DataDirect Networks

EF2000 FC RAID System

Installation Procedures

for Creo

Rev. A

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About this Manual

This manual details the EF2000 FC RAID System installation and configuration procedures for Creo installations.

The features and functions of the EF2000 system are fully documented in the *DataDirect Networks EF2000 Fibre Channel RAID System User Guide* and the *EF2000 Distributed Array Manager User Guide*.

This manual is structured as follows:

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1 List of Products

1. List of configurations:
   - Configuration 1:
     EF2000 with single controller (128MB cache) and
     8 × 36GB drive modules
     Creo PN: 501R49756
   - Configuration 2:
     EF2000 with single controller (128MB cache) and
     12 × 36GB drive modules
     Creo PN: 501R49757
   - Configuration 3:
     EF2000 with single controller (128MB cache) and
     8 × 73GB drive modules
     Creo PN: 501R49758
   - Configuration 4:
     EF2000 with single controller (128MB cache) and
     12 × 73GB drive modules
     Creo PN: 501R49759

2. Additional Items
   - 36GB disk drive module (Creo PN: 501R49751)
   - 73GB disk drive module (Creo PN: 501R49703)
   - Optical Conversion Kit, 30 meters (Creo PN: 501R49597)
   - Optical Conversion Kit, 100 meters (Creo PN: 501R49598)

2 Product Contents and Specifications

The EF2000 FC RAID systems for Creo contain the following:

1. EF2000 chassis with:
   - single controller
   - two power supply/cooling modules with power cords
   - two I/O modules
   - one ESI/Ops panel module with service keys
   - blank slot covers
   - drive modules - all drive modules currently contain 36GB or 73GB drives, labeled by slot number
2. Accessories:
   - DB9-to-DB9 Fibre Channel copper cables (for host connection)
   - Creo EF2000 CD-ROM
   - this Creo EF2000 Installation Manual
   - DataDirect Networks EF2000 FC RAID System User Guide
   - DataDirect Networks EF2000 Distributed Array Manager User Guide
3. Fibre Channel Host Bus Adapter (FC HBA)
4. Optical conversion kit, 30m or 100m, as an option

3 Installation Procedure

(assuming factory pre-formatting)

3.1 Unpacking and Identifying Sets of Products

1. Unpack the EF2000 carton. Check for any physical damage that may have occurred during shipment.

2. At the back of the unit, locate the serial number. The last four digits of the serial number are important—this will be used to identify matching drive modules that have been pre-formatted for this EF2000 system.

   Each power supply has its own built-in AC-DC power converter which accepts 110V and 230V AC inputs. The power supplies are fully interchangeable.

3. The drive modules are already installed in the EF2000.

   Each drive module has a pre-format identification number. This number shows the label number of the matching EF2000 unit along with the drive position.

   For a drive with a label of "06G8-1/3" indicates that the drive should be used in the EF2000 with a serial number ends in "06G8" and that it should be installed in slot 1/3 (see further information given in Section 3.4).

3.2 Installing HBA in Host Computer

1. Unpack the Fibre Channel HBA.

2. Shutdown the Creo host computer on which the FC HBA will be installed.

3. Install the FC HBA into the Creo host computer.

Note : ***For Brisque configurations based on pSeries 620 6F1, only Cambex PC1000 FC HBA is supported. For all other configurations, both Emulex LP8000 and Cambex PC1000 FC HBA's are supported. Currently, EF2000 RAID is shipped with Cambex PC1000 FC HBA only. Please refer Brisque and BrisqueServe PSP's to find out the slot assignment for FC HBA.***

4. Power on the Creo host computer.

3.3 Installing HBA Driver and DDN DAM on Host Computer

The Distributed Array Manager (DAM) program is included on the Creo EF2000 CD-ROM.

3.3.1 Automatic Installation using Scismit

The installation procedure is intended for Brisque/BrisqueServe V.4* only.

1. Login as root. Insert the Creo EF2000 CD-ROM.
2. Run "**scismit**". Then select "**Software Handling**" from the menu.
3. Select "**Update Software Packages**" and press <F4>.
4. From the "**Update List**", select:
   "**Upd_UpdInstall**"
   "**Upd_Brisque_Fiber**"
   and press <Enter> twice.
5. You will be prompted to confirm selection. Press <Enter> to continue.
6. The "**OK**" message appears when installation is complete. Press <F10> to exit.

Note : On some Brisque station with old version the installation will fail the first time, you should run the installation again.

3.3.2 Manual Installation using Installation Script

This installation procedure is intended for all other configuration that cannot use automatic installation described in Section 3.3.1.

1. Login as root. Insert the Creo EF2000 CD-ROM.
2. Type: **mount -r -v cdrfs /dev/cd0 /mnt**<Enter>
3. Type: **cd /mnt/**<Enter>
4. Type: **./Install.sh**<Enter>

5. The following messages appear:

```
"Install.sh is running."
"This script will install the device drivers for FC HBA and FC
attached storage. Please wait, the script is analyzing the system
configuration."
```

The analyzing process can take a few minutes.

6. Then the following message appears:

```
"EF2000 family RAID products require the DDN DAM management software.
Would you like to install the DDN DAM software now? (y/n)"
```

Type: **y**<Enter>

7. The following messages appear:

```
"The installation is completed."
"For more information see FC_Dev_Install.log."
"The system reboot is required."
"Please reboot the system."
```

8. See the "FC_Dev_Install.log" file to check the installation log.

9. Shutdown the Creo host computer.
Type: **shutdown -F**<Enter>

Note : ***After this installation (both automatic and manual) the DDN DAM management software will be launched automatically. You can disable this option by running:*** **rmitab "ddndam" <Enter>.**

3.4 Checking Setup on EF2000

1. Verify that the two power supplies, ESI/Ops panel module, RAID controller, two I/O modules, and two blank modules are installed in the back on the EF2000 (Figure 1).

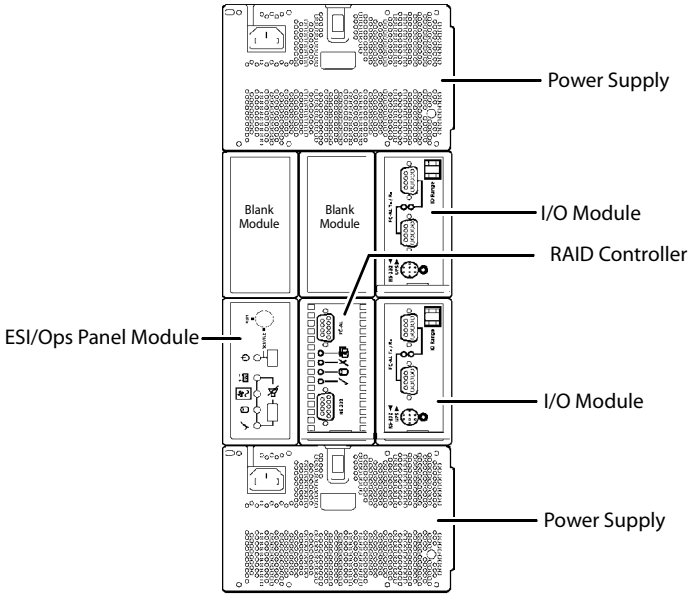


Figure 1. Module Locations on Rear Panel

2. Check that the ID Range switches are set to "0" on both I/O modules (Figure 2).

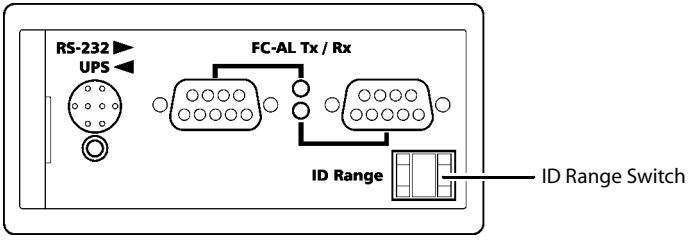
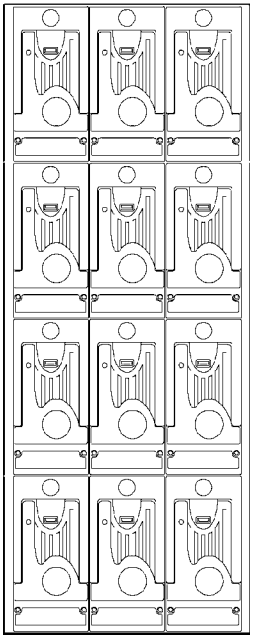


Figure 2. ID Switch on EF2000 I/O Module

3. The drive modules are already installed in the system. You may want to check that the drives are in the correct slots.

