

MAN-005500-001  
Rev. 1.0  
October 11,1996

# **CRD-5500**

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Redundant RAID  
Controller Kit

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89/336/EEC      EMC Directive

93/68/EEC      EMC Directive

On the approximation of the laws of Member States relating to Electromagnetic Compatibility.

This declaration is based upon compliance of the product to the following standards:

EN 55022, CISPR 22B      RF Emissions Control

EN 50082-1 IEC 801      Immunity to Electromagnetic Disturbances

Product Description:      RAID SCSI to SCSI Interface

Model:                      CRD-5500



Manufacturer:      CMD Technology, Inc.  
                            1 Vanderbilt  
                            Irvine, California 92718 (USA)

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# CRD-5500 Redundant RAID Controller Kit

## 1 Introduction

Two CRD-5500s may be combined to form a fault-tolerant system. If either controller detects that the other controller is not functioning properly, it automatically assumes responsibility for all system I/O activity. This switch over occurs automatically and virtually instantly. If you have two CRD-5500 controllers equipped with multiple host channels, you may designate individual host channels as either active or passive, providing a means to balance I/O activity between controllers.

## 2 Requirements

To combine two CRD-5500s as a redundant pair, both controllers must be configured as follows:

- 1 Both controllers must be equipped with the 5552 motherboard. Controllers with the 5552 motherboard will have a serial number of 5000 or higher.
- 2 Both controllers must be running the same firmware revision (B.0 or higher).
- 3 The amount of cache installed in each controller must be the same.
- 4 The amount of cache installed in SIMM slots 0A and 1A must equal the amount installed in slots 0B and 1B, as described in section 3.
- 5 The same number of SCSI I/O modules must be installed in each controller.
- 6 The type of I/O module installed in each slot on one controller must be the same as that installed in the corresponding slot on the other controller.
- 7 Each disk must be connected to the same disk channel on each unit.
- 8 Corresponding host modules on each controller must also be connected on the same SCSI host busses.
- 9 The Redundant Controller Communication (RCC) cable must be connected between the two controllers.
- 10 Each controller must have its own dedicated monitor.
- 11 Each controller should have a battery connected to it. At least one of the controllers must have a battery connected to it, to protect the cache data in the event of a power failure.

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### Note

If two CRD-5500s are connected into a redundant controller configuration, the maximum number of disk drives that can be supported (with a single host) is 48. The maximum number of disk drives on a single channel is 6, and the maximum SCSI ID for a disk drive on any drive channel is 5.

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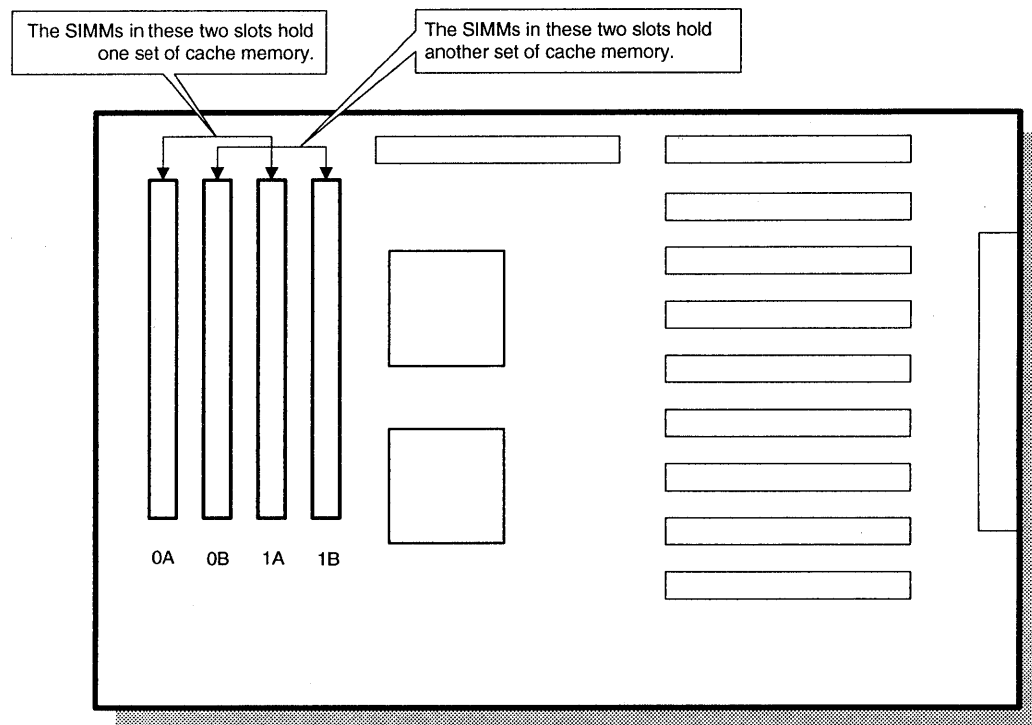
### 3 SIMM Installation

To utilize the redundant controller capability of a pair of CRD-5500s, both units must have the same amount of SIMM cache installed. Refer to the CRD-5500 User's Manual for information on purchasing SIMMs.

#### Warning

Be sure to remove all power (including battery power) to the controller before installing SIMMs. Observe all anti-ESD shop practices before you touch a SIMM.

On the 5552 motherboard, slots 0A and 1A form one set of cache memory. Slots 0B and 1B form another set. While one set is reading and writing data, the other set is "mirroring" the read/write. In the event of one CRD-5500's failure, one of the two halves of cache memory in the surviving CRD-5500 takes over the failed unit's read/write functions. Refer to Figure 1.



**Figure 1: Arrangement of SIMM slots on 5552 motherboard**

#### Note

It is not necessary for the SIMM configuration to be congruent as long as the same amount of memory is installed in each slot pair. For example: if a 64MB SIMM is in slot 0A, a 32MB SIMM is in slot 0B and a 32MB SIMM is in slot 1B, the requirements are met even though slot 1A is empty.

CMD recommends that SIMMs from the same manufacturer be used in any one CRD-5500.

If you are installing only one SIMM in a slot pair, use slot 0A or slot 0B as appropriate.

## 4 RCC Cable Connection

### Warning

Do NOT force the RCC cable connectors into the redundant controller connectors. Serious damage may result.

To function in the redundant controller mode, the two identically configured CRD-5500 controllers must be connected together with the specially provided redundant controller communication (RCC) cable. The cable must be twisted so that pin 1 on one controller matches pin 50 on the other, as shown in Figure 2.

