CS400-LC Hardware Replacement Procedures

HR90-2006

Contents

About the CS400-LC Hardware Replacement Procedures

The *CS400-LC Hardware Replacement Procedures* document includes procedures for replacing liquid cooling components in the SR6110 subrack and GB622X compute blade. It also includes procedures for replacing other components in the GB622X blade. Cray personnel or customers who perform these maintenance and replacement procedures must first complete Cray CCS hardware training and observe ESD precautions when servicing this equipment.

Document Versions

HR90-2006: This document supports the initial/FCS release of the CS400-LC hardware platform.

Required Tools

The cabinet and CS400-LC servers typically contain #1 or #2 Phillips machine screws. Typically, the only tools required to service components in the CS400-LC chassis are a set of Phillips screw drivers.

ESD Precautions

Observe electrostatic discharge (ESD) precautions during the entire removal and installation process. Required apparel includes an ESD smock, ESD shoes, and an ESD wrist strap.

CAUTION:

- **ESD Precautions**
- Observe all ESD precautions. Failure to do so can result in equipment damage.

ESD Smock

Wear a Cray approved static-dissipative smock when you service or handle an ESD-sensitive device. Completely button the smock and wear it as the outermost layer of clothing. You must have a portion of the smock's sleeves in direct contact with the skin of your arms. Skin contact is essential for a dissipative path-to-earth ground through your wrist strap. Tuck hair that exceeds shoulder length inside the back of the smock.

ESD Shoes

Wear approved static-dissipative shoes or approved dissipative heel straps on both shoes when you service or handle an ESD-sensitive device. When sensitive equipment is exposed to static discharge, ESD shoes provide a backup to the wrist straps and grounding cords and help prevent an excessive charge from building up on you when you contact the conductive flooring. Use dissipative footwear in addition to, not as an alternative to, a wrist strap.

ESD Wrist-strap

Wear a Cray approved wrist strap when you service or handle an ESD-sensitive device to eliminate possible ESD damage to equipment. Connect the wrist strap cord directly to earth ground.

Feedback

Visit the Cray Publications Portal at `https://pubs.cray.com` and use the "Contact us" link in the upper-right corner to make comments online. Your comments and suggestions are important to us. We will respond to them within 24 hours.

CCS Parts Repair and Replacement

Cray Cluster Supercomputer (CCS) Support is available to customers of Cray CS300, CS400, and CS-Storm systems. Four service tiers are available to CCS customers: Depot, Depot Rapid Exchange, Premium and Premium Plus.

CCS customers should initiate a request for support by creating a case in the *CrayPort* portal. For Premium and Premium Plus customers, support outside of local business hours can also be initiated by calling the after-hour support numbers.

This section provides information on the following service related topics:

- Requesting Part Repair or Replacement
- CS400-LC Spare Part Numbers

Requesting Part Repair or Replacement

Cray Cluster Supercomputer (CCS) customers and field support personnel must run appropriate diagnostics and perform troubleshooting before requesting part repair or replacement. These prerequisites are for replacement or repair of defective/suspect parts covered under a Cray Service Level Agreement (SLA). To streamline the return process, these prerequisites are being aligned with those of Cray's vendors. Cray Service will assist customers with troubleshooting and collaborate with vendors as needed. Cray remains the sole authority in granting a Return Materials Authorization (RMA). Cray may grant an RMA without diagnostic results for specific sites due to their security policies, or by authorization from a Cray executive, or for certain "Critical" cases as defined in the *Cray Cluster Supercomputer Support Operations Handbook*.

Troubleshooting Procedures and Requirements

Cray Service provides detailed troubleshooting requirements and procedures to diagnose and identify faulty hardware. These procedures are unique to specific part categories. Diagnostic utilities may be used to generate log files or output that must be sent to Cray Service when requested before an RMA request is processed. As a minimum, customers must demonstrate that the fault follows the suspect part. Cray will not repair or replace any returned part that does not comply with these troubleshooting requirements and procedures.

Return Materials Authorization Number

After an RMA is approved, Cray Service issues a unique RMA number for that part. A single RMA number is generated for each batch of identical parts. Orders containing different parts are issued different RMA numbers. For example, a replacement of 3 GPUs will share the same RMA number, but a replacement of 1 GPU and 1 HCA will be issued two RMA numbers. Cray will not repair or replace any returned part without an RMA number. Parts received by Cray without an RMA number will be returned as is.

Packaging and Shipping RMA Parts

All parts returned to Cray must be individually tagged and identified with the RMA number. They must be properly packaged to prevent shipping and ESD damage. If possible, customers should save and reuse Cray shipping boxes (in good condition) when returning parts. If this is not possible, customers should provide enough

packaging (antistatic bags and ESD foam) so there is at least 2 inches of threedimensional clearance between the part and the shipping box. Cray will not be responsible for any damage as a result of poor customer packaging and may return the damaged part as is, without repair or replacement. Customers may consolidate multiple RMA requests in a single CrayPort case. Similarly, customers may consolidate multiple RMAs in a single box, provided it meets Cray packaging recommendations.

Customers must print the CrayPort case number visibly and legibly on the exterior of the box or on the shipping address label.