Here is an example assuming the system's serial number ends in "06G8". The following chart shows which pre-format label would be correct for the slot when viewing from front of the system. ***Note that this example shows configuration for a fully populated system. Empty drive slots will be occupied by slot covers if you are using fewer drives***.



06G8-1/3	06G8-1/2	06G8-1/1
06G8-2/3	06G8-2/2	06G8-2/1
06G8-3/3	06G8-3/2	06G8-3/1
06G8-4/3	06G8-4/2	06G8-4/1

Follow these steps to remove a drive module:

- Ensure the anti-tamper lock is disengaged (indicator shows black) on the front of the module (Figure 3). If the indicator shows red, insert the lock key provided into the socket and turn 90° in a clockwise direction or until the indicator shows black.

Warning ! The lock can be easily broken. Rotate the key gently.

- Press on the small indentation area to release the latching handle.
- Then slide the module out of the bay.

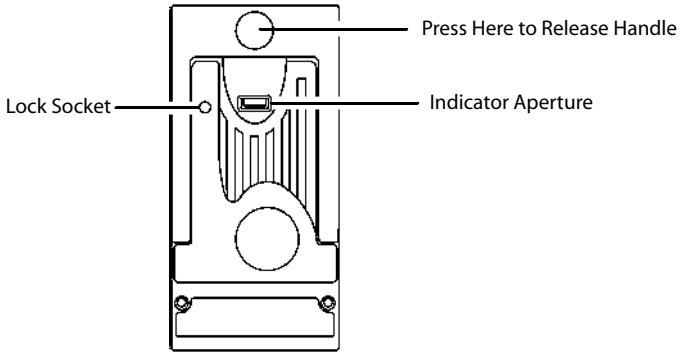


Figure 3. Front of Drive Module

3.5 Connecting to the Creo Host Computer

1. Locate the Fibre Channel cable in the accessory kit.

2. Connect the cable between the FC-AL connector on the EF2000 RAID controller and the FC HBA on the host computer (Figure 4).

3.6 Powering Up the System

1. Connect the two EF2000 power supplies to your AC power source using the power cords provided.

2. Using the keys provided, set the Run/Service keyswitch on the Ops Panel to the RUN position (Figure 5). ***Note that the Service mode should only be used when there is a power problem***.

3. The Power Supply/Cooling LED on the Ops Panel should change to green when the system power is activated.

4. Verify that all LEDs on the Ops panel are green, indicating that the system is functioning correctly.

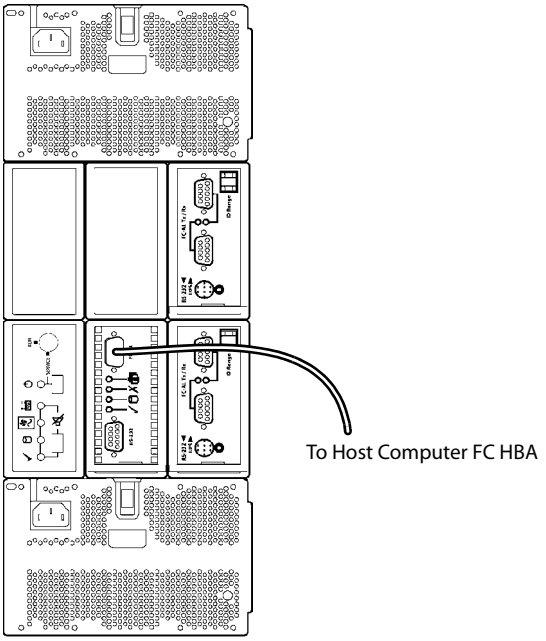


Figure 4. Connecting EF2000 to Host Computer

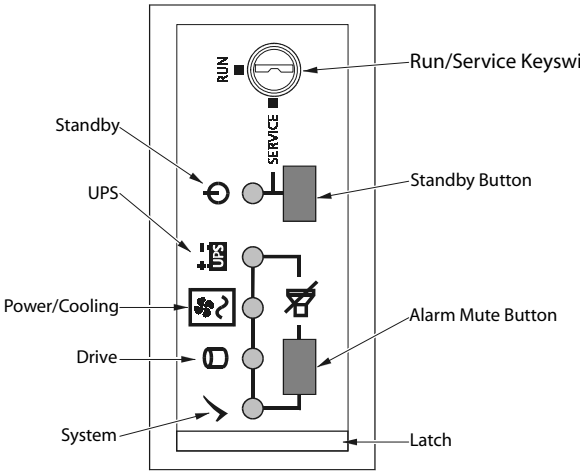


Figure 5. Ops Panel on EF2000

5. The drive modules are spun up automatically. The Status LED on the front of the drive module turns green when the drive is ready (Figure 6).

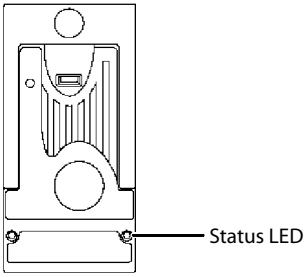


Figure 6. Status LED on Drive Module

6. When all the drives are ready, turn on the host computer. Upon boot up, check that the DAM program is started and the URL node for DAM service routine is displayed (Figure 7).

   If the DAM program is not started automatically, launch it by typing: **#/opt/dam/run_dam**.

```
DDN Distributed Array Manager, Release 1.2.5
Array configurator service started.
Set your browser to URL: http://<hostname>:2002/
```

Figure 7. URL Node for DAM Service Routine

3.7 Checking the Array Configuration for Proper Operation

The EF2000 systems will have been pre-formatted at the factory. During installation, it is necessary to check that the parameters are properly setup, via DAM.

3.7.1 DAM Start Up Screen

1. Verify the Ethernet connection on the host computer.
2. Set the browser to "http://<IP address of host computer>:2002".

   DDN DAM software uses port number 2002 as a default. You can check the actual port number by typing: **`# more /opt/dam/run_dam.log`**

   ```
   "DDN Distributed Array Manager, Release 1.2.5 [AIX binary] bind
   socket: Address already in use Array configurator service started.
   Set your browser to URL: http://<hostname>:2004"
   ```

3. When DAM is first started, you are prompted for the username and password (Figure 8).

   The factory-configured username is "admin" and password is "creo". Type in the username and password and click the **Accept** button.

   The Main Menu appears. (Please refer to the *DDN EF2000 FC RAID System User Guide* for information on how to change usernames and passwords.)

