



TALON4™

OSS-TALON4



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Unpacking and Inspection

Checking the Package Contents

The TALON 4 is shipped with the components and cables indicated in the table below. Make sure that all components are included in the shipping carton. Notify your supervisor if components are missing.

Components Shipped with the TALON 4

Description	Quantity
CD, RAIDCore RAID controller	1 each
Drive pack, removable	2 each
Quick Start Guide, TALON 4	1 each
Cable, power (for use in North America only)	1 each
Cable, LC to LC Duplex optical	1 each

Inspection

After unpacking the unit, examine the TALON 4 for:

- Correct model number (that the ___xxxxxxxx and SNxxxxxxxx) numbers on the barcode stickers match the information on the TALON 4 invoice).
- Bent, scratched, or missing pins on the connectors.
- Rust, discoloration, or signs of corrosion or water, moisture, or chemical damage.
- Drive packs that are cracked, scratched, dented, or chipped, and which do not smoothly slide in and out of their drive ports.

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Product Usage

To setup, configure, and use the TALON 4, the equipment operator must perform five operations in the order indicated in the table.

Sequence of TALON 4 Setup, Configuration and Usage Table

Operation	What to Do...
1	Unpack, inspect, and mount the unit
2	Review system requirements, safety precautions, and product usage
3	Plan system configuration and usage
4	Connect cables and establish data transmission connections
5	Install a disk pack and perform other equipment setup
6	Review and use unit components
7	Understand and use LED codes and functions

RAID Controller Requirements

This table below lists the requirements of the RAIDCore RAID controller used in the TALON 4.

Requirements for the RAIDCore RAID Controller(s) Table

Component	Requirements
Processor	x86, 32-bit compatible processor greater than 500 MHz
Memory	512 MB
Hard disk	At least one SATA, SATA II, or SAS disk; the number of disks depends on the number, type, and capacity of arrays to be created. NOTE: SAS is only supported on the RAIDCore RAID controller.
Available Slots	One PCI, PCI-X, or PCIe slot per controller (PCI-X 133/100/66, PCI-64 66/33, PCI-32 66/33), PCIe x1, x4, x8, and x16
Operating System	<ul style="list-style-type: none"> Windows XP (Professional Edition, 32-bit and 64-bit; Home Edition, 32-bit) Windows Server 2003 (Enterprise Edition, Standard Edition, Web Edition) (32-bit and 64-bit) <p>NOTE: Microsoft .NET Framework 1.1 is required for all Windows installations.</p> <ul style="list-style-type: none"> Red Hat Enterprise Linux 4 and 5 (64-bit and 32-bit) Red Hat Fedora™Core 5 and 6 (64-bit and 32-bit) SuSE Linux Professional 9.3 (64-bit and 32-bit) SuSE Linux Professional 10.1 and 10.2 (64-bit and 32-bit) SuSE Linux Enterprise Server 10 (64-bit and 32-bit)

Installation

Hardware Installation and Configuration

The TALON 4 is shipped with 19-inch rack-mounting hardware installed. Attach the TALON to the rack by screwing the system into the rack mounting angle near the front of the rack.

System Configuration

Before installing TALON 4, determine the following:

- Where will TALON 4 be physically located?
- What is the distance to the host system?
- What is the distance to a power source?

Connectors, Switches, and LEDs

Become familiar with the front and back of the TALON 4.

Cabling the Unit

Cabling the TALON 4 consists of making the following connections:

- Fibre Channel (using host adapters)
- Ethernet
- Electrical power
-

Fibre Channel Connections Compatible Fibre Channel Host Adapters

Use only optical cables and associated SFPs. Do not use copper cables.

Compatible 4 Gigabit Fibre Channel Host Adapters

ATTO	Celerity series
Apple	Fibre Channel

Compatible 2 Gigabit Fibre Channel Host Adapters

ATTO	Celerity series
Apple	Fibre Channel
Qlogic	QLA Series

- The TALON 4 communicates with your computer by using a 4GB Fiber Channel LC Duplex optical interface. A compatible host adapter must be installed in your computer for the TALON 4 to communicate with the host computer.
- To maximize the TALON 4's 4Gb Fiber Channel interface, the host adapter in the computer should also be rated for 4Gb Fibre Channel. The 2Gb Fibre Channel host adapters will work, but at a lower transfer rate.
- Make sure the host adapter is installed correctly, and that the appropriate host adapter drivers are installed and functioning properly, before connecting the TALON 4 to the computer system.
- To maximize the Ultra320 interface of the TALON 4, the SCSI host adapter in your computer should be rated for Ultra320. Ultra160, Ultra2, and Ultra Wide SCSI rated host adapters will work but at a slower transfer rate.
- Make sure the host adapter is installed correctly, and that the appropriate host adapter drivers are installed and functioning properly, before operating the unit.