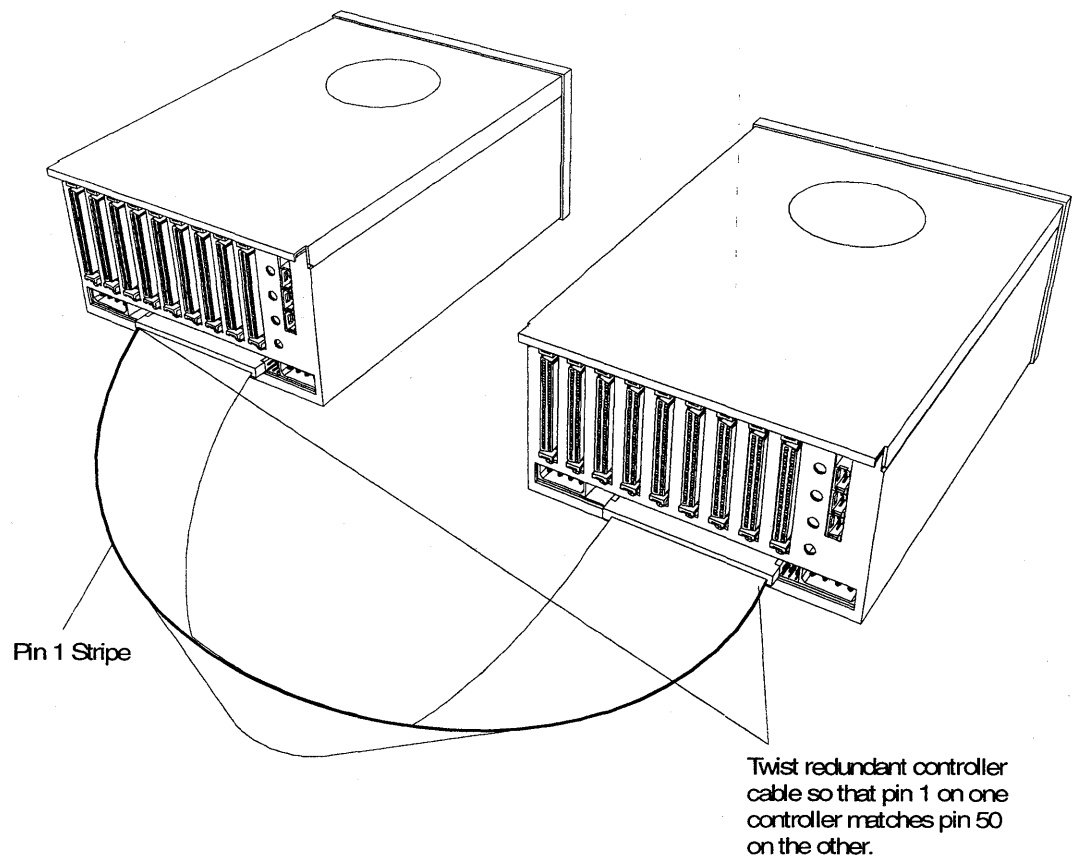
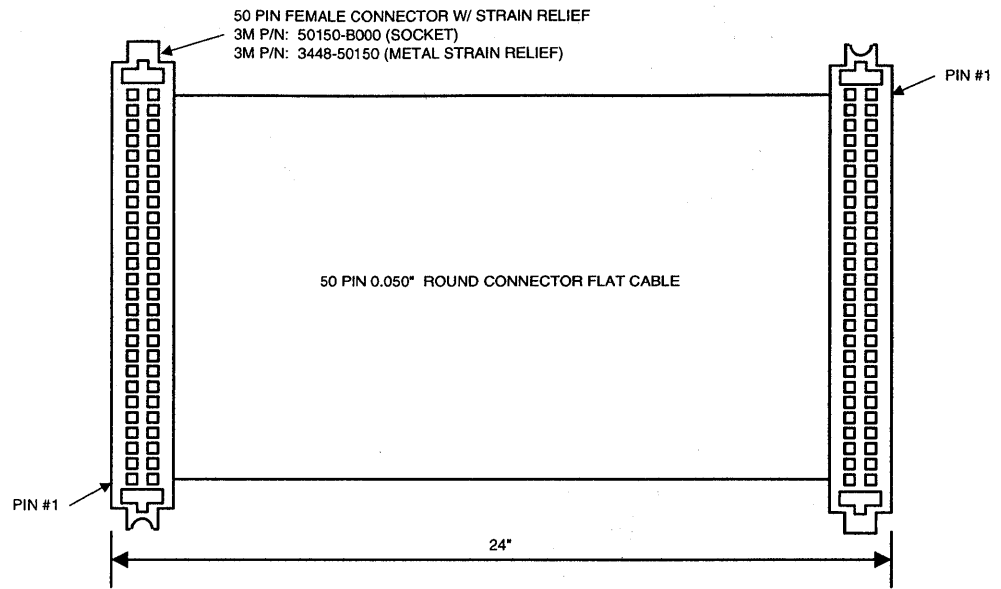


Figure 2: Redundant Controller Communication (RCC) Cable Installation

Figure 3 details assembly information for the RCC cable.



NOTE: PIN CONNECTION BETWEEN TWO SYSTEMS

|         |   |         |
|---------|---|---------|
| PIN #1  | - | PIN #50 |
| PIN #2  | - | PIN #49 |
| PIN #3  | - | PIN #48 |
| .       | - | .       |
| PIN #50 | - | PIN #1  |