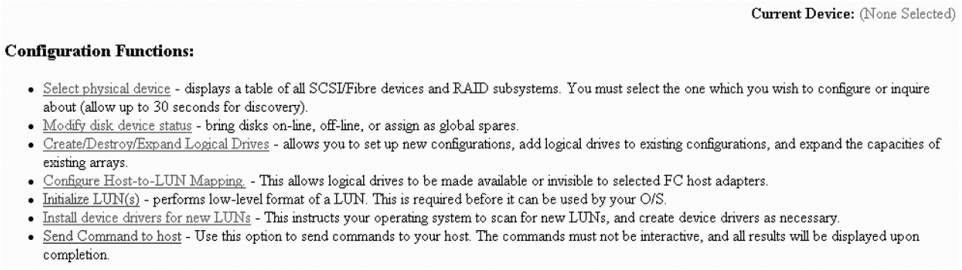


Figure 8. DAM Start Up Screen

3.7.2 Select a Physical Device (RAID Controller)

Before you start, you must select a RAID controller that you wish to configure or inquire about.

1. At the Main Menu, click **Select physical device** under Configuration Functions.



2. Then verify that the EF2000 controller can be seen (similar to Figure 9). The "Controller/Slot" column shows the model of controller, followed by the slot number in the EF2000 in parenthesis.

Select	Physical device path	Channel	ID	LUN	Type	Vendor ID (SCSI Inquiry)	Product ID (SCSI Inquiry)	Controller(Slot#) Address	Partner Controller(Slot#) Address
◉	/hw/scsi/sc3d110	3	1145394722	0	RAID	MYLEX	DACARMRB 10002B3	DAC960FFx (0) 20-00-00-80-E5-11-49-45	None

Select Reset Screen

Figure 9. Select Physical Device Screen

3. Click the radio button to select the controller and click **Select** to continue. Note that the currently selected device (DAC960FFx-based RAID Controller) is now displayed at the top right corner of the Configuration Functions menu.

3.7.3 Controller Settings

1. At the Main Menu, select **View/Modify RAID controller configuration** under Administrative Functions.

2. Verify that the controller settings are the same as shown in Figures 10, 11, 12, and 13. Then click **Cancel** at bottom of screen to return to Main Menu.

   If not, make changes accordingly and click **Apply** at bottom of screen to save the new settings. A controller reset may be required for the changes to take effect, if this is the case, select **Reset Controller(s)** under the Administrative Functions menu.

Current	Value	Category	Description
☑	**Auto Rebuild Management**	**On-the-fly**	If enabled, it detects the replacement of a failed drive and performs an automatic rebuild once it has spun up, provided it is installed into a redundant array (`RAID 1, RAID 3, RAID 5, RAID 0+1`). If this feature is disabled, the administrator must issue the rebuild command manually through this configurator.
☑	**Operational Fault Management**	**Reset**	Allows the controller to take autonomous actions when a failure occurs. This monitors and reports drive failures, background activity completion status, enclosure events, etc. This should remain enabled during normal controller operation. ***(This is also known as SES, or SCSI Enclosure Services)***
☐	**Auto Failback**	**Reset**	Allows the surviving controller to automatically sense and place an inserted replacement controller back in service.
☑	**Read Ahead**	**Reset**	The controller extends commands to the corresponding *stripe unit* size. The controller reads data from disk in chunks of one stripe-unit size. Given an 8KB stripe size, a 2KB read, for example, results in 8KB read being issued to the drive. The remaining 6KB of data stays in the cache.
☐	**Super Read Ahead**	**Reset**	The controller extends the read-ahead algorithm by always reading an extra cache line on a read request, and reading a further cache line when a cache hit occurs on a pre-fetched cache line. This is primarily useful for applications with a high degree of sequential access.
☐	**Reassign limited to 1 sector**	**Reset**	If enabled, reassigns will be restricted to only one block, the failing block. If this is disabled all reassigns will be for the entire current I/O, some possibly large number of blocks, not all of them failing. The single block reassign is further limited to recovered errors and medium errors.
☐	**True Verify**	**Reset**	When enabled, and if the host enables verify on an I/O operation, and data is transferred, a true verify with data comparison is performed. When disabled, no data comparison is made.
☐	**Disk Write Through Verify**	**Reset**	During error handling, this turns on Force Unit Access for reads and writes.

Figure 10. EF2000 Controller Settings (1)

50	**Rebuild/Check Consistancy Rate Default**	**On-the-fly**	This value times 2 approximates the percentage of available rebuild cycles to be used when rebuilding a RAID group, or checking consistancy. CPU utilization is always shared with data traffic. Range 0-50. Therefore, a value of 50 devotes the maximum allowable resources to a drive rebuild or expansion, allowing it to proceed at its fastest. A lower number provides more resources to service other IOs. ***If you wish to monitor the rebuild status through the configurator, set this value no higher than 45.***
244	**Disk Queue Limit**	**Reset**	Sets the maximum allowed queue depth for tagged commands to all attached disk drives. This value is further limited to the disk drives own tag limit, when that limit is reached. A setting of one is similar to no tags. If using device combing (Queuing- Coalescing Optimization), set the queue tag limit to 2. Do not change this value unless specifically directed to do so. Range is (1-255).
☑	**Queuing - Coalescing Optimization**	**On-the-fly**	If enabled, this will join the data from adjacent I/Os into a single I/O to improve performance.
☐	**Enable On queue full give BUSY**	**Reset**	Any time a command is received and the controller detects a queue full condition, it will normally return Queue Full status. If enabled, a queue full status will return a **BUSY** status, if disabled, it will return **QUEUE FULL**. This is intended to help hosts confused by QUEUE FULL.
☑	**Failover Node Name Retention**	**Reset**	If enabled, each controller shares its node name with its partner controller and those names are used through all phases of failover and failback. If disabled, each controller still shares its node name with its partner controller, and those names are still used through all phases of a failover, **BUT** when a failback occurs the replacement controller uses its own node name. Not having this feature enabled will have serious ramifications if the controllers are connected to a host that uses node names to locate the LUNs.
☐	**SAF-TE Data for UPS Support**	**On-the-fly**	If checked, then ups monitoring is disabled.
☑	**Disable Check Condition for Invalid LUN**	**Reset**	If checked, the inquiry command will return data with the peripheral qualifier field set to 1 or 0x20 for the byte meaning peripheral not connected. If clear, the inquiry will fail with check condition of illegal request (sense=5/25/00).
☐	**Disable Pause when Not Ready**	**Reset**	Normally, when controller is starting up, certain commands encounter a brief pause. If this field is checked, the pause is disabled, otherwise, it is enabled.

Figure 11. EF2000 Controller Settings (2)

☐	**Disable BUSY status on failback**	**Reset**	During failback, the survivor controller normally returns BUSY to new commands received from the host during the cache flush operation. If checked, requests are ignored. If unchecked, BUSY status is returned. This feature is intended to help hosts that are confused by a BUSY.
☑	**Enable DEBUG Port**	**Reset**	If checked, then debug output will go to the serial port. This is for Engineering and Diagnostic purposes only, and will result in a performance loss if enabled. If not checked, then the port will be in SLP (no jumper) or VT100 mode (jumper - Standard Mode).
☐	**Enable Vendor Unique TUR**	**Reset**	If checked, a Test Unit Ready command sent from the host to an off-line LUN will return a hard error status (4/00/00). If clear, then it will return a not ready status (2/04/03).
19200	**Serial Port BAUD Rate**	**Reset**	The baud rate of the serial port when in VT100 or Debug modes.
☑	**Force Simplex Mode**	**Reset**	This is provided to allow duplex firmware to serve in a simplex environment, and makes duplex firmware skip some of the active-active operations. If you check this field in a duplex environment, then one of the controllers will go into reset.
☐	**Conservative Cache Mode**	**On-the-fly**	This provides an extra degree of data safety when operating in failed over condition. This turns off write cache while the failed over condition persists. Checking this field enables conservative cache mode.
☐	**Simplex Disable Reset**	**Reset**	For simplex-only. If checked, prevents a controller from asserting the reset signal to the partner controller.
2048 Bytes	**Fibre Channel Frame Control**	**Reset**	Provided to allow adjustment of the FC chip's frame size. Unless you are almost always doing very small block I/O, then you would want this set to **2048**.
512 Bytes	**PCI Latency Control**	**Reset**	Provided to allow adjustment of the FC chip's use of the internal bus. It controls the amount of data each FC processor chip can burst across the primary bus before relinquishing bus ownership to the next device. This takes effect only when all internal FC bus ports are active and arbitrating. Ordinarily you should leave this set to the factory default value of **512**. If you are in a high throughput environment, then you *may* see a slight performance advantage if you change the value to **2048**.
☐	**Enable Hard Loop IDs**	**Reset**	This allows you to force the hard loop ID's for every controller and port. The fields below are used to assign them. Do not enable this feature unless you set appropriate values for your controllers. Changes will not go into effect until you issue a reset or recyle power to the array.