Fibre Chanel I/O Connections

A TALON 4 with a Fibre Channel interface is shipped with a 4Gb Fibre Channel SFP (Small Form-factor Pluggable) optical transceiver. There is an LC Duplex hookup on Side A or Side B. The SFP mates to two LC Duplex optical cables for data transfer to and from the host computer, server, etc.

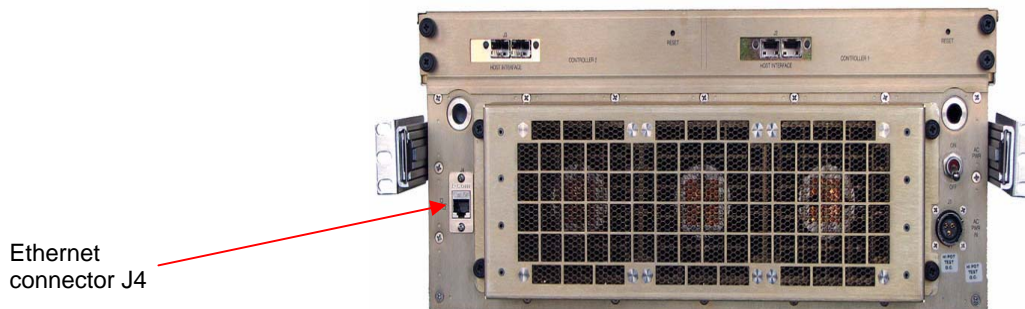
To Install the SFP and Connect the LC Duplex Optical Cable

1. Remove the protective cover from the SFP.
2. With the gold contacts facing down, insert the SFP into FC Port 1. Gently push the SFP in until it clicks.
3. The tips of the LC Duplex cable are packaged with a protective covering. (The protector might be a cap over the white tips of the LC cable or a clipped-on shell). Remove the cover before use.
4. Insert one end of the LC Duplex cable into the SFP at FC Port 1.
5. Insert the other end of the LC Duplex cable into the Fibre Channel switch or Fibre Channel host base adapter of the host computer, server, etc.
6. Repeat steps 4 and 5 for the other side of the TALON 4.

Ethernet Connections

Plug the Ethernet cable into connector J4 at the rear of the unit.

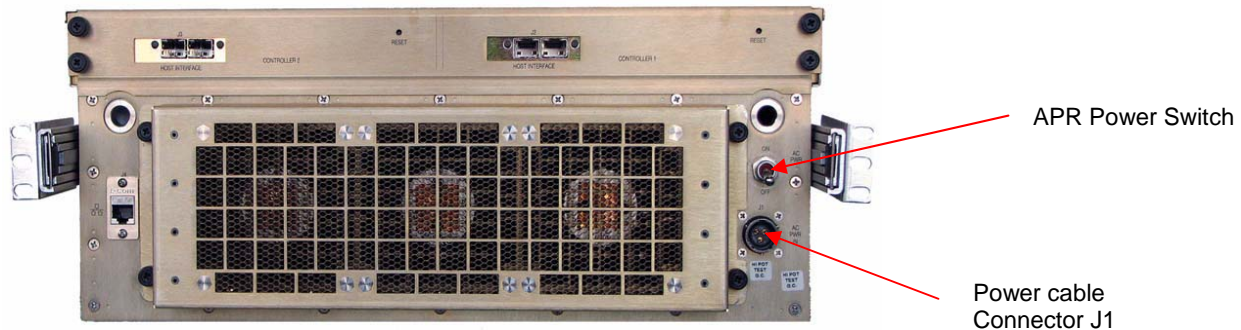
Location of Ethernet Connector J4



Electrical Connections

1. Set the AC PWR switch to **OFF**. See Figure below.
2. Connect a power cable at the rear of the unit, at AC PWR IN (J1).

See Figure below **Power Cable Connection. Power cable connector J1, AC PWR switch**