CS400-LC Spare Part Numbers

Part Number	Description
Subrack	
101129200	SR6110 subrack, 6U
101192700	SR6110 fan module, liquid cooled systems
100991400	iSCB module (for SR6110 subrack)
22302-0313-10	iSCB module PCBA - IO/network, GB2 Gemini, 10/100, RJ45, reset/LED
22309-0005-04	iSCB module PCBA - CPU, GB2 IMX253, 16 node mgr, hot-swap (plugs to midplane)
101192700	SR6110 fan module, liquid cooled systems
23101-0312-10	SR6110 fan-replacement, 12V, 3000 rpm with LED and cable assembly - fan, tachometer, connector
GreenBlade Liquid Cooling	
101273200	Heatsink Kit - Liquid cooling, dual CPU pumps, KP motherboard
101273300	Heatsink Kit - Liquid cooling, dual CPU pumps, TP motherboard
101273400	Heatsink Kit - Liquid cooling, dual CPU pumps and memory tubes, TP motherboard
101320500	Tubing/pump clip, single tube, liquid cooling, PC/ABS black, KP motherboard
101320600	Tubing clip, dual tube, liquid cooling, PC/ABS black, KP motherboard
100165502	Cable tie, 2.8" L X 0.07" W (to restrain cooling tubes on GB-622X-TP blades)
RackCDU	
101433800	Quick connector, male thread, red (vendor p/n: 11-900-0000100)
101433900	Quick connector, male thread, blue (11-900-0000101)
101434000	Power supply assembly, 24V 80W (11-900-0000103)
101434100	Control box, RackCDU (11-900-0000104)
101434200	Cable, RackCDU LED indicator (11-900-0000115)
101434300	Sensor, RackCDU fluid level (11-900-0000107)
101434400	Sensor, RackCDU leak (11-900-0000106)
101434500	Sensor, RackCDU flow (11-900-0000105)

Part Number	Description
101434600	Sensor, facility liquid pressure (11-900-0000099)
101434700	Sensor, RackCDU server coolant pressure (11-900-0000108)
Motherboards, DIMMs and Processors	
101123200	Intel Kennedy Pass motherboard, dual Xeon Haswell, 8X DIMM, FDR IB (Connect-IB) on-board
101132800	Intel Kennedy Pass motherboard, dual Xeon Haswell, 8X DIMM, (No InfiniBand on-board)
101123800	Intel Taylor Pass motherboard, dual Xeon Haswell, 16X DIMM, QSFP FDR IB
101132900	Intel Taylor Pass motherboard, dual Xeon Haswell, 16X DIMM, (No InfiniBand on-board)
100944700	DIMM, 8GB DDR4-2133 Reg dual rank 2RX8
100961800	DIMM, 16GB DDR4-2133 Reg dual rank ECC 1.2V 1GX4
101107700	DIMM, 32GB DDR4-2133 Reg dual rank ECC 1.2V 1GX4
101159100	IC, processor, E5-2660 V3, 2.6 GHz 10C Haswell 105W
101169900	IC, processor, E5-2620 V3, 2.4 GHz 6C Haswell 85W
101187200	IC, processor, E5-2683 V3, 2.40 GHz 14C Haswell 120W
101245301	IC, processor, E5-2699 V3, 2.3 GHz 18C Haswell 145W, SR1XD
101278300	IC, processor, E5-2667 V3, 3.2 GHz 8C Haswell 135W
101078600	IC, processor, E5-2670 V3, 2.3 GHz 12C Haswell 120W, M1
101078700	IC, processor, E5-2680 V3, 2.5 GHz 12C Haswell 120W, M1
101078900	IC, processor, E5-2690 V3, 2.6 GHz 12C Haswell 135W, M1
101079000	IC, processor, E5-2695 V3, 2.3 GHz 14C Haswell 120W, C1
101079100	IC, processor, E5-2650 V3, 2.3 GHz 10C Haswell 105W, M1
101120400	IC, processor, E5-2698 V3, 2.3 GHz 10C Haswell 135W, 40M , C1
Disk Drives	
101030500	Disk drive, SATA 600 GB SSD, 2.5" 6 Gb/s, 20nm, Intel S3500
101032700	Disk drive, SATA 480 GB SSD, 2.5" 6 Gb/s, 20nm, Intel S3500
101178400	Disk drive, SATA 120 GB SSD, 2.5" 6 Gb/s, 20nm, Intel S3500
101178500	Disk drive, SATA 160 GB SSD, 2.5" 6 Gb/s, 20nm, Intel S3500
101178600	Disk drive, SATA 240 GB SSD, 2.5" 6 Gb/s, 20nm, Intel S3500
101178700	Disk drive, SATA 300 GB SSD, 2.5" 6 Gb/s, 20nm, Intel S3500
101178800	Disk drive, SATA 800 GB SSD, 2.5" 6 Gb/s, 20nm, Intel S3500
101179000	Disk drive, SATA 100 GB SSD, 2.5" 6 Gb/s, 25nm, Intel S3700
101179900	Disk drive, SATA 200 GB SSD, 2.5" 6 Gb/s, 25nm, Intel S3700
101180400	Disk drive, SATA 800 GB SSD, 2.5" 6 Gb/s, 25nm, Intel S3700