Figure 12. EF2000 Controller Settings (3)

Ctrl0 Port0 [0] Ctrl1 Port0 [3]	**Hard Loop IDs for each controller and port**	**Reset**	Allows option of using the same loop IDs all the time. Some fibre HBAs require non-default settings here. Contact your supplier for details. The valid range is 0-125 (0 - 0x7d). Enter a decimal number. ***Do not adjust these numbers unless instructed to do so by your vendor's technical support team.***
☑	**Debug Dump**	**On-the-fly**	If the controller fails, and this feature is enabled, then it will dump detailed diagnostic information into a reserved area of disk which can be sent to engineering for failure analysis.*This should always be enabled.*
DISABLED	**ROF Rearm Interval**	**On-the-fly**	This reboot on failure rearm interval specifies how long the controller must stay up before the auto-reboot feature will be enabled.
0	**ROF Reboot Count**	**On-the-fly**	# of times the controller will be rebooted when a controller failure occurs within the rearm interval above. If this count is exceeded in the rearm interval, no more reboots on failure will occur. To disable the ROF, set this field to 0 and the rearm interval above to something other than **DISABLED**.
☑	**Enable Background Init**	**On-the-fly**	If enabled, you will then be allowed to perform background LUN initializations. This means that once you initiate a background init, then you will immediately be able to use the LUN for whatever I/O you wish to perform. The RAID engine will concurrently process application I/Os while initializing unused space. *Please do not change this value unless instructed to do so by your supplier.*
☑	**Smart Large Host Transfers**	**On-the-fly**	If checked, large transfers will coalesce into fewer I/Os, which means fewer disconnects on large transfers. This only takes effect for transfers larger than the stripe size. If enabled, you will have a slightly higher throughput, at a possible cost of some IOPs.
Automatic	**Spin-Up Settings**	**On-the-fly**	[2] # of Devices to spin up at a time. Ignored for "On Power" mode. [6] # of seconds to delay. For "Automatic", time between disk spin-up cycles. For "On Power", time before issuing start-up commands. For "On Command", time between disk spin-up cycles. [0] # of seconds between subsequent spin-ups. Only applicable to "On Power"

Notes:

1. Settings characterized as **Reset** require that the controllers be reset before the new settings are invoked.
2. Settings characterized as **On-the-fly** may be made at any time, and will become effective immediately.
3. Settings characterized as **New Config** must be made during initial configuration, before any LUNs are created. **They will result in data loss of existing RAID groups.**

Apply | Cancel | Reset Screen

Figure 13. EF2000 Controller Settings (4)

3.7.4 Physical Disk Status

1. At the Main Menu, select **Display physical subsystem information** under Reporting Functions.

2. The "Modify Disk Device Status" screen is displayed. Note that for tower configuration, rotate the chart by 90° clockwise.

   For 12-drive configuration, check that all the slots are occupied (similar to Figure 14)—the drive in slot 4/3 (CH=1, ID=114) is a hot spare (yellow) with no LUN defined, and the other 11 drives are on-line (green) with LUNs 0 and 1 defined.

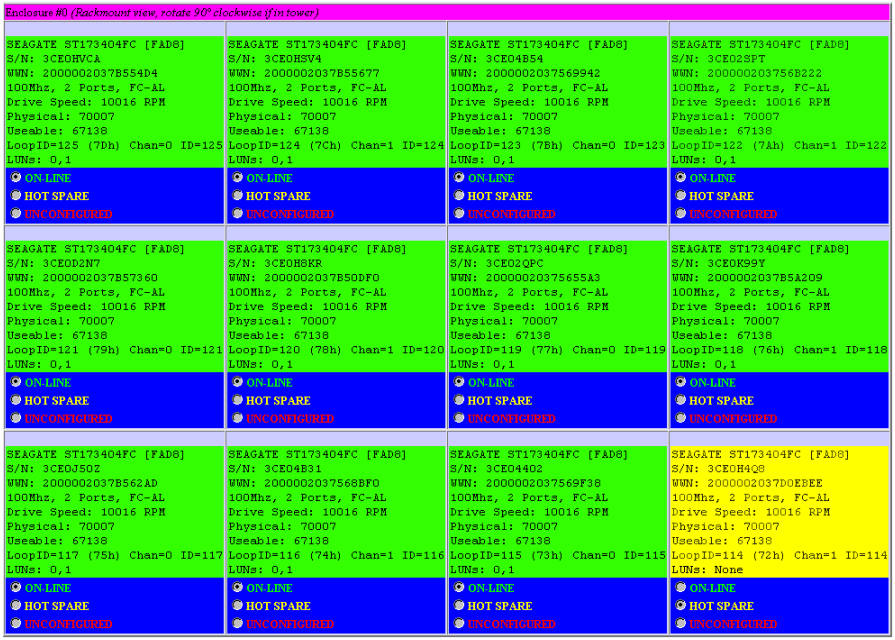


Figure 14. Example of Physical Disk Status Screen for 12 Drives

For 8-drive configuration, check that the bottom 8 slots are occupied (similar to Figure 15)—the drive in slot 4/3 (CH=1, ID=114) is a hot spare (yellow)with no LUN defined, and the other 7 drives are on-line (green) with LUNs 0 and 1 defined.