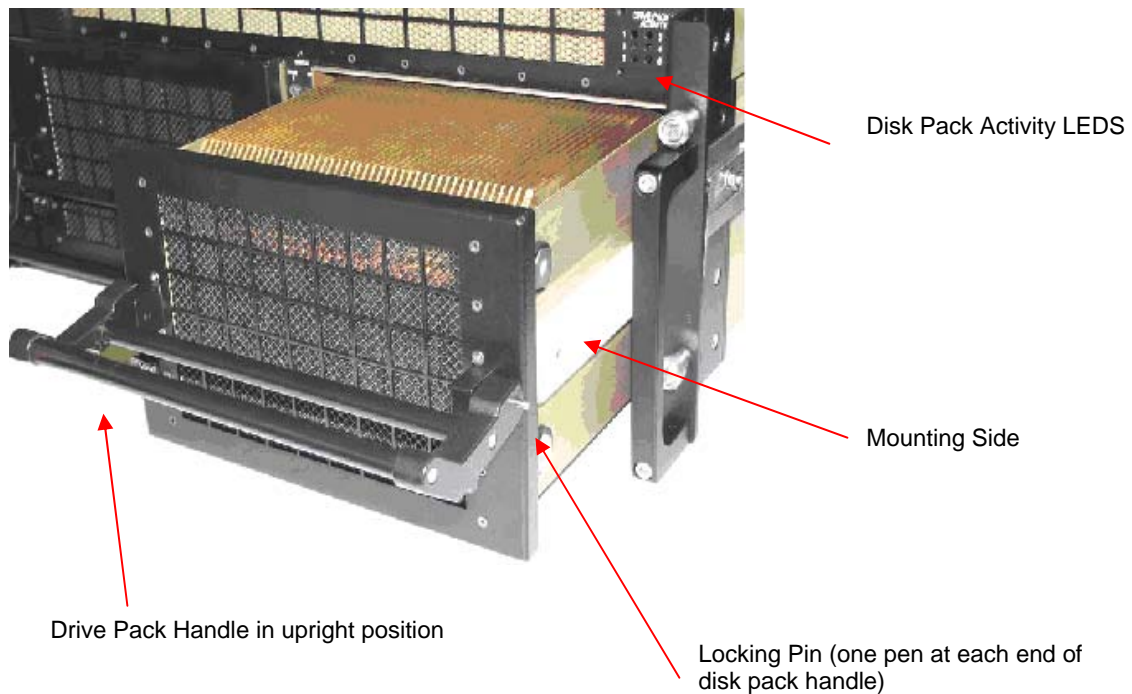
Powering Up the Unit

1. Power up the TALON 4 by setting the AC PWR switch to the ON position.
2. Verify that the fans are running in each power supply and in the fan module.

Installing a Drive Pack

To mount a disk pack, perform the following steps.

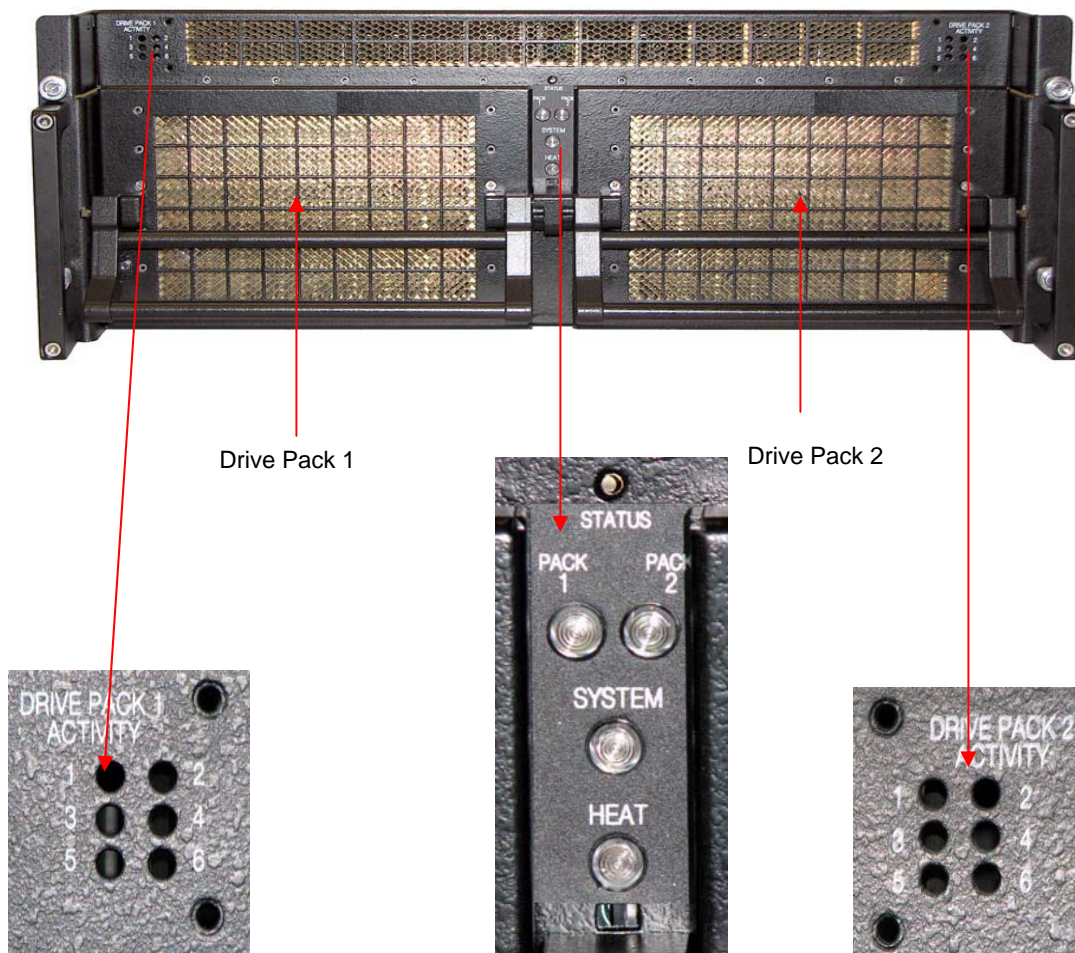
1. Align the mounting slides on the drive pack with the rails on each side of the disk rack compartment. Make sure the drive pack handle is in an upright position. See Figure below.