Part Number	Description
101180700	Disk drive, MSATA 120 GB SSD, 2.5" 6 Gb/s, 25nm, Intel 525
101180800	Disk drive, MSATA 180 GB SSD, 2.5" 6 Gb/s, 25nm, Intel 525
101180900	Disk drive, MSATA 240 GB SSD, 2.5" 6 Gb/s, 25nm, Intel 525
101181000	Disk drive, MSATA 60 GB SSD, 2.5" 6 Gb/s, 25nm, Intel 525
101181100	Disk drive, 400 GB SSD, 1/2 Height PCIe 2.0, 25nm, Intel 910
101181200	Disk drive, 800 GB SSD, 1/2 Height PCIe 2.0, 25nm, Intel 910
101205700	Disk drive, SATA 180 GB SSD, 2.5" 6 Gb/s, 20nm, R540/W490, Intel Pro 2500
101206400	Disk drive, SATA 120 GB SSD, 2.5" 6 Gb/s, 20nm, R540/W490, Intel Pro 2500
101206600	Disk drive, SATA 240 GB SSD, 2.5" 6 Gb/s, 20nm, R540/W490, Intel Pro 2500
101206700	Disk drive, SATA 480 GB SSD, 2.5" 6 Gb/s, 20nm, R540/W490, Intel Pro 2500
101238200	Disk drive, SATA 2 TB SSD, 2.5" 6 Gb/s, 7200 RPM, 128 MB Cache, Seagate Enterprise
160-00184B	Disk drive, SATA 500 GB SSD, 2.5" 6 Gb/s, 7200 RPM, 32 MB Cache, Seagate Constellation
160-00185C	Disk drive, SATA 250 GB SSD, 2.5" 6 Gb/s, 7200 RPM, 64 MB Cache, Seagate Constellation
160-00228A	Disk drive, SATA 1 TB SSD, 2.5" 6 Gb/s, 7200 RPM, 64 MB Cache, Seagate Constellation
160-00258A	Disk drive, SATA3 400 GB SSD, 2.5" 6 Gb/s, Read-500Mb/s, Write-460Mb/s, Intel
PCIe Cards	
100882500	PCIe3.0, x8, 40 GbE, HBA, dual-port, ConnectX-3, QSFP (MCX314A-BCBT)
101082500	PCIe3.0, x8, HCA, Connect-IB, single-port QSFP FDR, 56 Gb/s (MCB191A-FCAT)
101196800	PCIe3.0, x8, 40 GbE, HBA, single-port QSFP (MCX313A-BCBT)
101203000	PCIe3.0, 800 GB SSD, 1/2 height, 20 nm, R2800/W1900, P3700
101264800	PCIe3.0, 1.6 TB SSD, 1/2 height, 20 nm MLC, HHHL, P3700
101267000	PCIe3.0, 2.0 TB SSD, 1/2 height, 20 nm MLC, HHHL, P3700
101267100	PCIe3.0, 400 GB SSD, 1/2 height, 20 nm MLC, HHHL, P3700
101267200	PCIe3.0, 2.0 TB SSD, 1/2 height, 20 nm MLC, HHHL, P3600
101267300	PCIe3.0, 1.6 TB SSD, 1/2 height, 20 nm MLC, HHHL, P3600
101268500	PCIe3.0 x16, HCA ConnectX-4 VPI single-port QSFP, EDR 100 Gb/s InfiniBand
101278400	PCIe3.0 x16, HCA ConnectX-4 VPI dual-port QSFP, EDR 100 Gb/s InfiniBand
101290000	PCIe3.0 x16, HCA ConnectX-4 single-port QSFP, EDR 100 Gb/s InfiniBand
101290100	PCIe3.0 x16, HCA ConnectX-4 dual-port QSFP, EDR 100 Gb/s InfiniBand
132-00110B	PCIe2.0 x8, Intel True Scale Fabric InfiniBand, single-port, QSFP, QLE7300
132-00125A	PCIe2.0 x8, Intel True Scale Fabric InfiniBand, dual-port, QSFP, QLE7300
132-00128A	PCIe2.0 x8, Ethernet X520-DA2, dual-port, 10GB SFP+, low profile, full height
132-00137B	PCIe3.0 x8, HCA ConnectX-3 VPI single-port QSFP, 40Gb/s QDR IB, 10GbE

Part Number	Description
132-00138B	PCIe3.0 x8, HCA ConnectX-3 VPI dual-port QSFP, 40Gb/s QDR IB, 10GbE
132-00145A	PCIe3.0 x8, HCA ConnectX-3 VPI single-port QSFP, 40Gb/s FDR IB, 40GbE
132-00150A	PCIe3.0 x8, HCA ConnectX-3 EN dual-port SFP+, 10Gb/s, 40GbE
132-00157A	PCIe3.0 x4, HCA ConnectX-3 EN single-port SFP+, 10Gb/s, 10GbE
132-00159A	PCIe3.0 x16, HCA Connect-IB dual-port 56Gb/s FDR
Power Cords	
085-00370B	Power cord, LS14 TO LS26 10A-250V/277 1.2M
085-00374A	Power cord, LS14 TO LS26 10A-250V/277V 1.5M
085-00383A	Power cord, IEC LS25-LS26 250V TO 277V 1.5M

CS400-LC Additional Part Numbers

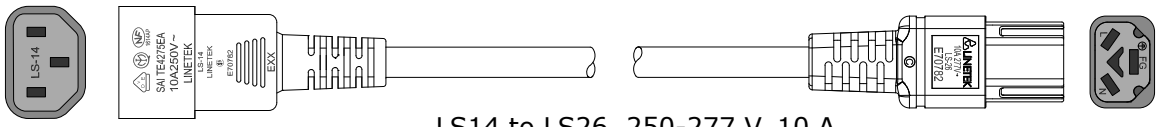
Part Number	Description
RackCDU and SR6110 Subrack	
101038000	Heat transfer fluid, DOWCAL 20, 2.6 gallon
22909-0162-01	Leak sensor cable assembly, daisy chain, 3P DTM to 3P PCB
22306-0006-05	Leak detection PCBA (used in 10 node leak detection tray)
22303-0080-00	PCBA front panel, 16 LED logo, liquid cooled
22302-0353-02	PCBA front panel, IO, fan control, ID SW board, liquid cooled
Thermal Interface Materials	
101007300	Thermal gap pads, 20 mm X 120 mm (for GB622X LC memory coolers
099-00048B	Thermal grease - G-751 1.0 grams (small syringe)
101175000	Thermal grease - G-751 1.5 grams (syringe)
100117501	Thermal grease - G-751 55 grams (tube)
Tools and Supplies	
10119380	Dispense gun, thermal grease (used to dispense the 55 gram tube)
100750100	Putty knife, plastic flexible, 1.5 in. wide

Power Cords

The following three power cords (085-) are part of the CS400-LC spare parts pool.

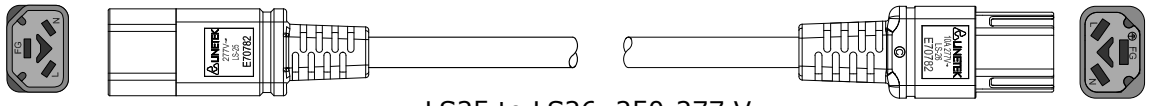
085-00370B 1.2 m (47 in.)

085-00374A 1.5 m (59 in.)



LS14 to LS26, 250-277 V, 10 A

085-00383A 1.5 m (59 in.)

