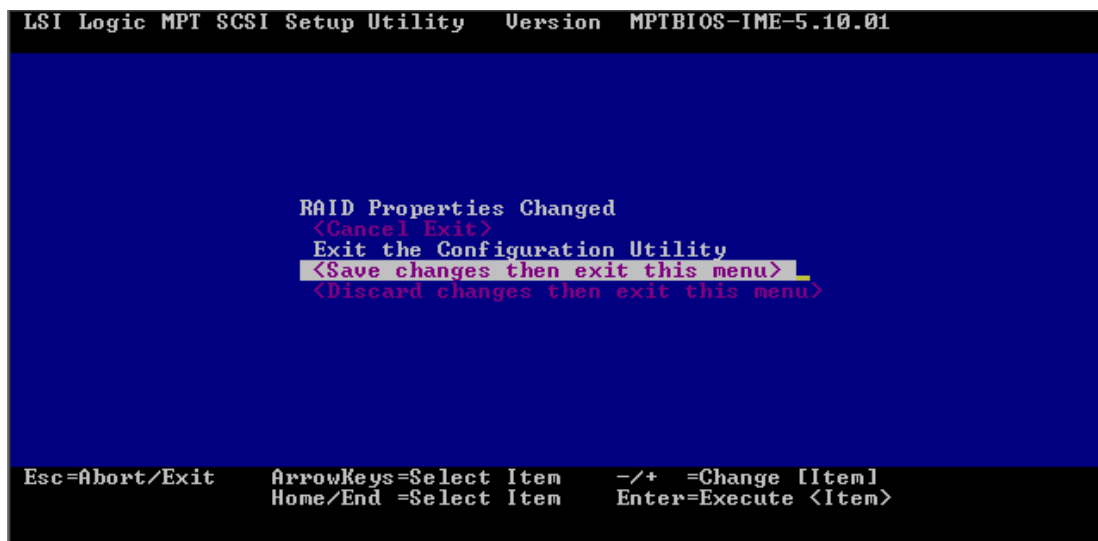


Figure 9. Integrated Mirroring: Save Changes

12. The IM volume is created and the synchronization starts immediately after choosing "<Save changes then exit this menu>" in step 12. On the Main menu, you will see below picture indicating the Raid drive is in "Resyncing" status.

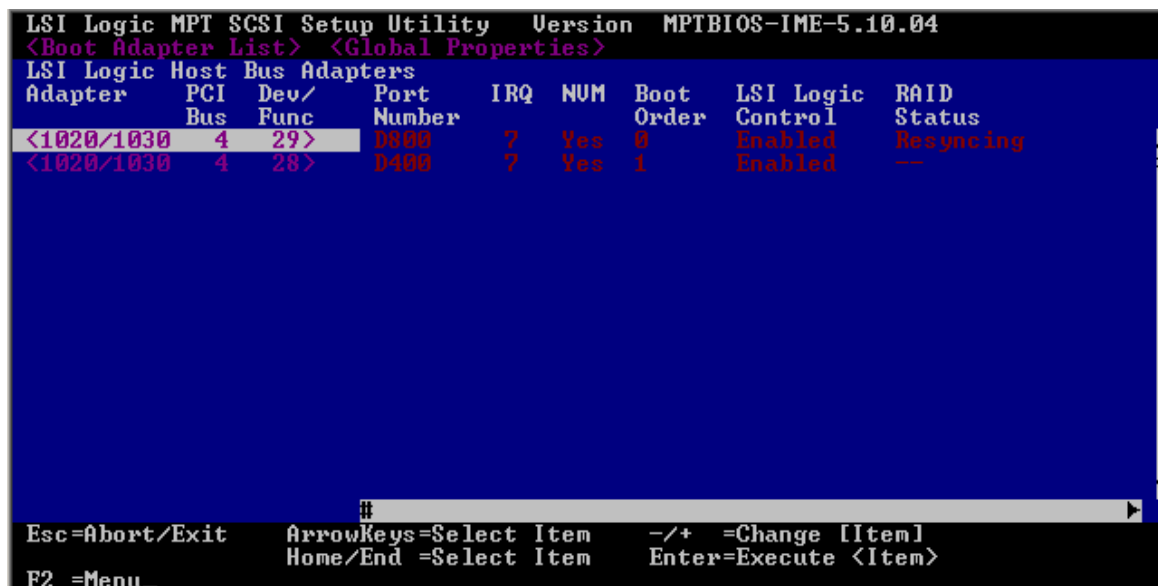


Figure 10. Integrated Mirroring: Return to Main menu

13. To enhance performance, it is not necessary to wait for the synchronization to finish. Synchronization can be done in the background. Press the <Esc> key to exit the Main menu. Then choose <Exit the Configuration Utility> to finalize the IM setup.