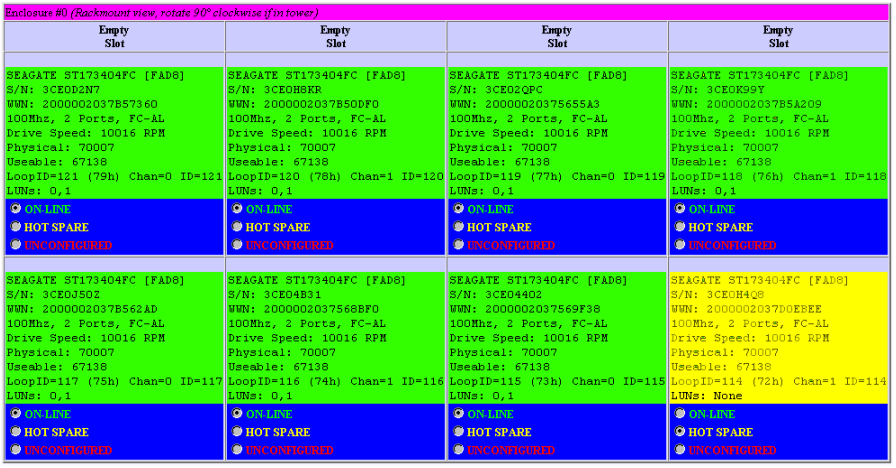


Figure 15. Example of Physical Disk Status Screen for 8 Drives

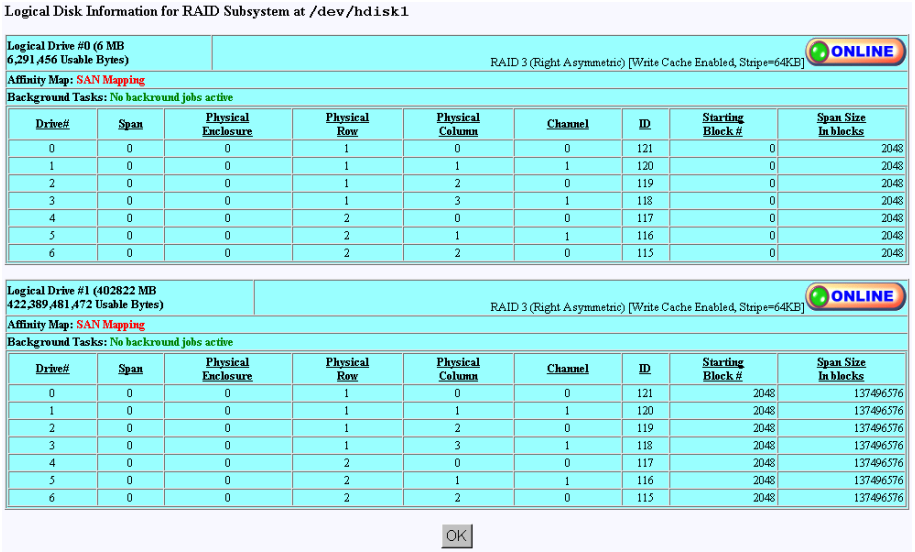
3. Click **OK** to return to Main Menu.

3.7.5 Logical Drive (LUN) Status

1. At the Main Menu, select **Display logical subsystem information** under Reporting Functions.

2. In the "Logical Disk Information" screen (similar to Figure 16), verify that both Logical Drives #0 and #1 are on-line with write cache enabled, stripe size of 64KB, and at RAID 3 level.

Note : ***Logical Drive #0 is a small-sized LUN which is not real. It will be used by the operating system as the management LUN. Only Logical Drive #1 should be used for data.***



Logical Disk Information for RAID Subsystem at /dev/hdisk1

Logical Drive #0 (6 MB 6,291,456 Usable Bytes) — RAID 3 (Right Asymmetric) [Write Cache Enabled, Stripe=64KB] — ONLINE

Affinity Map: SAN Mapping

Background Tasks: No backround jobs active

Drive#	Span	Physical Enclosure	Physical Row	Physical Column	Channel	ID	Starting Block #	Span Size In blocks
0	0	0	1	0	0	121	0	2048
1	0	0	1	1	1	120	0	2048
2	0	0	1	2	0	119	0	2048
3	0	0	1	3	1	118	0	2048
4	0	0	2	0	0	117	0	2048
5	0	0	2	1	1	116	0	2048
6	0	0	2	2	0	115	0	2048

Logical Drive #1 (402822 MB 422,389,481,472 Usable Bytes) — RAID 3 (Right Asymmetric) [Write Cache Enabled, Stripe=64KB] — ONLINE

Affinity Map: SAN Mapping

Background Tasks: No backround jobs active

Drive#	Span	Physical Enclosure	Physical Row	Physical Column	Channel	ID	Starting Block #	Span Size In blocks
0	0	0	1	0	0	121	2048	137496576
1	0	0	1	1	1	120	2048	137496576
2	0	0	1	2	0	119	2048	137496576
3	0	0	1	3	1	118	2048	137496576
4	0	0	2	0	0	117	2048	137496576
5	0	0	2	1	1	116	2048	137496576
6	0	0	2	2	0	115	2048	137496576

OK

Figure 16. Example of Logical Disk Information Screen for 8 Drives

3. Check that the capacities of the logical drives are as follows:

   For 8×36GB-drive configuration:
   Logical Drive #0 is 14MB
   Logical Drive #1 is 242970MB

   For 12×36GB-drive configuration:
   Logical Drive #0 is 10MB
   Logical Drive #1 is 347110MB

   For 8×73GB-drive configuration:
   Logical Drive #0 is 12MB
   Logical Drive #1 is 416532MB

   For 12×73GB-drive configuration:
   Logical Drive #0 is 10MB
   Logical Drive #1 is 694240MB

4. Click **OK** to return to Main Menu.

3.7.6 Set System Time and Date

The EF2000 system's time and date are factory-configured for U.S. Pacific Standard Time. These need to be changed for installations in other time zones.

1. Select **Set Real Time Clock in RAID Controller** under Miscellaneous Functions menu.

2. Click the **SET CLOCK** button to set the real time clock in the EF2000 RAID controller to match the time on your host computer (Figure 17).

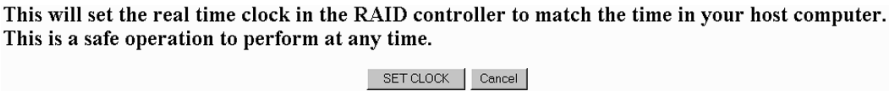


Figure 17. Set Real Time in Controller Clock Screen (1)

3. A message will appear upon completion (Figure 18). Click **OK**.



Figure 18. Set Real Time Clock in Controller Screen (2)

3.8 Running scismit

On the Creo host computer, run "scismit" and refer to Creo Brisque/ BrisqueServe Technical Manual for the "Configure New Disk" procedure.

Logical Drive #1 on the EF2000 system will appear as a new hard drive to the host.

4 Complete Formatting Instructions

(assuming no factory pre-formatting)

This section explains how to fully format an EF2000 system using the Distributed Array Manager software.

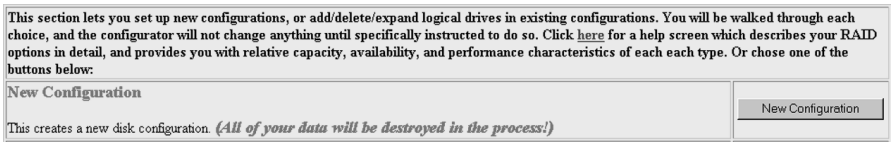
Warning ! This will delete any data on the EF2000.

4.1 Before You Start

1. Launch DAM (only if you chose not to run DDN DAM software automatically during the installation).
2. Select a physical device as described in Section 3.7.2.
3. Check that all drives are on-line with no LUNs defined (use **Display physical subsystem information** menu under Reporting Functions).
4. If a Logical Drive is present, delete it using the **Create/Destroy/Expand Logical Drives** menu under Configuration Functions.

4.2 Create Logical Drives and Hot Spare

1. At the Main Menu, select **Create/Destroy/Expand Logical Drives** under Configuration Functions. In the next screen, click **New Configuration**.



2. A screen similar to Figure 19 appears. The RAID Subsystems chart shows the graphical physical layout of the drives on the EF2000 (rotate the chart by 90° clockwise).

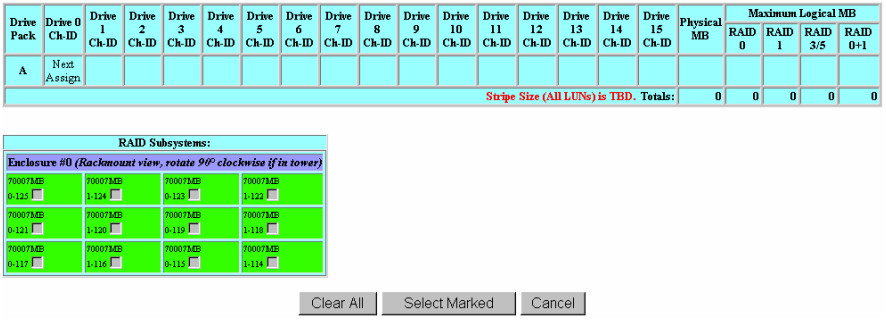


Figure 19. Create Drive Pack Screen

3. Before you format any logical drives, you need to create Drive Packs (which exist only for configuration purposes). Click the check box to select a drive.