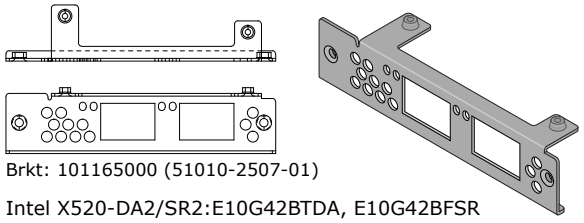


LS25 to LS26, 250-277 V

PCI Card Brackets

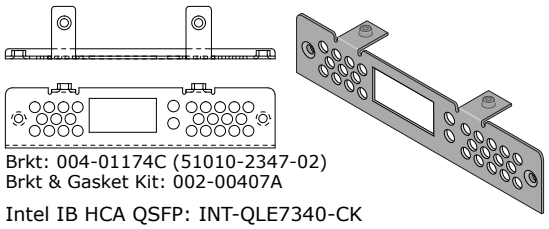
A custom PCI mounting bracket is required to install most PCI expansion cards in a GreenBlade chassis. The following custom Intel and Mellanox PCI brackets are available for popular expansion/add-on cards. If a bracket is not listed for the card that you want to add, please contact your Cray sales representative.

Intel PCI Brackets for GreenBlade Chassis



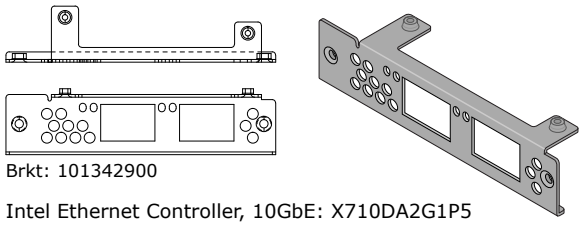
Brkt: 101165000 (51010-2507-01)

Intel X520-DA2/SR2:E10G42BTDA, E10G42BFSR



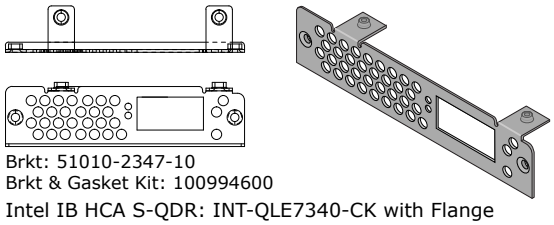
Brkt: 004-01174C (51010-2347-02)
Brkt & Gasket Kit: 002-00407A

Intel IB HCA QSFP: INT-QLE7340-CK



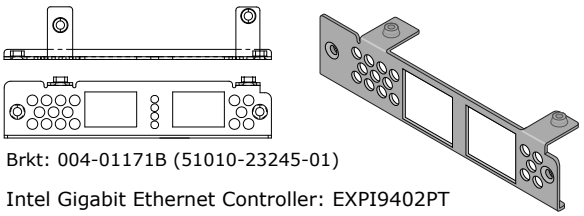
Brkt: 101342900

Intel Ethernet Controller, 10GbE: X710DA2G1P5



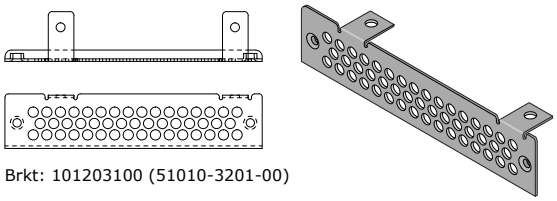
Brkt: 51010-2347-10
Brkt & Gasket Kit: 100994600

Intel IB HCA S-QDR: INT-QLE7340-CK with Flange



Brkt: 004-01171B (51010-23245-01)

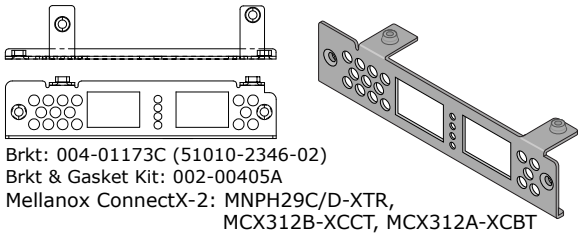
Intel Gigabit Ethernet Controller: EXPI9402PT



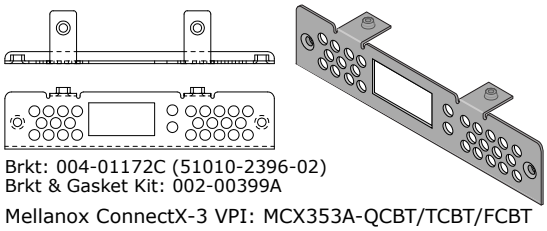
Brkt: 101203100 (51010-3201-00)

Intel SSD, P3600/P3700 series: SSDPEDMD016T401, SSDPEDMD800G401

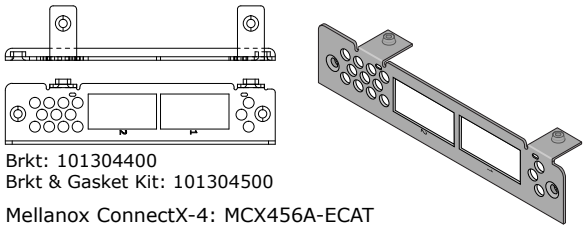
Mellanox PCI Brackets for GreenBlade Chassis



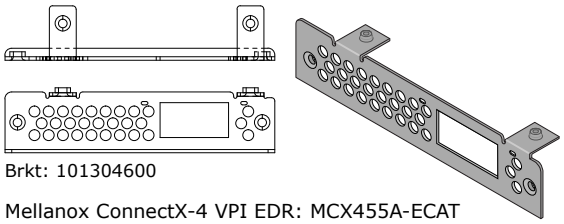
Brkt: 004-01173C (51010-2346-02)
Brkt & Gasket Kit: 002-00405A
Mellanox ConnectX-2: MNPH29C/D-XTR, MCX312B-XCCT, MCX312A-XCBT