CMD PART NUMBER: CBF-000024-150

Figure 3: RCC Cable Assembly Information

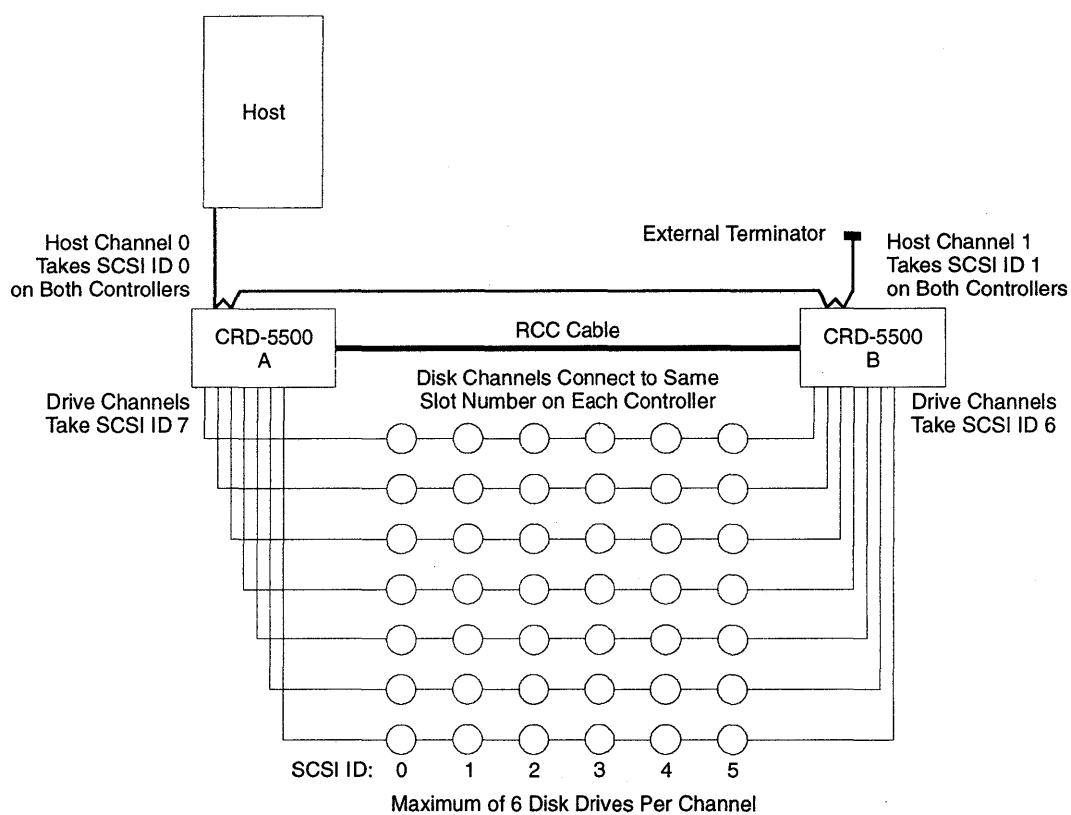


## 5 Single-Host Configuration Examples

### Note

The following examples are intended to illustrate the general principles of configuring a redundant controller system, and should not be construed to imply that they are the preferred or recommended method.

Figure 4 depicts one typical redundant controller configuration with two host channels per controller and a single host. Table 1 lists host channels, SCSI IDs and status for a typical single-host configuration.



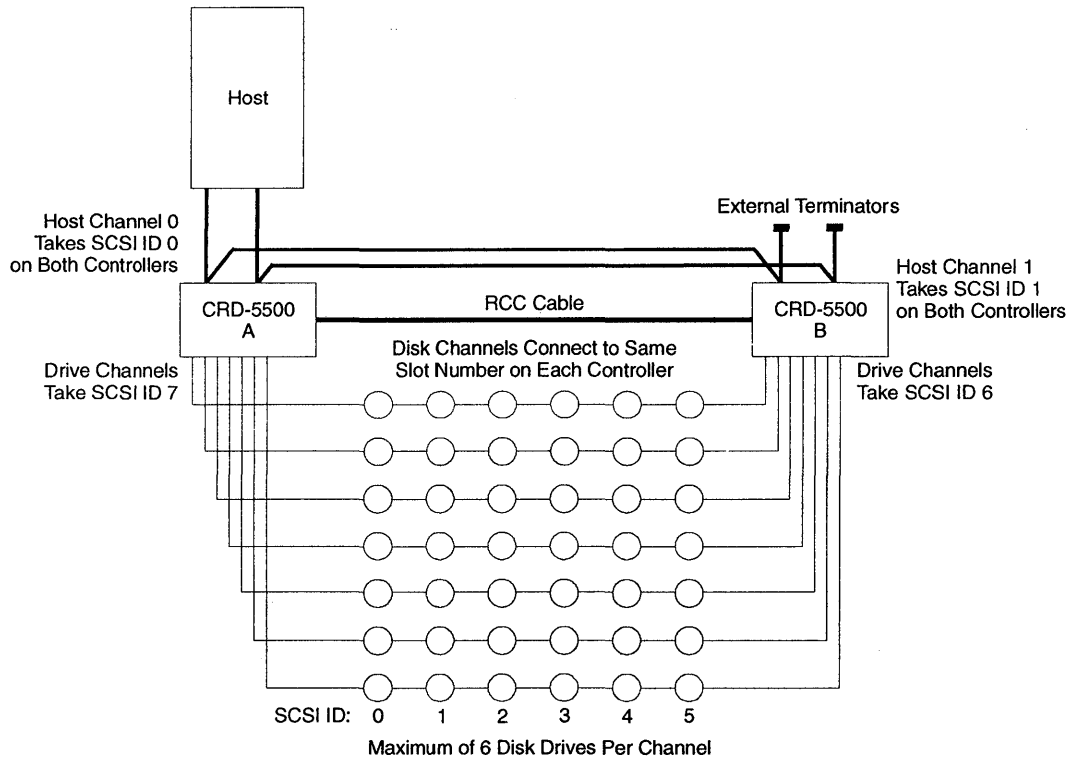
**Figure 4: Single-host cabling diagram (example 1)**

**Table 1: Example Configuration for Single-Host System**

| Controller/Host Channel | SCSI ID | Status  |
|-------------------------|---------|---------|
| A/0                     | 0       | Active  |
| A/1                     | 1       | Passive |
| B/0                     | 0       | Passive |
| B/1                     | 1       | Active  |

By using Host LUN Mapping, you may balance I/O traffic between controllers by assigning some of your RAID sets to one host channel and the remainder to the other host channel. In the above example, RAID sets mapped to host channel 0 would be handled by controller A. RAID sets mapped to host channel 1 would be handled by controller B.

Figure 5 depicts another typical redundant controller configuration. This configuration offers greater throughput than the one shown in Figure 4. Host channels, SCSI IDs and status for this configuration are the same as in Table 1.



**Figure 5: Single-host cabling diagram (example 2)**

One host SCSI bus runs to host channel 0 on controller A, then to host channel 0 on controller B. The other host SCSI bus runs to host channel 1 on controller A, then to host channel 1 on controller B. Both hosts are then terminated with external terminators (the other end of each bus is terminated at the host adapter).

## 6 Multiple-Host Configuration Examples

### Note

These examples are intended to illustrate the general principles of configuring a redundant controller system, and should not be construed to imply that they are the preferred or recommended methods. There are many ways to configure such a redundant controller system. For instance, many users will wish to run disk channel cables from one controller to the other and then to the disk drives.

In the configuration diagrammed in Figure 6, both CRD-5500 controllers have two host channels. Host computer 0 is connected to host channel 0 on both controllers, and host computer 1 is connected to host channel 1 on both controllers. By using the host channel status settings listed in Table 2, and by using host LUN mapping to map RAID sets to particular host channels, you may isolate I/O activity for host computer 0 on controller A and I/O activity for host computer 1 on controller B, while still benefiting from redundancy.