2. Carefully slide the drive pack straight back into its compartment. **(See Figure Above).** A Drive Pack Partially Inserted into the Drive Pack Compartment, Mounting slide Drive pack handle, Disk Pack, Activity LEDs (in an upright position), Locking pin (one pin at each end of the disk pack handle).
3. When the drive pack slides into the enclosure and the front of the drive pack is approximately even with the front of the enclosure, lower the drive pack handle. (The locking pins on the handle engage indents in the latching blocks and secure the drive pack in its compartment).
4. Wait for the pack to perform a self-test and initialization.
5. When the individual drives are spun-up, the unit brings the RAID controllers online. Observe the Drive Pack 1 (or 2) Activity LEDs on the front of the TALON 4. When the LEDs are illuminated the indicated drives are ready for operations.

Operations

Front Panel Components

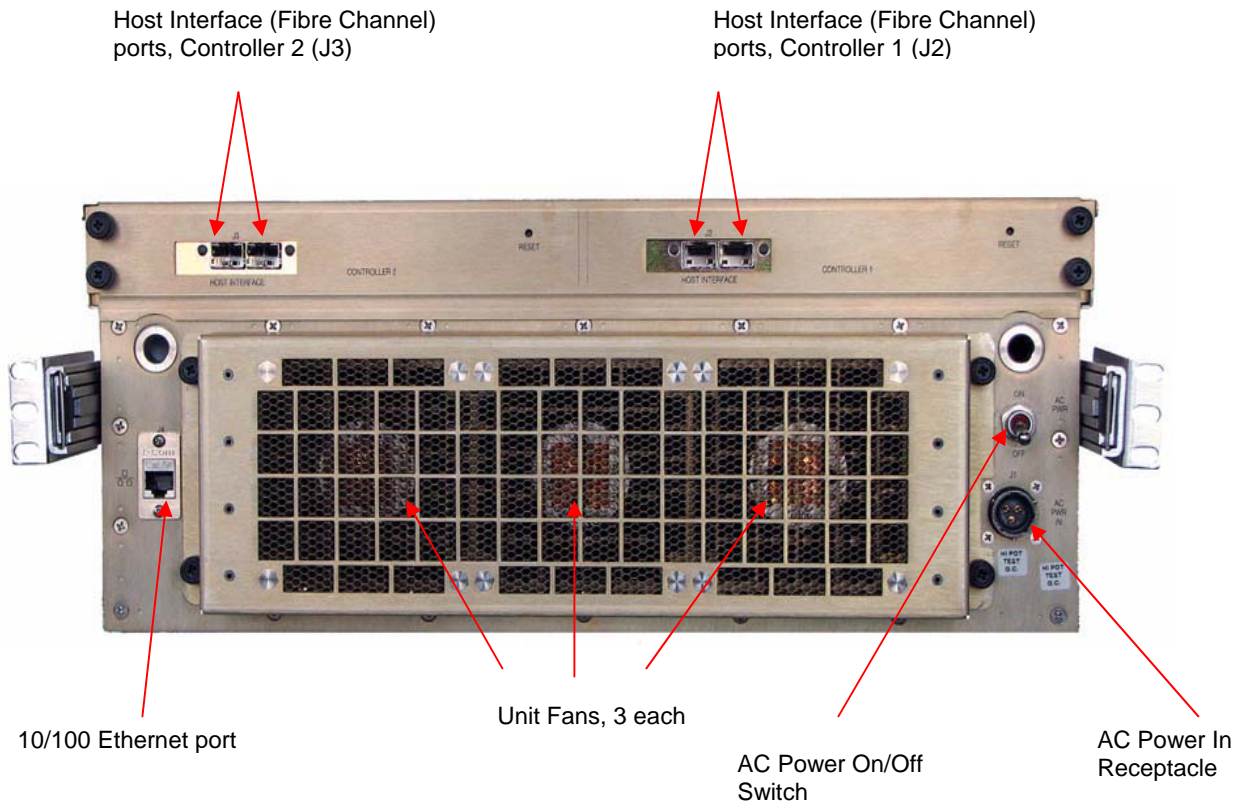


Descriptions of the Front Panel Components Table

Component	Description
Drive Pack 1, Drive Pack 2	Each removable Drive Pack contains six 500GB disk drives and a RAIDCore RC52xx RAID controller.
DRIVE PACK 1 ACTIVITY 1-6	Each LED corresponds to disk drives 1 to 6 in Drive Pack 1. A disk drive's LED is illuminated when the disk drive is available for data I/O operations.
DRIVE PACK 2 ACTIVITY 1-6	Each LED corresponds to disk drives 1 to 6 in Drive Pack 2. A disk drive's LED is illuminated when the disk drive is available for data I/O operations.
STATUS - PACK 1	An illuminated LED indicates that the disk pack is powered-up and available for data I/O operations.
STATUS - PACK 2	An illuminated LED indicates that the disk pack is powered-up and available for data I/O operations.
SYSTEM	An illuminated LED indicates that the host computer is communicating with the TALON 4.
HEAT	An illuminated LED indicates that the heaters are operating.

Rear Panel Components

Rear Panel Components figure



Descriptions of the Rear Panel Components Table

Component	Description
Host Interface (Fibre Channel) ports, J2 and J3	Accepts 4 Gb Fibre Channel optical cables for connections between the TALON 4 and a host computer. Uses a SFP to connect each port to an LC duplex optical cable.
10/100 Ethernet Port	Provides access for 10 Mbps or 100 Mbps data transfer speeds.
Unit Fans	Vents heat from the interior of the TALON 4.
AC Power On/Off Switch	Turns AC power on or off to the TALON 4 power supply.
AC Power In Receptacle	Accepts cable for connection to a 100-240 VAC power source. WARNING: Prior to performing any maintenance on the TALON 4, remove the AC power cable from its receptacle to ensure that all power is removed from the unit.
Power Module Fans	Vents heat from the interior of the power modules (power supplies).

Unit Power-Up Sequence

Always power-up the TALON 4 before powering-up the host computer. This allows the disk drive modules, and the data access/data transmission functions of the TALON 4, to be fully operational before the host computer is booted-up and “sees” the TALON 4 activities.

Scanning a SCSI Bus