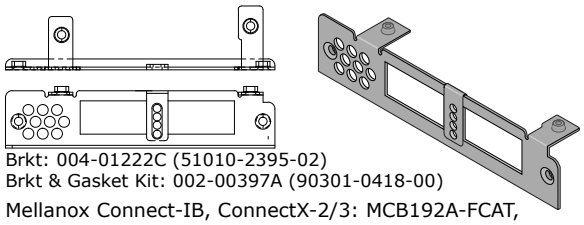
Brkt: 004-01172C (51010-2396-02)
Brkt & Gasket Kit: 002-00399A
Mellanox ConnectX-3 VPI: MCX353A-QCBT/TCBT/FCBT



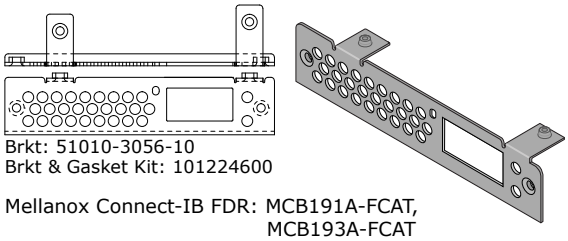
Brkt: 101304400
Brkt & Gasket Kit: 101304500
Mellanox ConnectX-4: MCX456A-ECAT



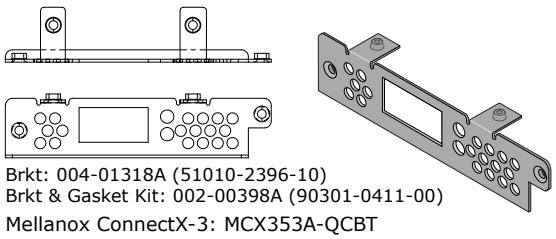
Brkt: 101304600
Mellanox ConnectX-4 VPI EDR: MCX455A-ECAT



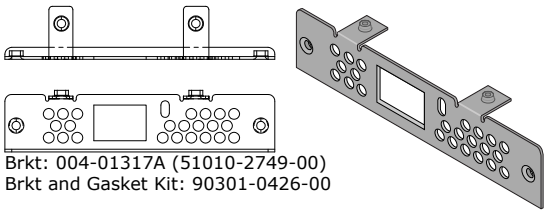
Brkt: 004-01222C (51010-2395-02)
Brkt & Gasket Kit: 002-00397A (90301-0418-00)
Mellanox Connect-IB, ConnectX-2/3: MCB192A-FCAT, MCB194A-FCAT, MCX354A-QCBT/TCBT/FCBT, MHQH29C-XTR, MHRH29C-XTR



Brkt: 51010-3056-10
Brkt & Gasket Kit: 101224600
Mellanox Connect-IB FDR: MCB191A-FCAT, MCB193A-FCAT



Brkt: 004-01318A (51010-2396-10)
Brkt & Gasket Kit: 002-00398A (90301-0411-00)
Mellanox ConnectX-3: MCX353A-QCBT



Brkt: 004-01317A (51010-2749-00)
Brkt and Gasket Kit: 90301-0426-00
Mellanox ConnectX-3 10GbE: MCX311A-XCCT/XCAT

GB622X Replacement Procedures

The following procedures are included in this section to prepare a GB622X chassis before replacing failing components/assemblies. The replacement procedures in this *CS400-LC Hardware Replacement Procedures* document begin with the GB622X chassis removed from the subrack and placed on an ESD safe work surface with the cover removed. These preparation procedures are not repeated in each component/assembly replacement procedure.

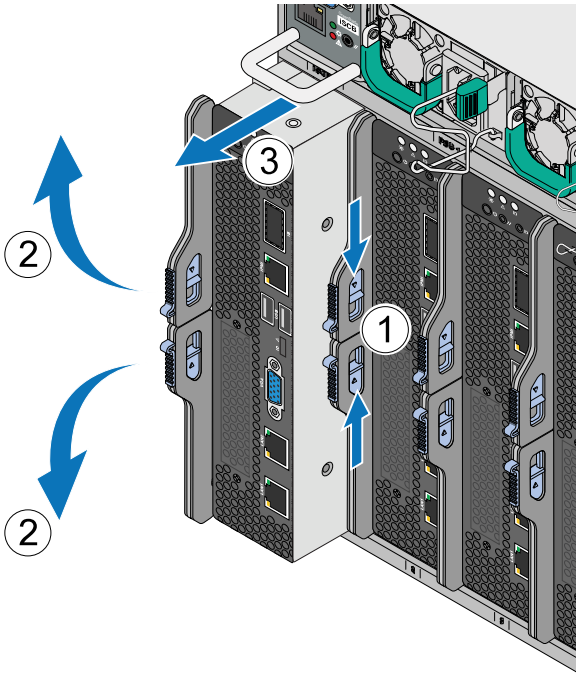
- GB622X Power Down
- GB622X Chassis Removal
- GB622X Cover Removal
- GB622X Cover Installation

GB622X Power Down

1. Power down the GB622X using ACE, IPMI, or iSCB commands.
2. Check that the power status LED on the front is off.
3. Disconnect all Ethernet, InfiniBand (IB), and other I/O cables.

GB622X Chassis Removal

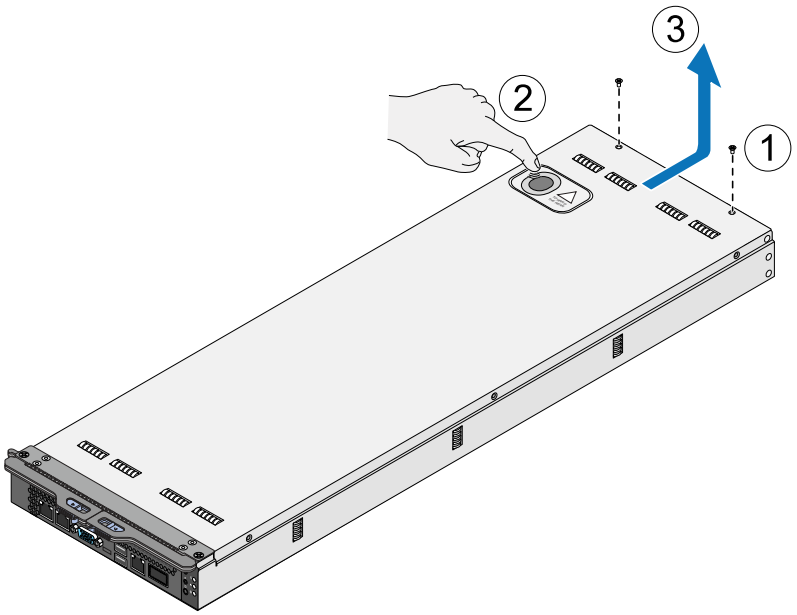
1. Press the blue, spring-loaded, latch in each ejector handle to release the lever from the front of the chassis. Refer to the following figure.