   For 12-drive configuration, select drives (0-125), (1-124), (0-123), (1-122), (0-121), (1-120), (0-119), (1-118), (0-117), (1-116), (0-115).

   For 8-drive configuration, select drives (0-121), (1-120), (0-119), (1-118), (0-117), (1-116), (0-115).

   Then click **Select Marked**.

4. The screen is updated (Figure 20). The selected drives are "added" to Drive Pack A. The total capacity is calculated and displayed. Click **Define LUNs** to continue.

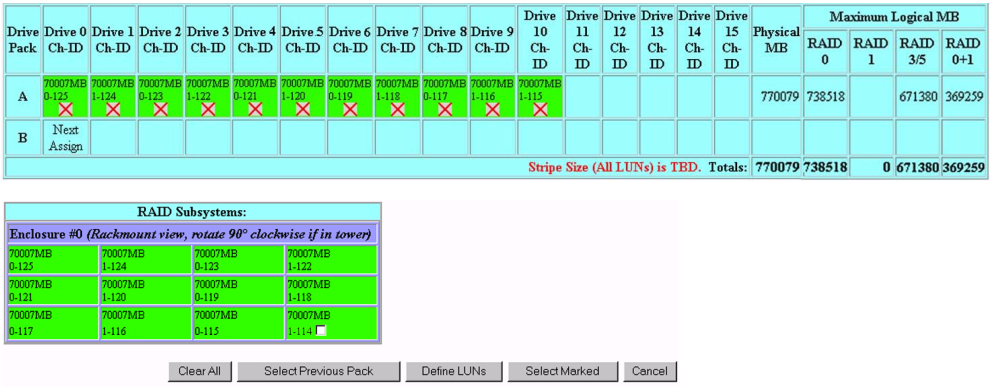


Figure 20. Select Drive Screen

5. In the next screen (Figure 21), click to select Drive Pack A. Then click **Configure New**.

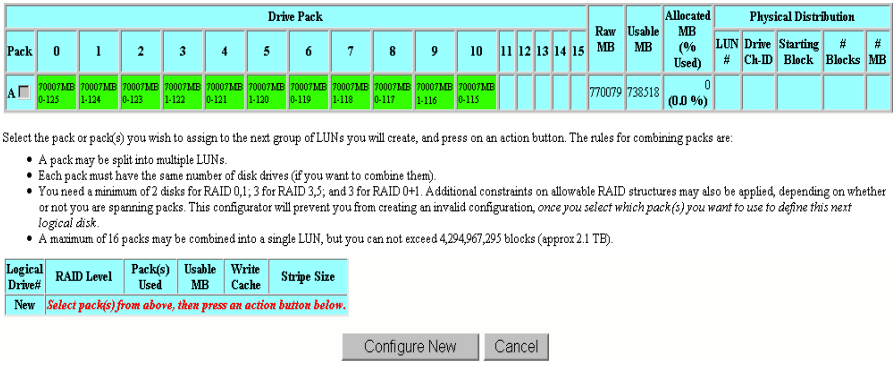


Figure 21. Select Drive Pack Screen

6. In the next screen (Figure 22), select “RAID 3” from the RAID Level pull down list. Type “10” in the Usable MB box. Check the box to enable Write Cache. Select “64 KB” for Stripe Size. Then click **Apply** to continue.

Note : Logical Drive #0 is a small-sized LUN which is not real. It will be used by the operating system as the management LUN. Only Logical Drive #1 should be used for data.

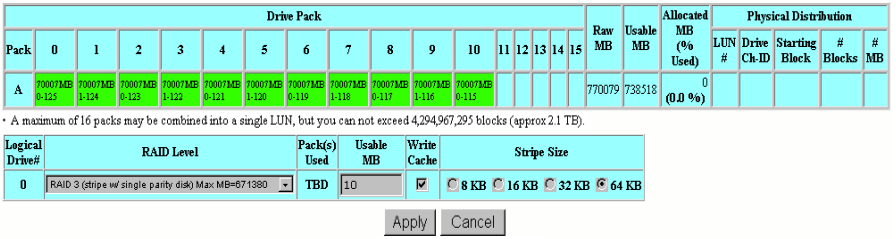


Figure 22. Define Logical Drive #0 Screen

7. For Logical Drive #1 (Figure 23), select “RAID 3” from the RAID Level pull down list. Type “ALL” in the Usable MB box. Check the box to enable Write Cache. Then click **Apply** to continue.

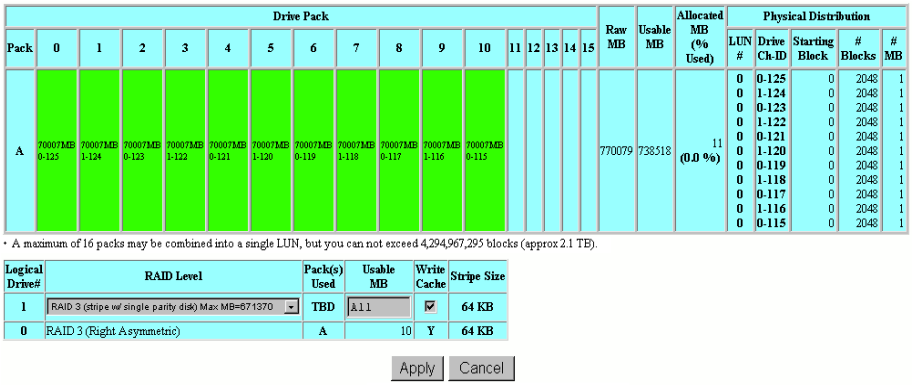


Figure 23. Define Logical Drive #1 Screen

8. The next screen (Figure 24) displays information for the defined LUNs. Click **Next Screen** to continue.

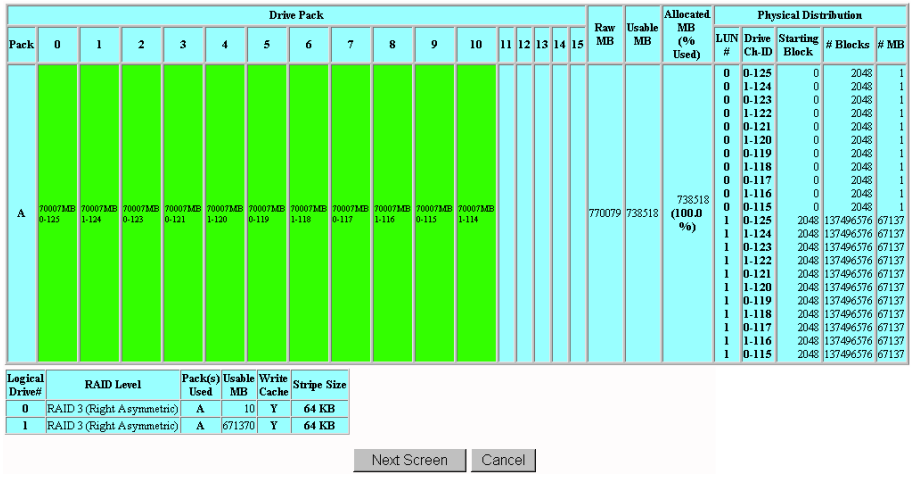


Figure 24. Logical Drives Defined Screen

9. In the next screen (Figure 25), click **YES** to add the new LUNs.

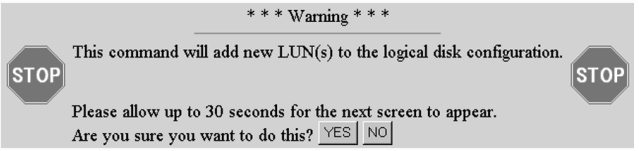


Figure 25. Add New LUNs Warning Message

10. In the next screen (Figure 26), click **OK** to continue.

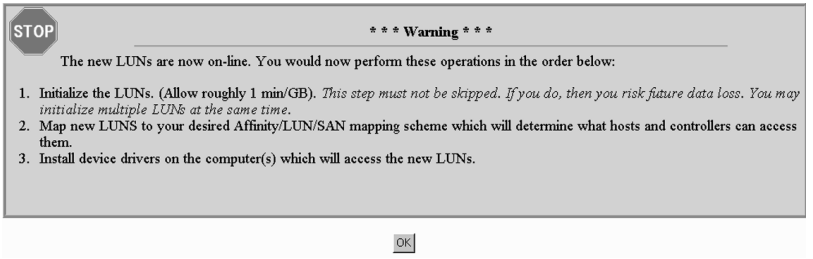


Figure 26. Add New LUNs Message

11. In the "Reset controller warning" dialog box, click **YES**.

A reset is required, and not optional. Upon successful reset, the Main Menu will appear.