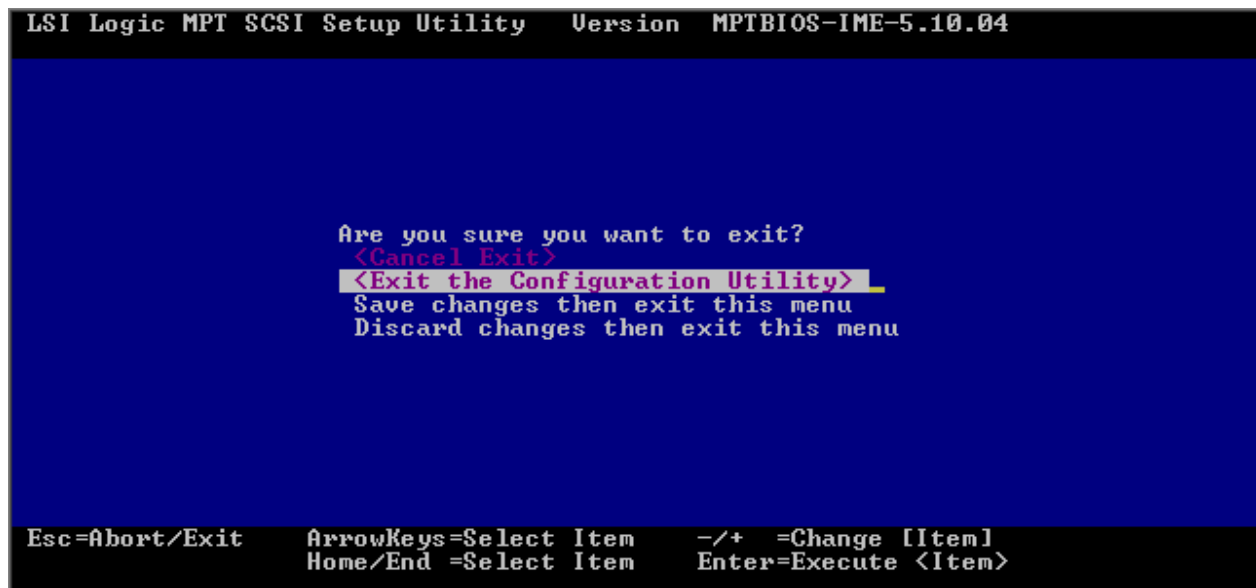


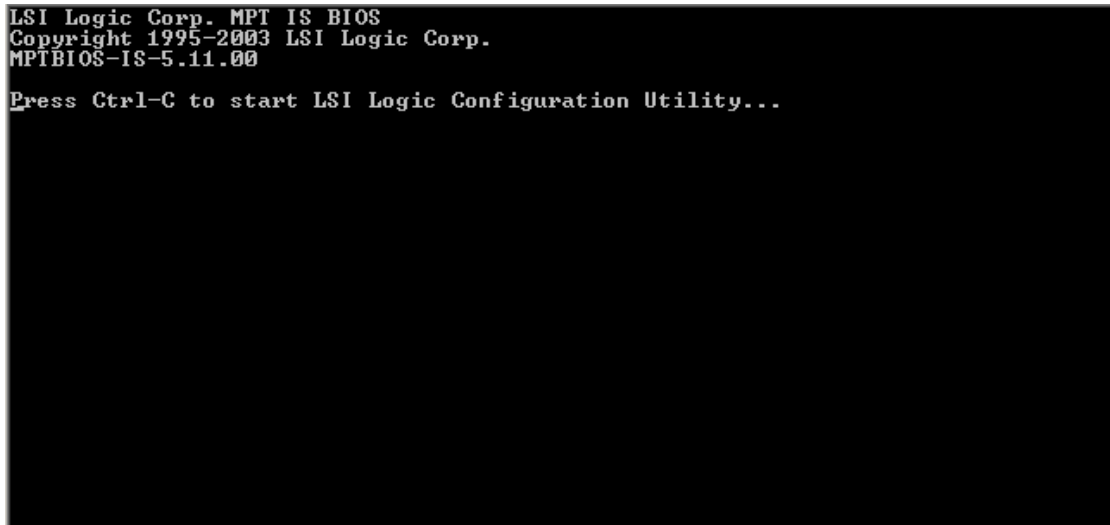
Figure 11. Integrated Mirroring: Confirm Exit the utility