2. Pull and spread the two handles toward the sides of the GB622X to disengage the GB622X from the subrack chassis.
3. Lift up the handle at the bottom and pull the GB622X out of the subrack.

GB622X Cover Removal

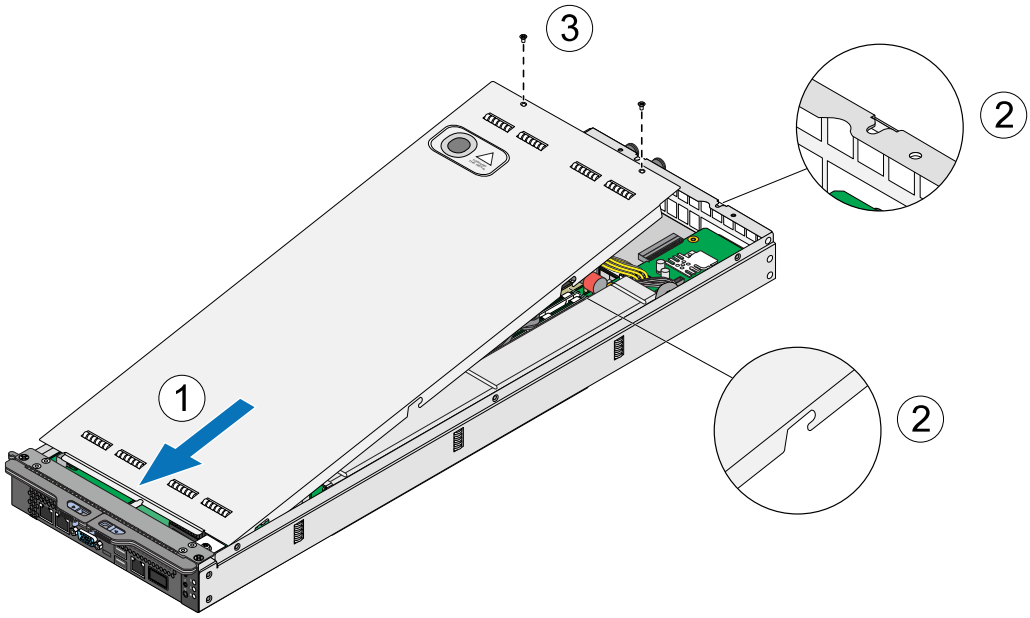
1. Remove the two screws that secure the cover to the chassis. Refer to the following figure.
2. Press down on the latch button and slide the cover toward the rear of the chassis.
3. Lift the cover and remove it.



GB622X Cover Installation

The top cover is a required component of the GB622X GreenBlade chassis. Do not attempt to insert a GreenBlade chassis into a subrack without the top cover in place.

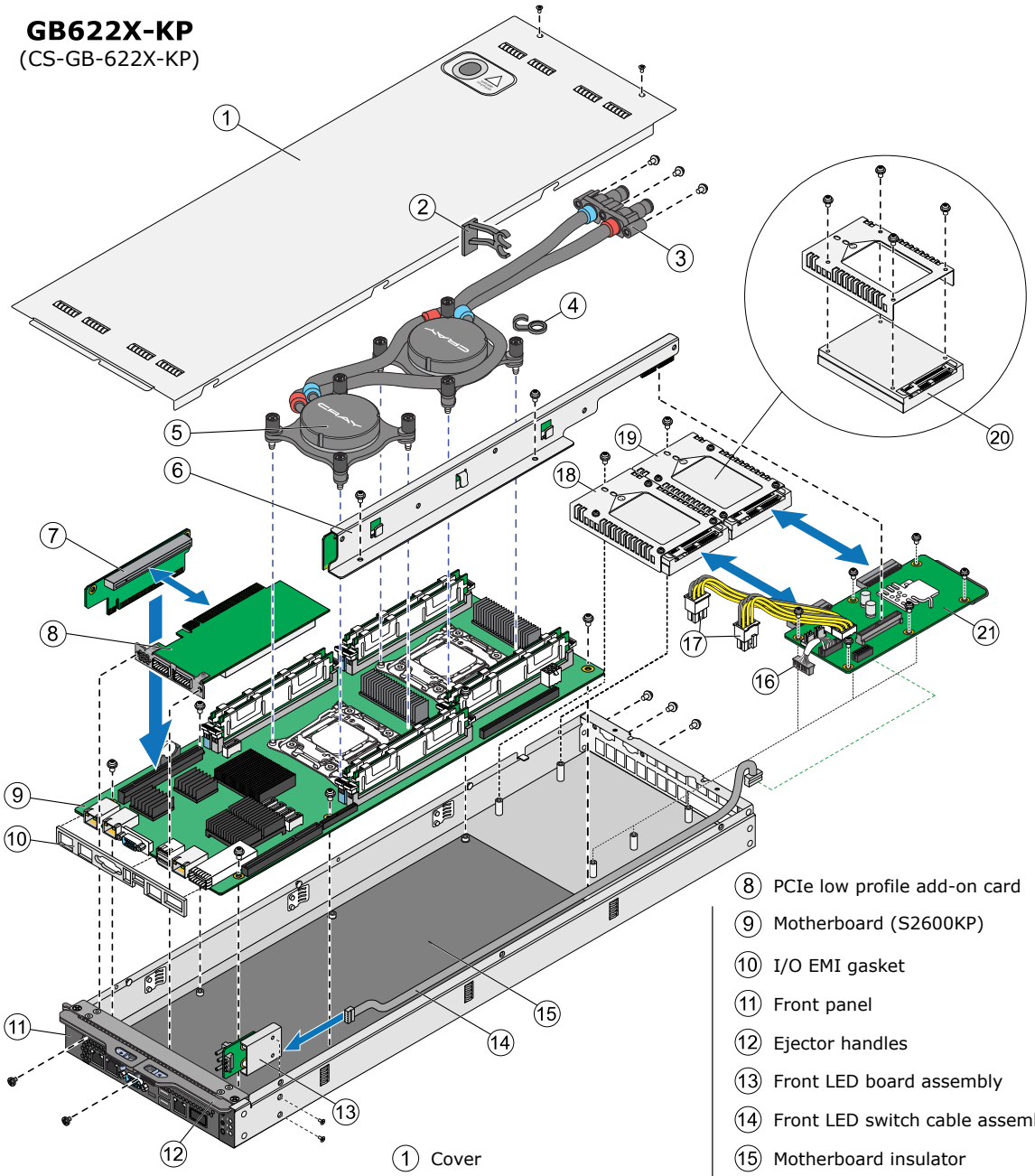
1. Tip the front of the cover down so the flange on the cover fits below the top of the front panel housing.
2. Lower the back of the cover. The cutouts on the side fit around the pins/rivets inside the chassis and the pins on the underside of the cover fit into the recesses in the rear panel.
3. Slide the cover forward and secure it to the chassis with two screws.