12. Select **Initialize LUN(s)** from the Configuration Functions menu.

13. In the Initialize LUNs screen (Figure 27), type "YES" in the box for both logical drives. Then click **INITIALIZE** to continue.

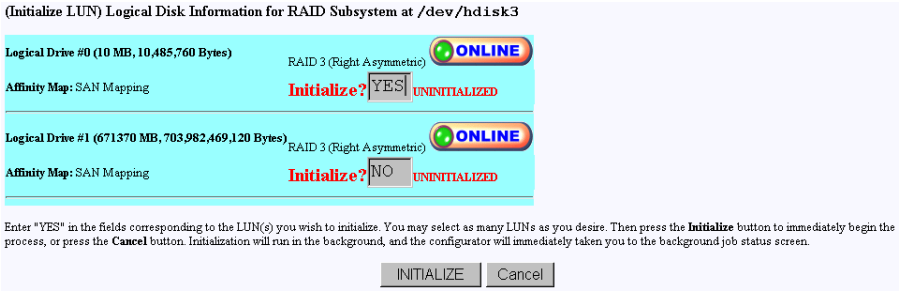


Figure 27. Initialize LUNs Screen

14. The message “Request to Initialize LUN - Operation started successfully” will be displayed. Click **OK** in the dialog box.

15. DAM will display the initialization status screen to indicate the progress (Figure 28).

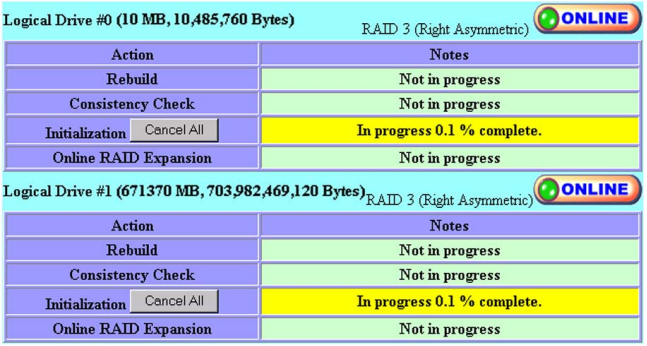


Figure 28. Initialize LUN Status Screen

16. Wait until initialization is complete. At the Main Menu, select **Display physical subsystem information** under Reporting Functions.

17. In the Modify Disk Device Status screen, make drive at CH=1, ID=114 into a hot spare by changing its status to HOT SPARE (Figure 29). Click **OK** to save.

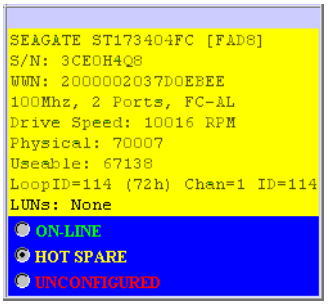


Figure 29. Make Hot Spare

18. Log into the host computer and enter command: **`cfgmgr`**
Check that two LUNs can be seen.

19. Then type: **`lsdevfc`**
Check that the capacity of LUN 1 is:
242970 MB for 8×36 GB-drive configuration
347110 MB for 12×36 GB-drive configuration
416532 MB for 8×73 GB-drive configuration
694240 MB for 12×73 GB-drive configuration

20. Use **`scismit`** to configure the disks.
Do not configure LUN 0. Use only LUN 1 to create the new Data Volumes.

This completes the LUN format process.

5 Drive Failure Recovery

The EF2000 controllers provide automatic rebuild capabilities in the event of a physical disk drive failure. The controller performs a rebuild operation automatically when a disk drive fails and all of the following conditions are true:

- A standby or hot spare disk drive of identical or larger size is found;
- All system drives that are dependent on the failed disk drive are configured as a redundant array; RAID 1, RAID 3, RAID 5, or RAID 0+1;
- The Auto Rebuild Management function is enabled.

During the automatic rebuild process, system activity continues as normal; however, system performance may degrade slightly.

5.1 Using Standby Rebuild

To use the automatic rebuild feature, it is necessary to maintain a hot spare or standby disk drive in the system. The number of hot spare disk drives in a system is limited only by the maximum number of disk drives available on each disk channel.

A *hot spare* disk drive can be created using the "*Modify Disk Device Status*" option in DAM.

5.2 Changing the Rate of Rebuild

The rate of rebuild can be adjusted using the "*View/Modify RAID controller configuration*" function in the Administrative Functions menu.

50	**Rebuild/Check Consistancy Rate Default**	**On-the-fly**	This value times 2 approximates the percentage of available rebuild cycles to be used when rebuilding a RAID group, or checking consistancy. CPU utilization is always shared with data traffic. Range 0-50. Therefore, a value of 50 devotes the maximum allowable resources to a drive rebuild or expansion, allowing it to proceed at its fastest. A lower number provides more resources to service other IOs.

5.3 Monitoring the Rebuild Progress

You may monitor the rebuild progress using the "*Display status of background jobs*" function in the Miscellaneous Functions menu (Figure 30).

If you want to abort the rebuild, click **Cancel All**.

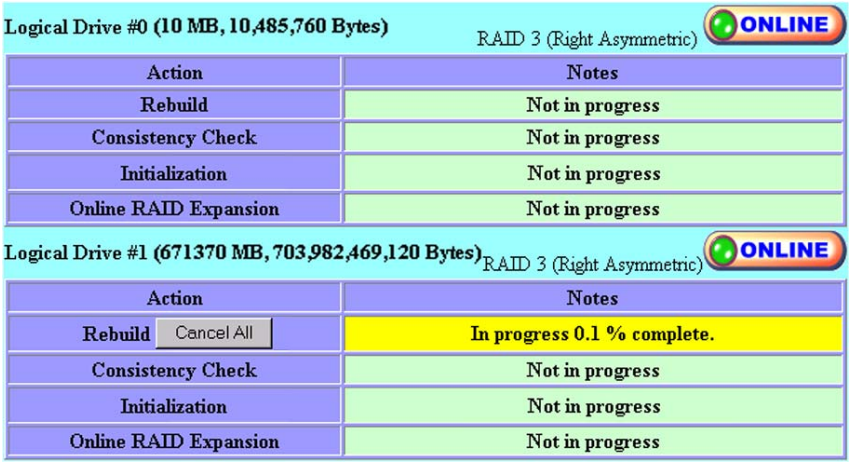


Figure 30. Status of Rebuild

5.4 Returning the System to Fault-Tolerant State

The EF2000 controllers support the ability to perform a *hot swap* disk drive replacement while the system is on-line. A disk drive can be disconnected, removed, and replaced with a different disk drive without taking the system offline.

It is recommended that you replace the failed drive as soon as possible so that the Logical Drive can return to its optimal state. If you replace the failed drive while rebuild is taking place, the system will finish rebuilding data on the spare drive first. When rebuild is complete and the failed drive has been replaced, the system will automatically copy the data from the spare drive to the new drive, and return the spare drive to its standby state. The Logical Drive is then fully restored.