Now the IM is ready to use after system reboot. The synchronization will be run in background and the operating system can now be installed, synchronization will continue during the installation and complete much more quickly once the operating system is installed.

3.3 Integrated Striping Configuration Procedure

Follow the steps below to build an Integrated Striping set of disks.

1. During the system POST, press F2 to enter Bios setup. Ensure the on Board SCSI Mode be set to "IS", save configuration and reboot. Please refer to Intel® Server Board users guide for system Bios setup.
2. Press <Ctrl>+<C> during POST when prompted to do so by the RAID card BIOS. See the following figure.



```
LSI Logic Corp. MPT IS BIOS
Copyright 1995-2003 LSI Logic Corp.
MPTBIOS-IS-5.11.00
Press Ctrl-C to start LSI Logic Configuration Utility...
```

Figure 12. Integrated Striping: System Boot Screen

The main configuration screen is displayed, as shown below.



Figure 13. Integrated Striping: Main Menu

- Use the up and down arrow keys to locate the adapter.
- Press <Enter> to view the Adaptor properties. See the figure below.

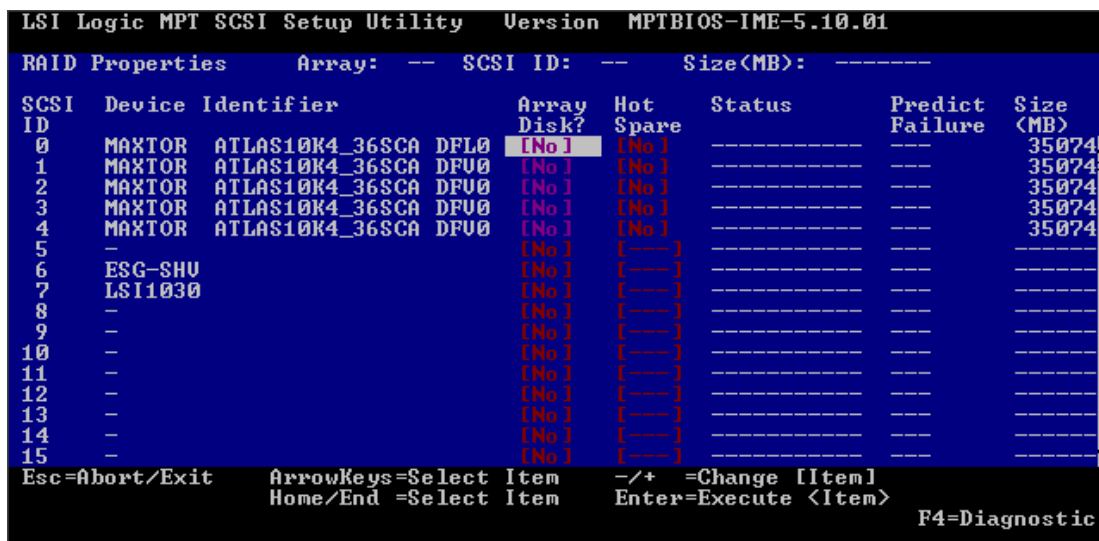


Figure 14. Integrated Striping: Select Array Disk

- Use the arrow keys on the Select Array Disk screen to select the first disk for the array.
- Use the arrow keys to move to the “Array Disk?” column.
- Press the <+> key to change the value in the “Array Disk?” column from “No” to “Yes”.

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A warning message is displayed to tell you data on the disk will be lost. Cancel the operation if you want to keep the data, otherwise chose erase the data and continue.

8. Repeat steps 12 through 16 to add other disks to the array.
9. Press <Esc> to exit the configuration screen.
10. Select "<Save changes then exit this menu>" and press <Enter> confirm the change and return to main menu.