GB622X Exploded Views

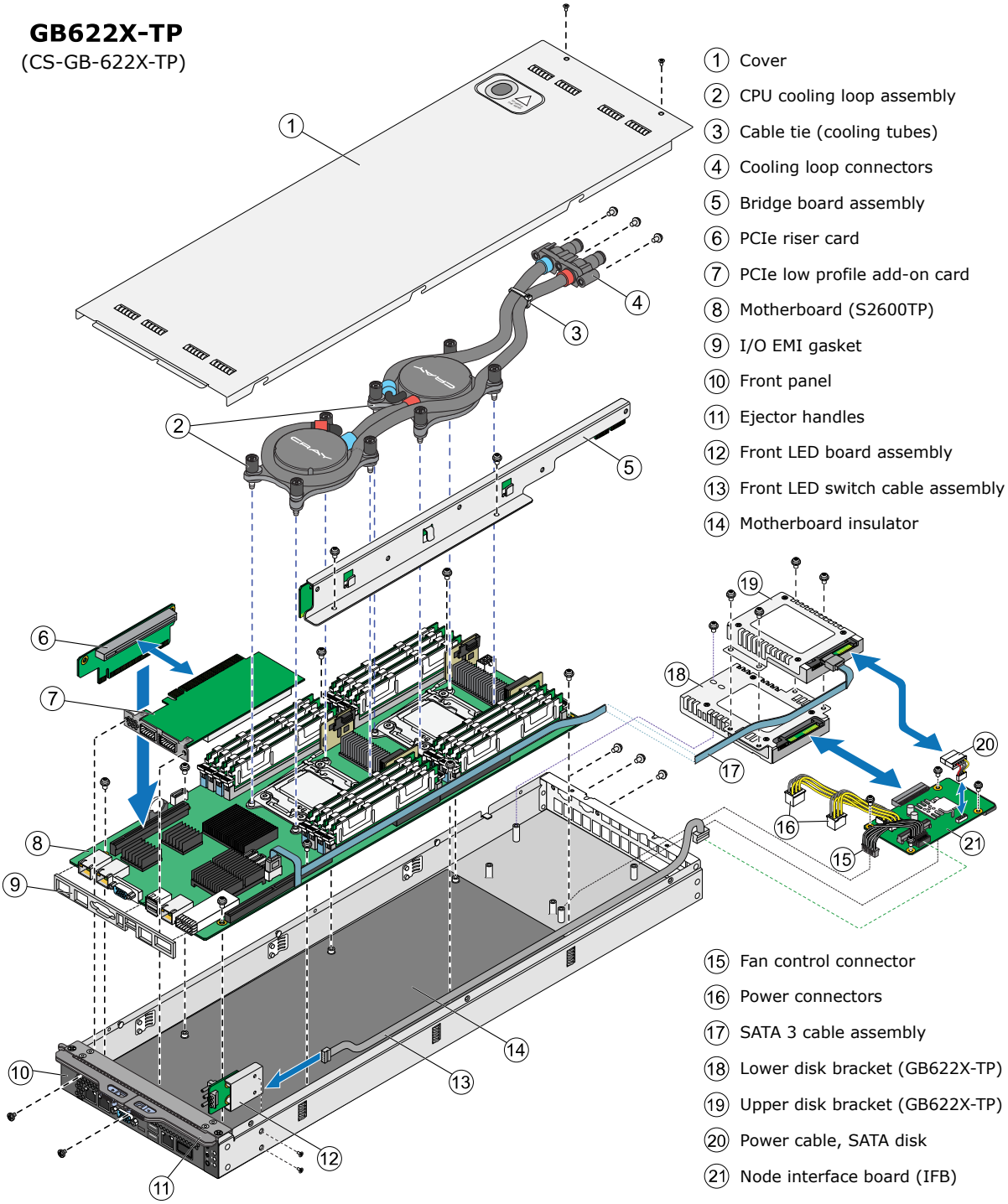
The following three exploded views of GB622X models show the internal components of each chassis. Refer to these illustrations when replacing components and following procedures. These detailed exploded views show screw locations, component placement, and the intended assembly of components. Detailed step-by-step information describing the location of components and screws for component removal and replacement is not provided in all the replacement procedures in this *CS400-LC Hardware Replacement Procedures* document.