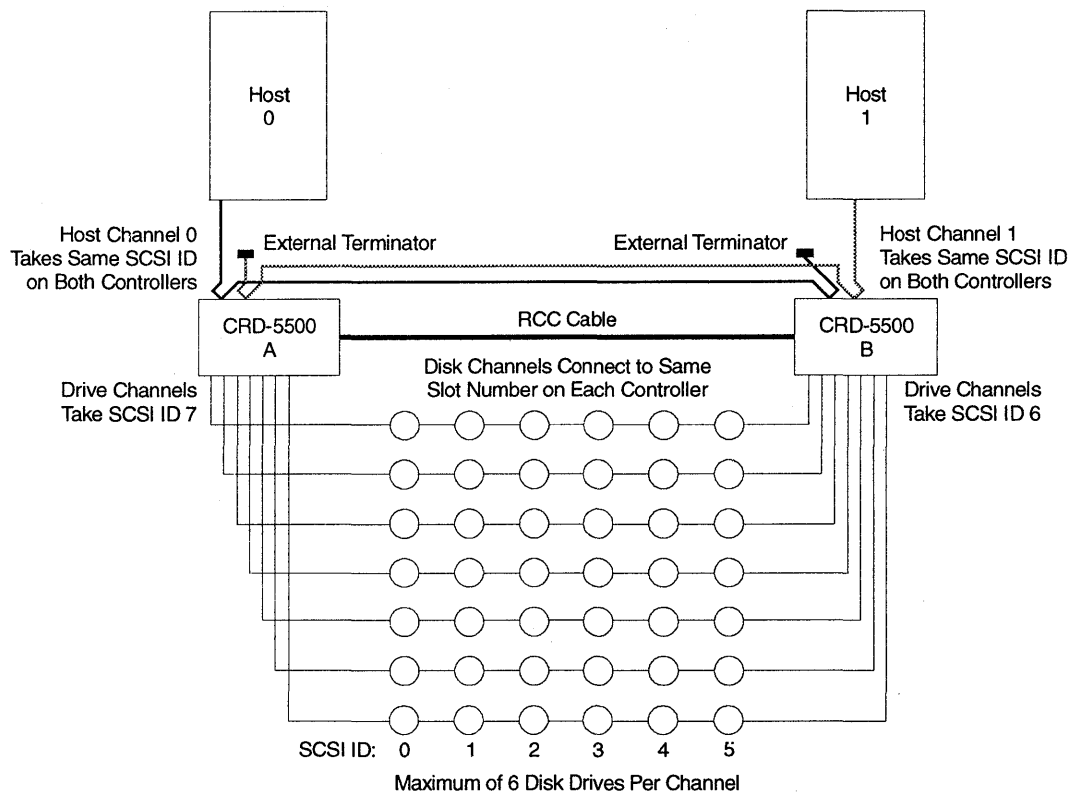


Figure 6: Multiple-host cabling diagram (example 1)

Table 2: Configuration for Multiple-Host System (example 1)

| Controller/Host Channel | SCSI ID | Status  |
|-------------------------|---------|---------|
| A/0                     | 0       | Active  |
| A/1                     | 0       | Passive |
| B/0                     | 0       | Passive |
| B/1                     | 0       | Active  |

In the configuration diagrammed in Figure 7, both CRD-5500 controllers have four host channels. Host computer 0 is connected to host channels 0 and 1 on both controllers, and host computer 1 is connected to host channels 2 and 3 on both controllers. This configuration offers greater throughput than the one shown in Figure 6. By using the host channel status settings listed in Table 3, and by using host LUN mapping to map RAID sets to particular host channels, you may isolate I/O activity for host computer 0 on controller A and I/O activity for host computer 1 on controller B, while still benefiting from redundancy.