When a drive pack is removed from the TALON 4, system-generated SCSI time-outs might cause the system to stop looking for storage available via the Fibre Channel interface. To correct this situation, commands can be issued that prompt the system to “rediscover” the TALON 4. The following examples illustrate the use of these commands on SGI IRIX systems and SUN Solaris Systems.

SGI Irix

On SGI IRIX systems, the SCSI bus can be scanned and the file system remounted, as shown in the following example: [Need an updated example, if applicable at all].

Sun Solaris

On SUN Solaris systems, the SCSI bus may need to be rescanned and the file system remounted. To rescan the SCSI bus, refer to the following example: [need an updated example, if applicable at all]

Windows 2003 or XP

Microsoft Windows 2003 or XP host systems can rediscover disk devices. However, it is occasionally necessary to reboot. Windows can rediscover the TALON 4 disk pack through either the Disk Administrator or Disk Part. To access the Disk Administrator:

1. Left-click on Start, then right-click on My Computer > Manage.
2. Choose “Disk Management” under the “Storage” heading in the left tree hierarchy.
3. From the Action menu, choose Rescan Disks. Windows updates the disks on the right side of the screen with information, including the recently inserted TALON 4 device.

Obtaining an IP Address

There are two methods for obtaining the IP address of TALON 4. The simplest is to have an IP supplied by the DHCP server on the network. The other requires assigning a static IP to the TALON 4.

DHCP

TALON 4 configures to an IP address from a DHCP/BOOTP server on a network. If the network has such a server, power up the TALON and use the following instructions to find the IP address.

1. Verify that the Ethernet cable is connected to TALON 4 and to the network.
2. Power up the system and wait for the power-up cycle to finish.
3. Push the Display/Eject button. The status of the Ethernet connection appears: EnEt=uP, followed by the IP address, for example: Addr=172.20.110.11.

NOTE: It might take a few minutes to obtain the address from the DHCP server. Until then, the system displays: EnEt=dn. If this address appears, periodically recheck the address until a different address appears.

Static IP via a Serial Port

Use the following procedure if the network does not have a DHCP server.

1. Before power-up, verify that the Ethernet cable is connected to the TALON 4 and to the network.
2. Connect the serial port on the front panel to a host terminal with an ASCII terminal emulation program. The default serial port parameters are: 9600 baud, 8 bits, No Parity, 1 Stop, No Flow Control.
3. Power up the system. During power-up, the TALON 4 will display a boot-up message.
4. Press any key in the time indicated in the boot up message to step through the dialog and modify the system Ethernet parameters, including the IP address. After an IP address is assigned, use a browser to access the Web Manager to configure and monitor the system. For example, if the address is 172.20.201.1, use the URL address <http://172.20.201.1> to configure and monitor the array system.

Creating a File System

During the initial installation of the TALON 4 system or when installing a new disk pack for the first time to an existing TALON 4, it might be necessary to create a file system on the disk pack.