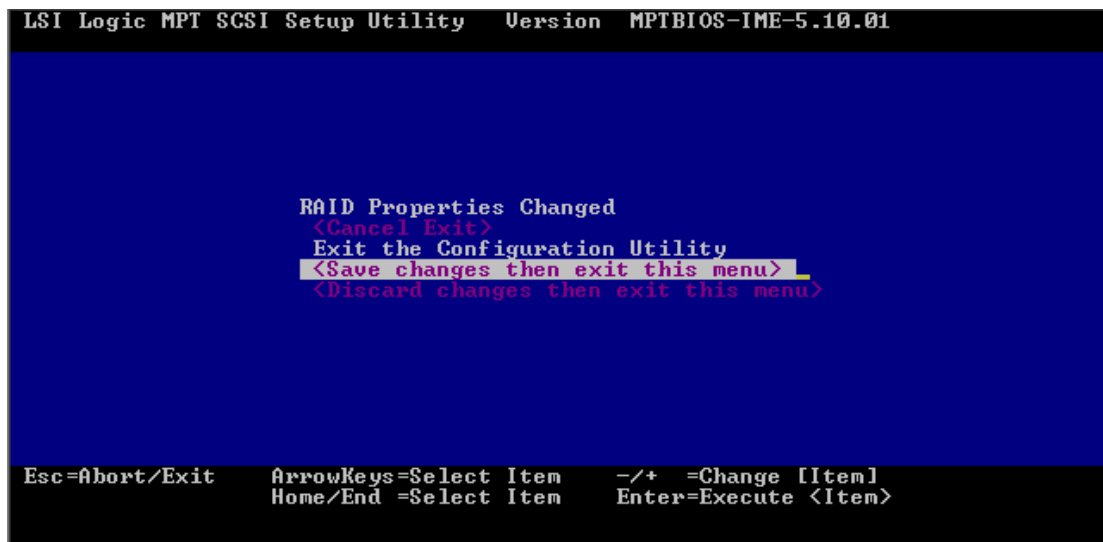


Figure 15. Integrated Striping: Save Changes

The IS volume is created and synchronization starts immediately. Verify the RAID properties on the screen; the "RAID Status" column should show "Optimal" as shown below.

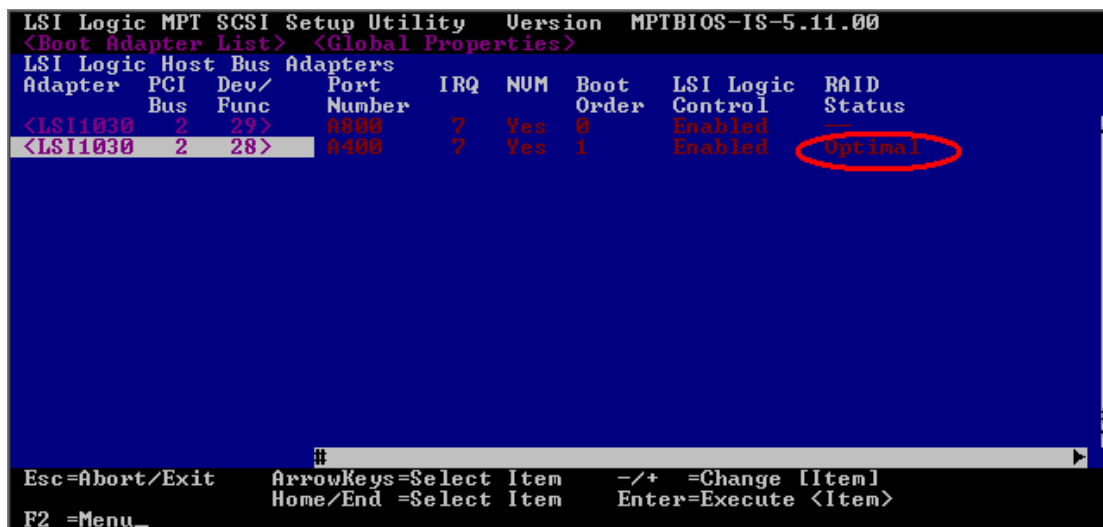


Figure 16. Integrated Striping: RAID Status Screen

11. Press <Esc> to exit the configuration utility. The system will reboot automatically to finalize the configuration.