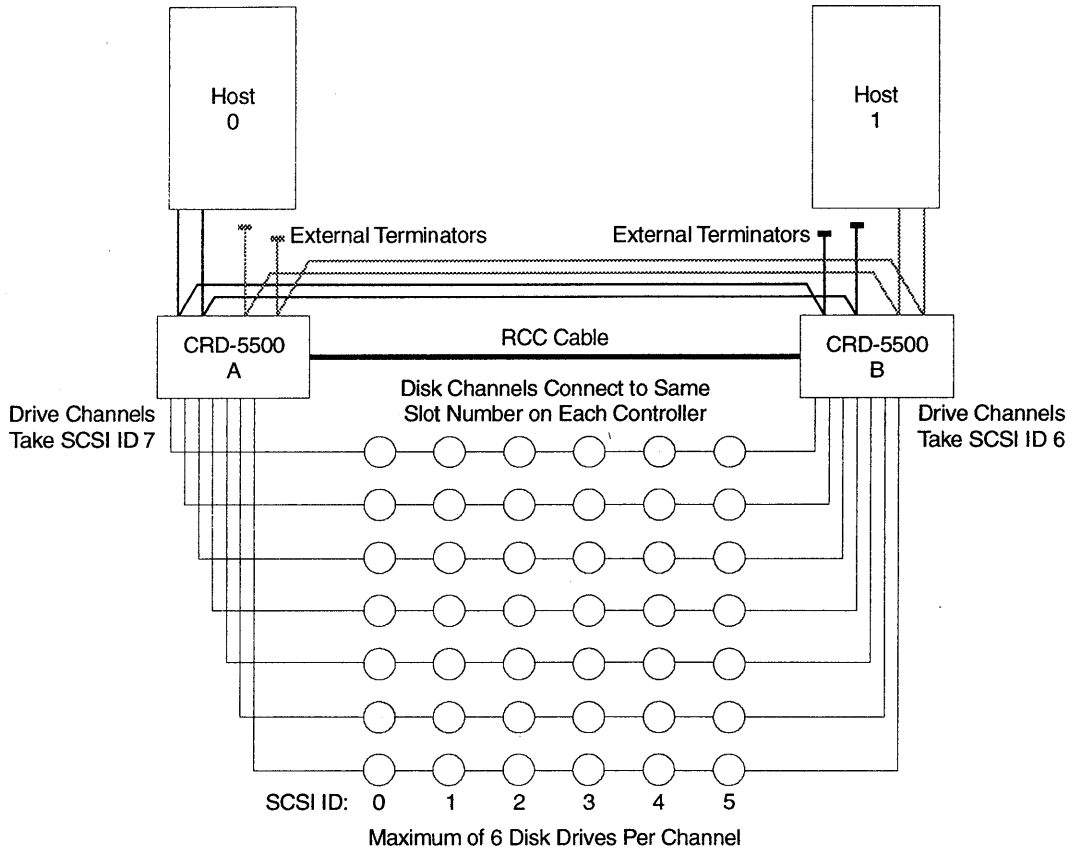
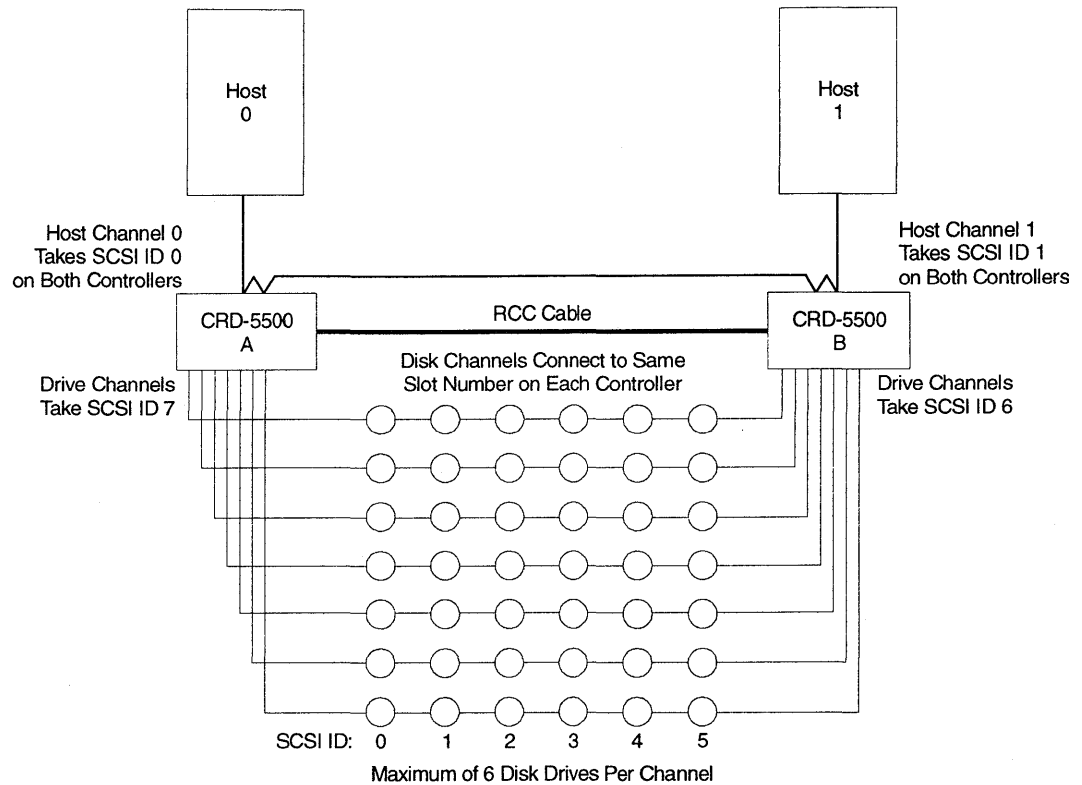


Figure 7: Multiple-host cabling diagram (example 2)

Table 3: Configuration for Multiple-Host System (example 2)

| Controller/Host Channel | SCSI ID | Status  |
|-------------------------|---------|---------|
| A/0                     | 0       | Active  |
| A/1                     | 1       | Passive |
| A/2                     | 2       | Active  |
| A/3                     | 3       | Passive |
| B/0                     | 0       | Passive |
| B/1                     | 1       | Active  |
| B/2                     | 2       | Passive |
| B/3                     | 3       | Active  |

The configuration diagrammed in Figure 8 supports a dual-ported host environment (e.g., VMS/AXP SCSI cluster, Windows NT cluster, TruCluster for DEC UNIX). It requires only one SCSI cable and one SCSI controller per host system. Host channels, SCSI IDs and status for this configuration are shown in Table 4.

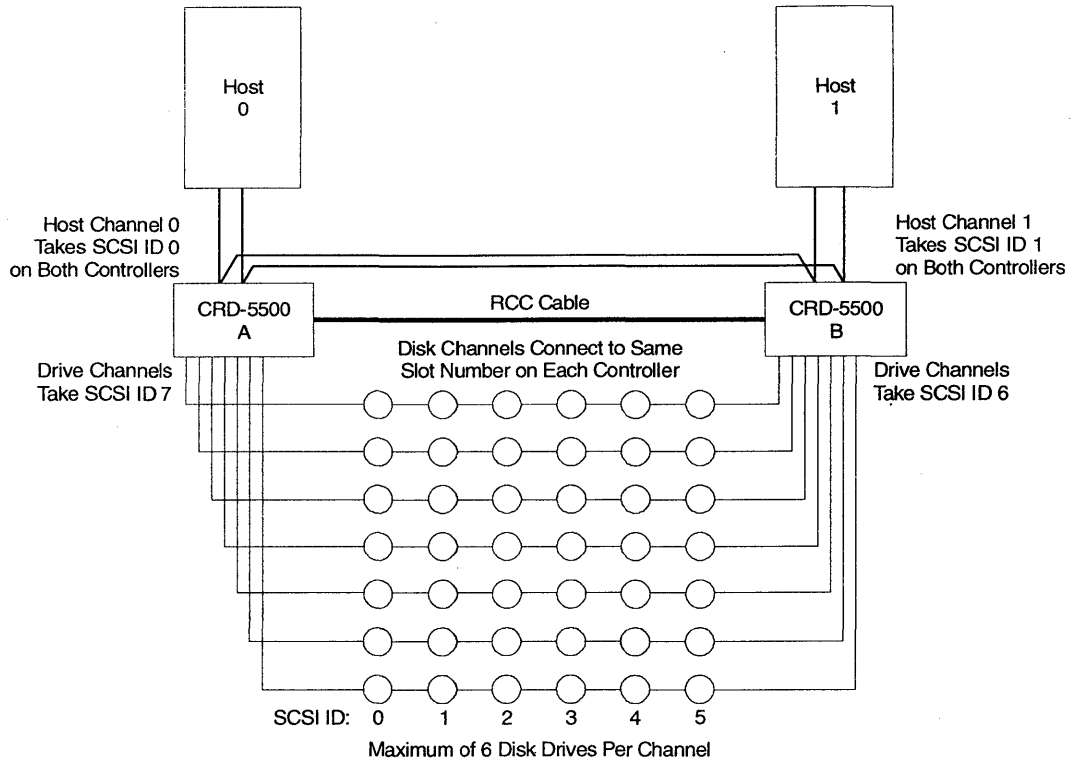


**Figure 8: Multiple-host cabling diagram (example 3)**

**Table 4: Configuration for Multiple-Host System (example 3)**

| Controller/Host Channel | SCSI ID | Status  |
|-------------------------|---------|---------|
| A/0                     | 0       | Active  |
| A/1                     | 1       | Passive |
| B/0                     | 0       | Passive |
| B/1                     | 1       | Active  |

The configuration diagrammed in Figure 9 also supports a dual-ported host environment (e.g., VMS/AXP SCSI cluster, Windows NT cluster, TruCluster for DEC UNIX). Because it uses two SCSI cables, it has greater throughput than the configuration shown in Figure 8. Host channels, SCSI IDs and status for this configuration are shown in Table 5.