6 Firmware Upgrade Procedure

This section explains the steps to download the EF2000 controller firmware.

Before you begin:

- Unmount all logical disks from host computer.
- Flush controller's cache. (Use **Flush controller(s) write cache to disk** in Miscellaneous Functions menu)
- Back up all data files - upgrading firmware will destroy existing data structures.
- Make sure no background operations such as consistency checks are running. (Use **Display status of background jobs** in Miscellaneous Functions menu)
- Copy the firmware file to the host computer.

Procedure:

1. Select **Flash new firmware onto controller(s)** from the Miscellaneous Function menu (Figure 31).

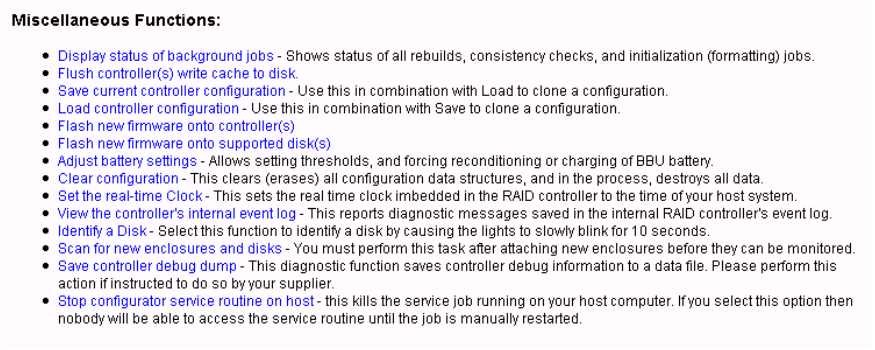


Figure 31. Miscellaneous Functions Menu

2. Read the notes in the screen before you proceed (Figure 32).

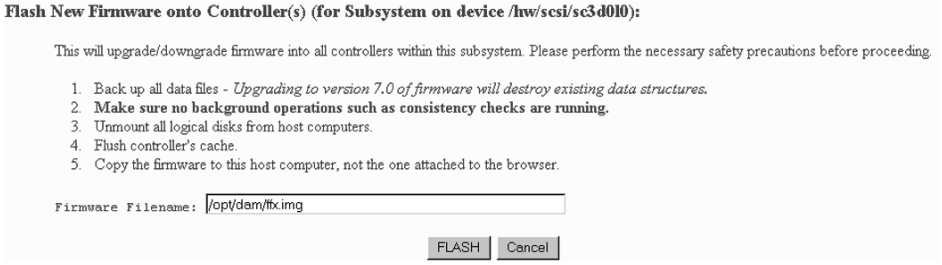


Figure 32. Firmware Download Screen

3. When the system is ready, enter the filename of the image and click **FLASH**. DAM will then run through a simple verification to see if the image is of the right size and type for your EF2000. If not, it will report the problem.

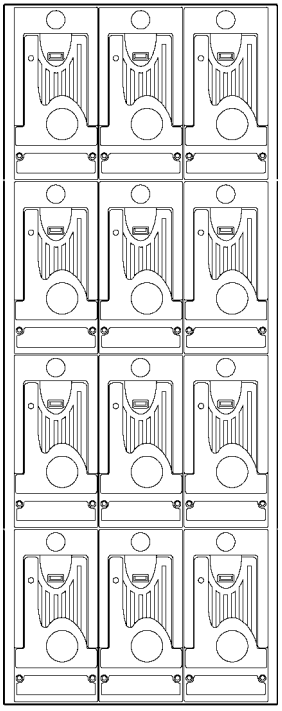
4. The process will only take a few moments and DAM will display the Reset Controller screen upon completion. A controller reset is required in order to complete the firmware download process. Click **YES** to reset controller.

5. Upon successful reset, use **View/Modify RAID controller configuration** in Miscellaneous Functions menu to check current firmware version.

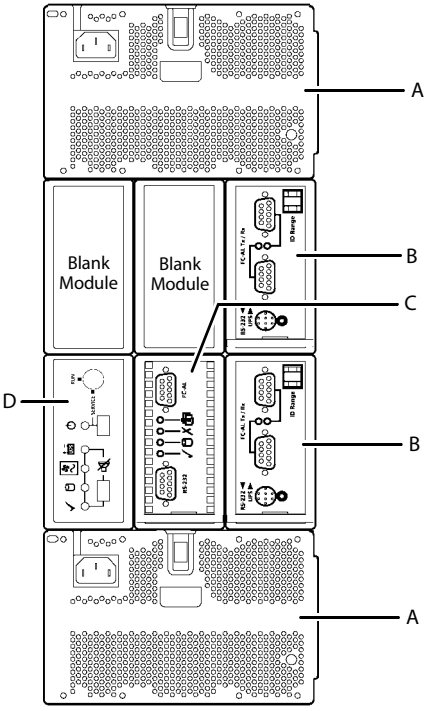
7 List of Replacement Parts for EF2000 System

Listed below are the replacement parts and their product numbers for the Creo EF2000 system.

Front View



Rear View



Item	Description	DDN PN	Creo PN
A	Power supply/cooling module	EF-PSU-550	607S00814
B	I/O module	EF2000-1X12-IO	607S00815
C	RAID controller module	CF2000-128	607S00816
D	ESI/Ops panel module	87-00017-001	
	EF2000 system with single controller	EFR2112-128	607S00817

Drive Modules

Description	DDN PN	Creo PN
36GB FC 10,000RPM 3.5" disk module	FM36GC	607S00808
73GB FC 10,000RPM 3.5" disk module	FM73GC	607S00770
Drive Slot Cover	FMCOVER	607S00821

Cables and Accessories

Description	DDN PN	Creo PN
FC host bus adapter, single loop 64 bit copper GBIC	I-250-CS	609-00001
FC cable, copper, DB9-DB9, 5-meter	C-300-AC-15	607S00823
FC cable, optical, 30-meter	C-350-MMO-90	607S00824
FC cable, optical, 100-meter	C-350-MMO-100	607S00825
MIA optical-to-copper converter	C-001-AOC	607S00826
EF2000 FC RAID System Installation Procedures for Creo	96-00115-001	607S00827
DataDirect Networks EF2000 FC RAID System User Guide	96-00089-001	607S00828
DataDirect Networks EF2000 Distributed Array Manager User Guide	96-00107-001	607S00829
Creo EF2000 CD-ROM	53-00181-001	607S00830

8 *Notes on Handling and Shipping the Product*

Use only the original packaging material to ship the components.

Do not operate the EF2000 system with any uncovered slots for any extended period of time. Failure to do so could affect the air cooling system.

9 Contacting Technical Support & Shipping Instructions

You can contact DataDirect Networks Customer Service by:

Telephone at (818) 700-7676 (Option 1)
Fax at (818) 700-7662
Internet e-mail at customerservice@datadirectnet.com

You can contact DataDirect Networks Technical Support by:

Telephone at (818) 700-7676 (Option 2)
Fax at (818) 700-7677
Internet e-mail at support@datadirectnet.com

Technical Support is available Monday through Friday,
9 am to 6 pm Pacific Standard Time.

After hours support is available to those customers that have a Service Contract. Please contact our sales representatives for more information.

You can find us on the World Wide Web at www.datadirectnet.com

Corporate Headquarters is located at:

9320 Lurline Avenue
Chatsworth, California 91311
(818) 700-7600, (818) 700-7601, fax

Product Shipping Instructions

If you are shipping the product to another location, always use the original packaging provided with your unit(s).

If you are sending a product to DataDirect Networks for warranty or out of warranty repair, you ***must*** obtain a Return of Materials Authorization (RMA) number from DataDirect Networks Technical Support.

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NETWORKS

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