Windows 2003 or XP Operating Systems

Microsoft Windows 2003 or XP host systems allow for two disk types, basic and dynamic. A basic disk comes online automatically, whereas a dynamic disk must be manually forced on-line each time a pack is removed and reinserted. The basic disk for use on the TALON 4 is recommended. After creating a basic disk, create either an NTFS or FAT-32 file system. Refer to Microsoft documentation for creating a basic disk with an NTFS or FAT-32 file system.

Unix Operating Systems

On UNIX systems, create standard file systems as you would on any storage device.

- XFS for SGI IRIX® systems
- UFS for SUN Solaris® systems
- _____ for Linux
- _____ for SuSE

Refer to SGI or SUN documentation for information about creating file systems

Starting the Disk Pack Heaters

The heat-phase data string appears when the disk pack temperature and user settings indicate that drives require heating before they spin up. This heating information is repeated during the course of the heat phase, which can last up to one hour. The heat phase default is 20 minutes. This information is not shown if a heat-phase is not required, or if the heater option is not installed. The symbols for the heat phase display are:

Heat Phase Formula Legend

Display	Indicates
[Beginning of data string.
H	Heating symbol.
w=	Current heating level is in use. The “w” value is between 1 - 8. TALON 4 automatically adjusts the heating level in response to time and temperature conditions.
x	Remaining heating time in minutes. This is the maximum time remaining that the disk pack will continue to heat, unless the target temperature is achieved first.
t#=#	Current temperature symbol. Identifier number (2 or 3) of the sensor reporting this temperature. The reading is from the warmer of the two disk pack sensors.
-yy0c	Current temperature is in Celsius. The minus sign (-) is shown only when negative temperatures are reported.
tt=	Target temperature symbol. The heating phase ends when either the current temperature is equal to or exceeds the target temperature, or the remaining heating time expires.
-yy0c	Target temperature is in Celsius. The minus sign (-) is shown only when negative temperatures are reported.
]	End of data string.

Frequently Asked Questions (FAQs)

Frequently Asked Questions Table

What is the proper placement of my TALON 4	The TALON 4 can be operated only in a rack configuration.
How do I know when the heater is on?	The Temperature LED on the front of the TALON 4 is illuminated as green when the heater is operating.
How can I replace a disk drive in a drive pack?	Individual disk drives cannot be replaced. A drive pack (consisting of 6 disk drives) must be replaced as a single assembly.
What are typical data rate speeds?	The internal data rate ranges anywhere from ___/sec to about / secs
What is striping?	Striping is a technique where different parts, called sectors, of different disk drives are used alternately in sequence. This is done for several possible reasons: a) Gaining performance; b) Increasing reliability; or c) Increasing capacity.
What is spanning/concatenation?	This is a technique where hard disk drives are used end-to- end, i.e. where one fills up the data continues on to the next. This is strictly done for capacity, and has no gains in either speed or reliability.
What is mirroring?	Mirroring is where data, when written, is written to two different disks or sets of disks ---i.e. the same copy in both places. This offers reliability, at the cost of capacity and speed.
Do I need to do any software-based Preventative maintenance on the array?	No. Programs, such as Disk First Aid, Scan Disk, etc. are not recommended
How do I defragment the array?	Defragmenting software is not recommended. The best way to defragment the array is to back it up, reformat/restripe it, then restore the backup.
Do I need to do anything to keep the TALON 4 clean?	Clean the unit with a soft cloth. If further cleaning is necessary, use a mild liquid soap.

Maintenance

Removing a Drive Pack

Stopping I/O Transactions

To remove a disk pack, you must first stop all I/O transactions between the host computer and the drive packs, in order to maintain data integrity between remote and base hosts.

Unmount UNIX File Systems

If the disk pack has a mounted file system, unmount the file system to ensure that the data structures are properly closed down before removing the disk pack.

To unmount the UNIX file system:

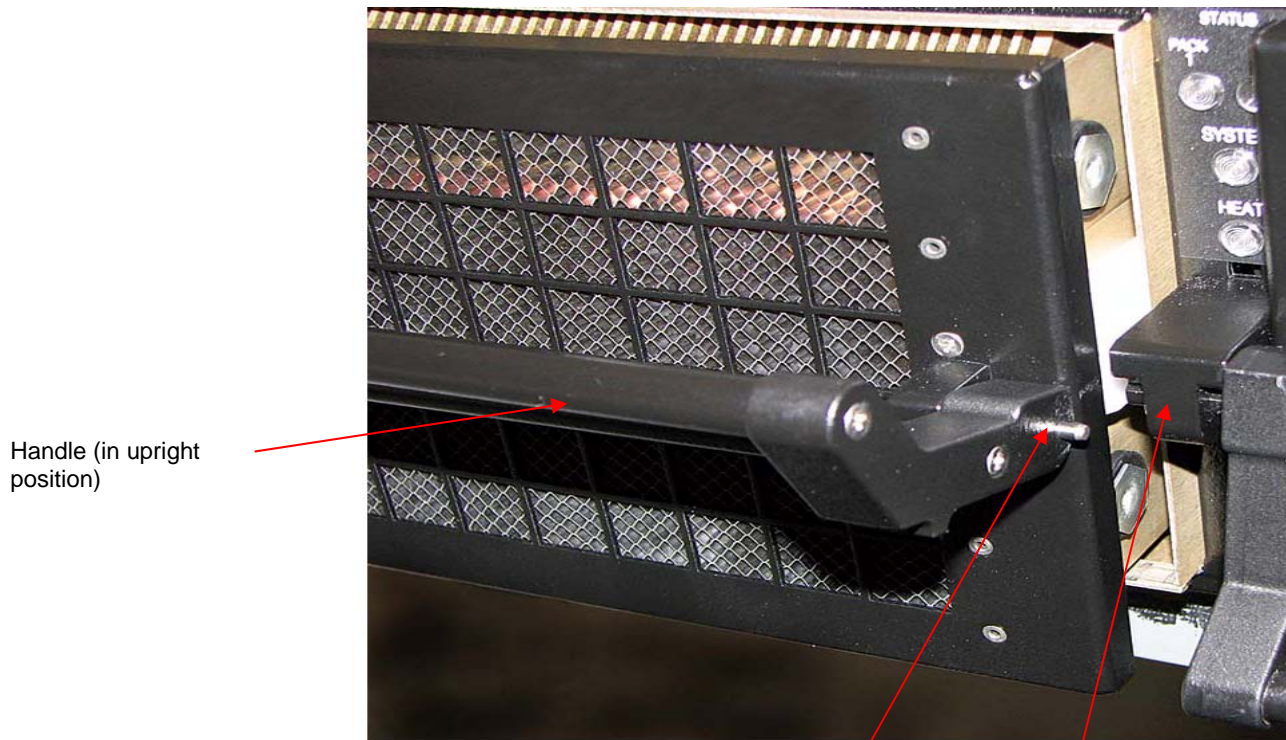
1. Stop all I/O from going to the logical units that exist on the TALON 4.
2. Verify that the file system is mounted.
 - List the file system with the `df` command.
 - Use flags after the command (such as `-k`) to format the output and make it easier to read and interpret.

NOTE: Only a superuser can unmount file systems. Flush Windows Data

Remove a Drive Pack

1. Grasp the front handle at the drive pack.
2. Lift the handle fully upright, to disengage the locking pins (2 each per handle) from the latching blocks.

Locking Pin (1 of 2) Disengaged from the Latching Block



Handle (in upright position)

Locking Pin

Latching Block

3. Carefully slide the drive pack out of its compartment.
4. Place the disk pack on a flat, stable surface.

RAIDCore RAID Controller Information

RAIDCore RAID Controller Information

Board type	Bus Type	Number of ports and type	PCIe +12V	PCIe +3.3V	Total Operating Power	Dimensions	Operating Temperature Range
	PCI-E 4-port	4 – SFF-8087	.245A	.255A	3.78W	2.73-in. (H) x 4.25-in. (L)	0° to 55°C

PCI-E 1.0a compliant

- SATA1 or 2 compliant, 3Gb/s with Native Command Queuing
- SAS compliant, 3Gb/s
- >1GB/s Performance, up to 32 drives spanned
- Phoenix adapters support SAS expansion
- RAID levels 0,1,5,10,50
- CE, FCC, and UL regulatory certifications
- RoHS Compliant
- Temperature range not tested yet

System Information

System Information

Condition or Component	Value or Range
Controller	Single or dual RAID controllers, supporting RAID levels 0, 1, 5, and 10.
Performance	Sustained data rates of over ___ MB/s per controller.
Capacity	Up to 6 TB per drive pack, and 12 TB per TALON 4 system.
Disk Drives	500 GB, 750 GB, and 1 TB.
Host Interface	4 Gb Fibre Channel or SCSI Ultra 320.

Physical Information

Physical Information

Condition	Value or Range
System Dimensions	19-in. wide x 6.97-in. high x 24-in. deep (483 mm x 177 mm x 606 mm).
Drive Pack Dimensions	8.2-in. wide x 4.8-in. high x 11.2-in. deep (208 mm x 122 mm x 285 mm).
System Weight	65 lbs. (29.5 kg.)
Weight per drive pack (with six drives)	15 lbs. (6.8 kg.)