**Figure 9: Multiple-host cabling diagram (example 4)**

**Table 5: Configuration for Multiple-Host System (example 4)**

| Controller/Host Channel | SCSI ID | Status  |
|-------------------------|---------|---------|
| A/0                     | 0       | Active  |
| A/1                     | 0       | Passive |
| B/0                     | 0       | Passive |
| B/1                     | 0       | Active  |

The configuration diagrammed in Figure 10 also supports a dual-hosted environment (e.g., VMS/AXP SCSI cluster, Windows NT cluster, TruCluster for DEC UNIX). Because it uses four SCSI cables, it has greater throughput than the configuration shown in Figure 9. Host channels, SCSI IDs and status for this configuration are shown in Table 6.

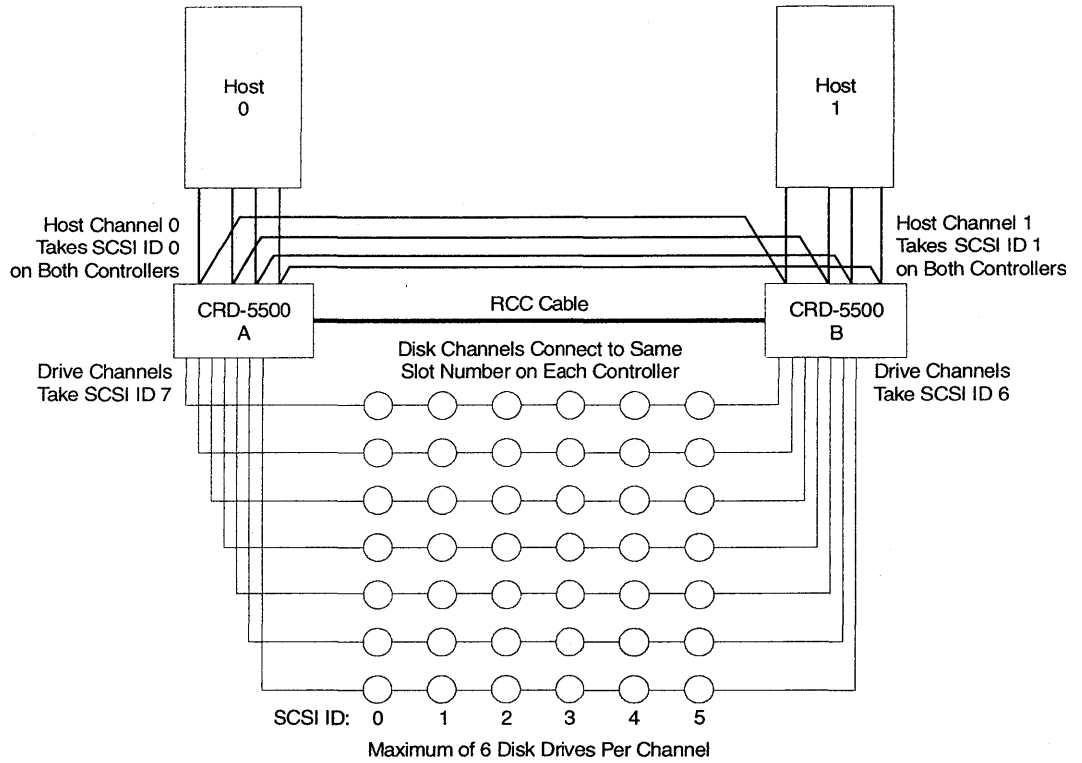


Figure 10: Multiple-host cabling diagram (example 5)

Table 6: Configuration for Multiple-Host System (example 5)

| Controller/Host Channel | SCSI ID | Status  |
|-------------------------|---------|---------|
| A/0                     | 0       | Active  |
| A/1                     | 0       | Passive |
| A/2                     | 0       | Active  |
| A/3                     | 0       | Passive |
| B/0                     | 0       | Passive |
| B/1                     | 0       | Active  |
| B/2                     | 0       | Passive |
| B/3                     | 0       | Active  |

## 7 Configuring the Redundant Controller Mode

After setting the hardware up as described above, the two controllers can be powered on. After running self test, they will automatically attempt to bind themselves into a redundant controller set. The first attempt will normally fail because various setup parameters first need to be configured.

### Note

The following screens depict a configuration example for one controller in a redundant pair. Unless otherwise directed, you must perform each step on the other controller as well.

- 1 Go to the MAIN MENU and select *Setup Parameters*.

```
Right Raid Unit Monitor Utility      07-29-96
MAIN MENU                            15:32:48
```

```

+-----+
| RAID Set Information |
| Setup Parameters    |
+-----+
| Host Parameters     |
| System Parameters  |
| Host LUN Mapping    |
| Disk Parameters     |
| Channel Settings    |
| Rdnt Ctrlr Parameters |
+-----+

```

UP ARROW: CURSOR UP | DOWN ARROW: CURSOR DOWN | ENTER: SELECT | CTRL-Z: EXIT |

- 2 Select *Rdnt Ctrlr Parameters* (Redundant Controller Parameters). The following screen will appear:

```
Right Raid Unit Monitor Utility      07-29-96
REDUNDANT CONTROLLER PARAMETERS     15:39:26
```

```

+-----+-----+
| Parameter | Value |
+-----+-----+
| Controller Name | # 1 |
| Host I/O Channel 0 | Active |
| Host I/O Channel 1 | Passive |
+-----+-----+

```

ARROW KEYS: MOVE CURSOR | ENTER: SELECT | CTRL-Z: EXIT |

- 3 Perform the following actions:
  - A** Enter a name or number for each controller. This name will be used in other screens to identify the controller. It is a good idea to select a descriptive name to help you distinguish between the controllers. Names reflecting the physical location of the controller, such as "Top," "Bottom," "Left," or "Right," may be helpful.
  - B** Set the status for each of the host I/O channels. When you restart the controllers to complete the configuration, the host channel status settings on the second controller to finish booting up will automatically be the opposite of the settings on the first controller. In other words, if the first controller boots up with host channel 0 as active and host channel 1 as passive, then the second controller will automatically set its host channel 0 as passive and host channel 1 as active.

When finished, press CTRL-Z to return to the MAIN MENU.



#### 4 Select Setup Parameters.

Right Raid Unit Monitor Utility  
MAIN MENU

07-29-96  
15:40:28

```

+-----+
| RAID Set Information |
| Setup Parameters    |
+-----+
| Host Parameters     |
| System Parameters  |
| Host LUN Mapping   |
| Disk Parameters    |
| Channel Settings   |
| Rdnt Ctrlr Parameters |
+-----+

```

UP ARROW: CURSOR UP | DOWN ARROW: CURSOR DOWN | ENTER: SELECT | CTRL-Z: EXIT |

#### 5 Select Disk Parameters.

Right Raid Unit Monitor Utility  
DISK PARAMETERS

07-29-96  
15:43:10

| Channel | Termination | Module Description  |
|---------|-------------|---------------------|
| 2       | Full        | 16-Bit Single-Ended |
| 3       | Full        | 16-Bit Single-Ended |

ARROW KEYS: MOVE CURSOR | ENTER: SELECT | CTRL-Z: EXIT |

#### 6 Select the proper SCSI termination for each disk channel.

- A** If the relevant controller is at the end of the SCSI bus, set termination to **FULL**, unless you are using external terminators on the disk channel buses.
- B** If the relevant controller is in the middle of the SCSI bus, set termination to **OFF**.
- C** If you are using 16-bit "wide" SCSI modules, you may also select **PARTIAL** termination. In which case, the module will terminate the upper 8 bits of the bus only. Use this option if you are mixing wide and narrow drives on the same bus, and the I/O module is in between a wide drive and a narrow drive.

When finished, press CTRL-Z to return to the MAIN MENU.

---

#### NOTE

The above applies only for the 5540 fast/wide single-ended module. For the 5560 fast/wide/differential module, termination cannot be selected via the utility menu (it will always show "NA") and must be supplied via an external differential terminator.

---

**7 Select Setup Parameters.**

Right Raid Unit Monitor Utility  
MAIN MENU

07-29-96  
15:44:02

```

+-----+
| RAID Set Information |
| Setup Parameters   |
+-----+
| Host Parameters    |
| System Parameters  |
| Host LUN Mapping   |
| Disk Parameters    |
| Channel Settings   |
| Rdnt Ctrlx Parameters |
+-----+

```

UP ARROW: CURSOR UP | DOWN ARROW: CURSOR DOWN | ENTER: SELECT | CTRL-Z: EXIT |

**8 Select Host Parameters.**

Right Raid Unit Monitor Utility  
HOST PARAMETERS

07-29-96  
15:51:17

| Parameter   | Channel 0 | Channel 1 |
|-------------|-----------|-----------|
| SCSI ID     | 0         | 1         |
| Tag Queuing | ON        | ON        |
| Sync. Mode  | ON        | ON        |
| Sync. Rate  | 20 MB/SEC | 20 MB/SEC |
| Bus Width   | 16 Bit    | 16 Bit    |
| Termination | FULL      | FULL      |

ARROW KEYS: MOVE CURSOR | ENTER: SELECT | CTRL-Z: EXIT |

**NOTE**

The controller will not let you configure a passive host module.

- 9** Configure each active host module as required. Each host channel configuration must dovetail with its counterpart on the other controller. When two controllers boot up and attempt to form a redundant pair, the first controller to boot up will identify its active host channels and instruct the other controller to configure its counterpart host channels to match those on the first. Similarly, when the second controller boots up, it will copy the configuration information for its active host channels to the other controller. When finished, press CTRL-Z to return to the MAIN MENU.

**10 Select Setup Parameters.**

Right Raid Unit Monitor Utility  
MAIN MENU

07-29-96  
15:44:02

```

+-----+
| RAID Set Information |
| Setup Parameters   |
+-----+
| Host Parameters    |
| System Parameters  |
| Host LUN Mapping   |
| Disk Parameters    |
| Channel Settings   |
| Rdnt Ctrlx Parameters |
+-----+

```

UP ARROW: CURSOR UP | DOWN ARROW: CURSOR DOWN | ENTER: SELECT | CTRL-Z: EXIT |

**11** Select *Host LUN Mapping*.

| Right Raid Unit Monitor Utility |                  | 07-29-96 |                  |
|---------------------------------|------------------|----------|------------------|
| HOST LUN MAPPING                |                  | 15:46:22 |                  |
| Channel 0                       |                  |          |                  |
| Host LUN                        | Redundancy Group | Host LUN | Redundancy Group |
| 0                               | 0                | 16       | -                |
| 1                               | 1                | 17       | -                |
| 2                               | 2                | 18       | -                |
| 3                               | 3                | 19       | -                |
| 4                               | -                | 20       | -                |
| 5                               | -                | 21       | -                |
| 6                               | -                | 22       | -                |
| 7                               | -                | 23       | -                |
| 8                               | -                | 24       | -                |
| 9                               | -                | 25       | -                |
| 10                              | -                | 26       | -                |
| 11                              | -                | 27       | -                |
| 12                              | -                | 28       | -                |
| 13                              | -                | 29       | -                |
| 14                              | -                | 30       | -                |
| 15                              | -                | 31       | -                |

N: NEXT CH | P: PREV CH | ENTER: SELECT | C: CLEAR | D: DEFAULT | CTRL-Z: EXIT

- 12** If you have more than one host channel in each controller, you may balance I/O activity between each controller with the Host LUN Mapping screen. Select an active host channel with the N and P keys. (The controller will not let you set LUN mapping for a passive channel.) Use the C key to clear the screen if you wish to start with a blank slate. Then, match the redundancy groups that you wish this host channel to handle to a logical unit number (LUN). This is the LUN that the host will use to address the redundancy group. A dash (-) indicates that the LUN is not mapped to any redundancy group.