Environmental Information

Environmental Information Table

Condition	Value or Range
Temperature (operating)	0F to 113F (-18C to +45C)
Temperature (non-operating)	-67F to +160F (-55C to +71C)
Altitude (operating)	0 to 41,000 feet (0 to 12,496 meters)
Relative Humidity (operating)	6 to 95%
Relative Humidity (non-operating)	6 to 100%

Environmental Testing Compliance

Environmental Testing Compliance

Condition	Compliance per Cited Standard
Shock	MIL-STD 810F
Vibration	MIL-STD 810F
Temperature and Humidity	MIL-STD 810F
Salt Fog	MIL-STD 810F
Explosive Atmosphere	MIL-STD 810F
Emissions/Immunity	MIL-STD 461, CE101, CE102, CS114, RE101, RE102, RS103

Overview of RAID RAID Minimum Disk Requirements

The following table lists the minimum number of disks required for each RAID level.

RAID Level	Minimum number of disks	Maximum number of disks
JBOD (Volume)	1	32
RAID0	2	32
RAID1	2	2
RAID1n	3	16
RAID10	4	32
RAID10n	6	32
RAID5	3	16
RAID50	6	32

Expanding Disk Capacity Online

Online capacity expansion (OCE) allows:

- Adding any number of disks to an array at any time
- Accessing the array data while it is being redistributed.

To increase the size and organization of an array, transform the array. Use the transform function as part of the system backup and recover strategy, by using RAID1, RAID10, RAID1n, and RAID10n array types.

Migrating RAID Levels Online

Online RAID Level Migration (ORLM) allows the system to move from one RAID level to another. While the migration is taking place, the data is accessible and protected to the lowest protection of either the source RAID level or the destination RAID level. The transform feature can be used to increase the size and organization of an array. It can also be used as part of the system backup and recover strategy through the use of the RAID1, RAID10, RAID1n, and RAID10n array types.

Performance Considerations

With RAID, performance is based on four elements:

- The number and organization of disks in an array
- Caching attributes being used for the array
- The application workload
- PCI bus speed.

Disks

RAID increases performance by putting more disks to work and by buffering data for the host. Many disks can transfer data at greater than 50 Megabytes per second. RAIDCore RC5000 Series RAID controllers can aggregate this bandwidth in an almost linear fashion, as more of the same drives are included in an array.

Caching

The RAIDCore RAID controller software can also be configured to provide read and write-back caching, if desired. Write-back caching has a large effect on most workloads, but should be used with caution.

Workload

When configuring an array, workload is probably the most important performance variable. Most applications do many more reads than writes, so the best performance will be obtained with array types like RAID0, RAID10, and RAID5.

PCI Bus Speed

Performance bottlenecks can be caused by the type of PCI bus you are using. The maximum theoretical performance of a PCI 32-bit 33-MHz bus is 132 Megabytes per second. Performance increases to 512 Megabytes per second with a PCI 64-bit 66-MHz bus. The best possible performance with the fewest bottlenecks on PCI-X systems can be obtained by using a PCI-X 64-bit 133-MHz bus. It offers 1024 Megabytes per second. For PCIe systems, RAIDCore RC52XX-08E adapters support a 4x link that offers 1024 Megabytes per second in each direction, for a theoretical throughput of 2048 Megabytes per second.

Reliability Considerations

Reliability is enhanced through data redundancy and backup.

Redundancy

RAID1, RAID10, RAID5, or RAID50 are necessary for redundancy. With redundancy, both capacity and performance are sacrificed for reliability. With RAIDCore RAID controllers, extremely high performance is obtained even with redundant-type arrays.

Backup

The controller's ability to transform arrays and split mirrors can be used as part of a backup strategy. For example, you can create a RAID1 or RAID10 array, yet periodically transform them into RAID1n and RAID10n arrays. The RAID1n and RAID10n arrays can be split into the original array and a backup array. As part of a hot fallback strategy, the backup array can be kept online and hidden from the operating system or remain visible, or it can be removed and stored as a backup device. When a boot array is split, the original and the copy are exact copies with the same labels. When using the Linux operating system, Ciprico Inc. recommends that you keep the split copy hidden during boot time, to avoid boot-time issues with duplicate labels.

Flexibility and Expansion Considerations

Before configuring an array, consider the following points to enhance the flexibility of your RAID system.

Multiple Types

Most RAID controllers do not allow

- Changing a chosen array type
- Creating more than one type of array for each controller
- Creating more than one array per physical disk.

With the RAIDCore RAID controller, different types of arrays can be created on the same disk, to adapt each array to the I/O that it processes. Depending on the array capacity and redundancy level, an existing array can be transformed to another RAID type, if the type of array being used is not the optimal type for the application. Also, different arrays with different characteristics can be built for different applications.

Operating System Considerations

An important array planning consideration is whether to extend the RAID benefits to the system disk and operating system, as well as to the data disks. For example, if the operating system is installed on a RAID1 array (mirror), split the array into two volumes. Hide one of the resulting volumes. The operating system can be recovered easily if the system disk fails. Alternatively, improve operating system performance by installing the operating system on a RAID10 array. Split the array and hide one of the RAID0 arrays (like a hot spare).