When you have finished with one active host channel, switch to the other controller's Host LUN Mapping screen, select an active host channel, and assign LUNs to other redundancy groups not mapped to the other controller's active host channel or channels. For example, you might map redundancy groups 4 through 7 to LUNs 0 through 3 on host channel 1 of the second controller, as follows.

| Left Raid Unit Monitor Utility |                  | 07-29-96 |                  |
|--------------------------------|------------------|----------|------------------|
| HOST LUN MAPPING               |                  | 15:46:22 |                  |
| Channel 1                      |                  |          |                  |
| Host LUN                       | Redundancy Group | Host LUN | Redundancy Group |
| 0                              | 4                | 16       | -                |
| 1                              | 5                | 17       | -                |
| 2                              | 6                | 18       | -                |
| 3                              | 7                | 19       | -                |
| 4                              | -                | 20       | -                |
| 5                              | -                | 21       | -                |
| 6                              | -                | 22       | -                |
| 7                              | -                | 23       | -                |
| 8                              | -                | 24       | -                |
| 9                              | -                | 25       | -                |
| 10                             | -                | 26       | -                |
| 11                             | -                | 27       | -                |
| 12                             | -                | 28       | -                |
| 13                             | -                | 29       | -                |
| 14                             | -                | 30       | -                |
| 15                             | -                | 31       | -                |

N: NEXT CH | P: PREV CH | ENTER: SELECT | C: CLEAR | D: DEFAULT | CTRL-Z: EXIT

In this example, the host would access redundancy groups 0 through 3 through host channel 0 of the "Right Raid" controller and redundancy groups 4 through 7 through host channel 1 of the "Left Raid" controller.

When finished, press CTRL-Z to return to the MAIN MENU.

- 13** Restart both controllers. The two controllers should automatically bind into a redundant controller set. When this is done, enter the MAIN MENU on both monitors.

14 Select Setup Parameters.

Right Raid Unit Monitor Utility 07-29-96  
 MAIN MENU 15:47:01

```

+-----+
| RAID Set Information |
| Setup Parameters   |
+-----+
| Host Parameters    |
| System Parameters  |
| Host LUN Mapping   |
| Disk Parameters    |
| Channel Settings   |
| Rdnt Ctrlr Parameters |
+-----+
    
```

UP ARROW: CURSOR UP | DOWN ARROW: CURSOR DOWN | ENTER: SELECT | CTRL-Z: EXIT |

15 Select Rdnt Ctrlr Parameters.

Right Raid Unit Monitor Utility 07-29-96  
 REDUNDANT CONTROLLER PARAMETERS 15:47:07

```

+-----+
| Parameter          | Value |
+-----+
| Controller Name    | 1     |
| Host I/O Channel 0 | Active|
| Host I/O Channel 1 | Passive|
+-----+
    
```

ARROW KEYS: MOVE CURSOR | ENTER: SELECT | CTRL-Z: EXIT |

16 Verify the parameters on both monitors. If they are in order, press CTRL-Z to return to the MAIN MENU.

17 Select System Information.

Right Raid Unit Monitor Utility 07-29-96  
 MAIN MENU 15:47:16

```

+-----+
| RAID Set Information |
| Setup Parameters     |
| System Information   |
+-----+
| I/O Statistics       |
| Free Lists Statistics |
| Manufacturing Information |
| Environmental Status |
| I/O Process Information |
| Rdnt Ctrlr Information |
+-----+
    
```

UP ARROW: CURSOR UP | DOWN ARROW: CURSOR DOWN | ENTER: SELECT | CTRL-Z: EXIT |

18 Select Rdnt Ctrlr Information.

Right Raid Unit Monitor Utility 07-29-96  
 REDUNDANT CONTROLLER INFORMATION 15:48:20

|                         |  |                            |
|-------------------------|--|----------------------------|
| Controller Name         | LEFT   | RIGHT                      |
| Disk Channel ID         | 6  | 7                          |
| Host I/O Channel        | 1  | 0                          |
| Active RAID Set Numbers | 4 5 6 7  | 0 1 2 3                    |
| Last Msg Sent           | Heartbeat Count: 45 (Ch 1)                     | Heartbeat Count: 45 (Ch 1) |
| Status                  | Bind Successfully Completed: 07-29-96 15:26:00 |                            |

CTRL-Z: EXIT |

19 Verify the following:

- A The STATUS indicates that the bind was successfully completed.
- B The disk channel IDs and host I/O channels are separate and distinct for each controller.
- C Active RAID set numbers are not duplicated between the two controllers.
- D Heartbeat messages are being sent and received between the two controllers.

This concludes the configuration procedure for redundant controller mode operation.

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## 8 Restart After Switchover

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### NOTE

To avoid disrupting SCSI bus activity when replacing a failed CRD-5500 unit in a redundant controller configuration, both units **MUST** use external termination for both the host and disk channels.

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- 1 Pause or stop all host I/O activity to the CRD-5500 redundant controller subsystem.
  - 2 Shut down the surviving CRD-5500 controller (either from the main menu or the front panel). This is especially important, to ensure that data in the cache is written to disk. **IF THIS STEP IS NOT PERFORMED AND THE BATTERY IS REMOVED, ALL DATA IN THE CACHE WILL BE LOST.**
  - 3 Power off both CRD-5500 controllers.
  - 4 Remove battery power to both CRD-5500 controllers. Ensure that enough time is allowed for the cache memory to fully discharge before continuing.

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### NOTE

If a failed CRD-5500 is only being "power-cycled", perform steps 1 through 4. Then skip to steps 10 through 14.

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- 5 Swap the failed CRD-5500 with another identical controller. The unit being swapped in must be configured in exactly the same way (same number and type of host and disk channel modules, same amount of cache memory etc.).
  - 6 Re-establish the system: reconnect terminations, battery power connections, SCSI cables and the RCC cable.
  - 7 Power on both CRD-5500 controllers.
  - 8 Reconfigure all controller parameters on the replacement unit for each sub-menu choice under *Setup Parameters* (i.e., *Host Parameters*, *System Parameters*, *Host LUN Mapping*, *Disk Parameters*, *Channel Settings and Redundant Controller Parameters*).
  - 9 Shut down both CRD-5500 controllers (either from the main menu or the front panel).
  - 10 Power cycle both CRD-5500 controllers.
  - 11 Go to the *RAID Set Information* screen. Verify that all RAID sets are visible.

- 12 Verify that all controller parameters are correct on both units by checking each sub-menu choice under *Setup Parameters* (i.e., *Host Parameters*, *System Parameters*, *Host LUN Mapping*, *Disk Parameters*, *Channel Settings* and *Redundant Controller Parameters*).
- 13 Go to the *Redundant Controller Information* screen. Verify that the two CRD-5500 controllers have successfully bound. Ensure that all RAID sets are active on the host channels of the correct controller (in accordance with the *Host LUN Mapping* and *Redundant Controller Parameters* settings on both controllers).
- 14 Resume host I/O activity to the CRD-5500 redundant controller subsystem.

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