GB622X-KP
(CS-GB-622X-KP)



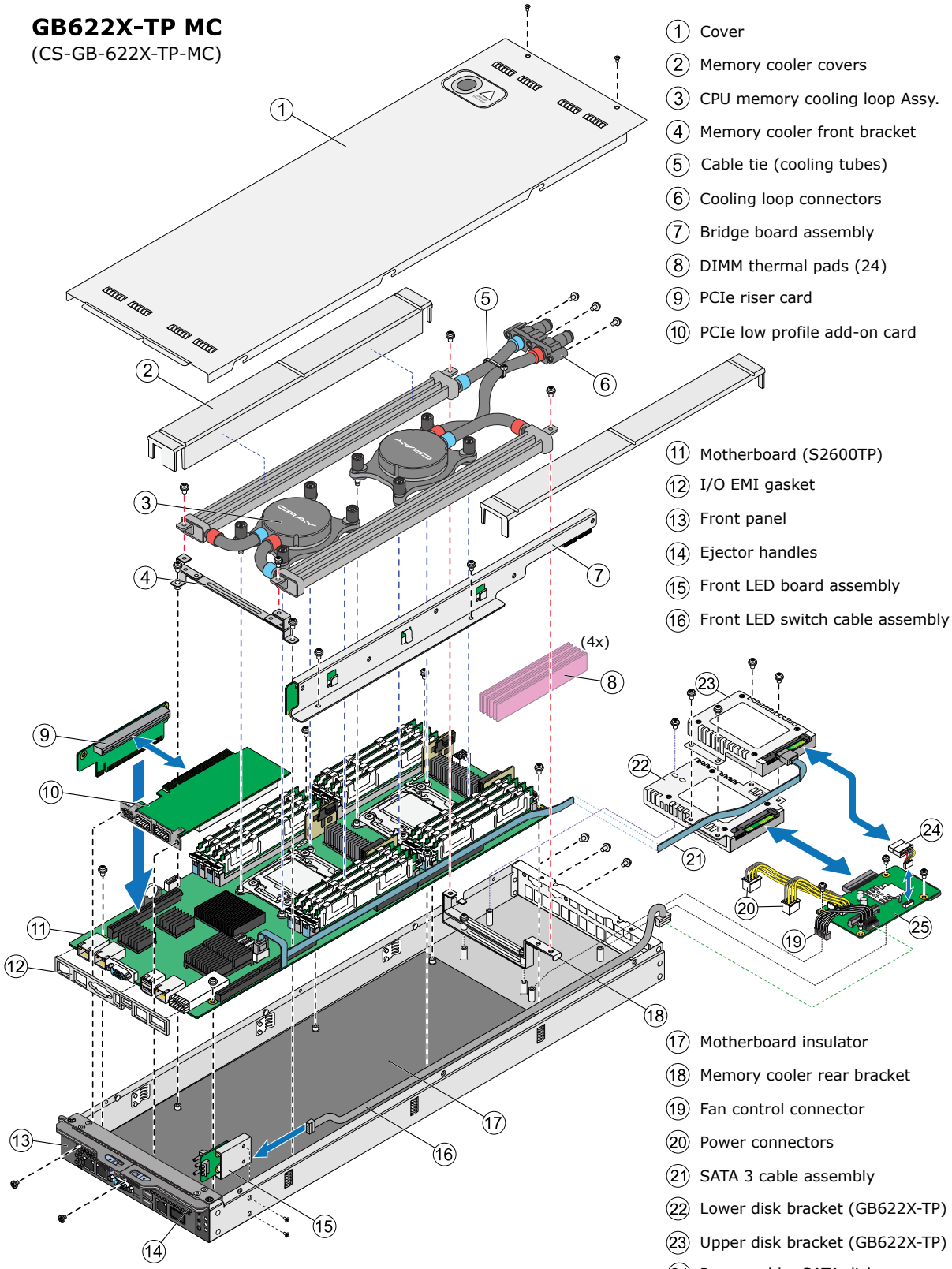
1. Cover
2. Liquid tube holder, GB622X-KP
3. Cooling loops connectors
4. Liquid tube clip, GB622X-KP
5. CPU cooling loop assy.
6. Bridge board assembly
7. PCIe riser card
8. PCIe low profile add-on card
9. Motherboard (S2600KP)
10. I/O EMI gasket
11. Front panel
12. Ejector handles
13. Front LED board assembly
14. Front LED switch cable assembly
15. Motherboard insulator
16. Fan control connector
17. Power connectors
18. Disk bracket number 1, GB622X-KP
19. Disk bracket number 2, GB622X-KP
20. SATA 2.5” SSD
21. Node interface board (IFB)

GB622X-TP
(CS-GB-622X-TP)



1. Cover
2. CPU cooling loop assembly
3. Cable tie (cooling tubes)
4. Cooling loop connectors
5. Bridge board assembly
6. PCIe riser card
7. PCIe low profile add-on card
8. Motherboard (S2600TP)
9. I/O EMI gasket
10. Front panel
11. Ejector handles
12. Front LED board assembly
13. Front LED switch cable assembly
14. Motherboard insulator
15. Fan control connector
16. Power connectors
17. SATA 3 cable assembly
18. Lower disk bracket (GB622X-TP)
19. Upper disk bracket (GB622X-TP)
20. Power cable, SATA disk
21. Node interface board (IFB)

GB622X-TP MC
(CS-GB-622X-TP-MC)



1. Cover
2. Memory cooler covers
3. CPU memory cooling loop Assy.
4. Memory cooler front bracket
5. Cable tie (cooling tubes)
6. Cooling loop connectors
7. Bridge board assembly
8. DIMM thermal pads (24)
9. PCIe riser card
10. PCIe low profile add-on card
11. Motherboard (S2600TP)
12. I/O EMI gasket
13. Front panel
14. Ejector handles
15. Front LED board assembly
16. Front LED switch cable assembly
17. Motherboard insulator
18. Memory cooler rear bracket
19. Fan control connector
20. Power connectors
21. SATA 3 cable assembly
22. Lower disk bracket (GB622X-TP)
23. Upper disk bracket (GB622X-TP)
24. Power cable, SATA disk
25. Node interface board (IFB)

DIMM Thermal Pad Replacement

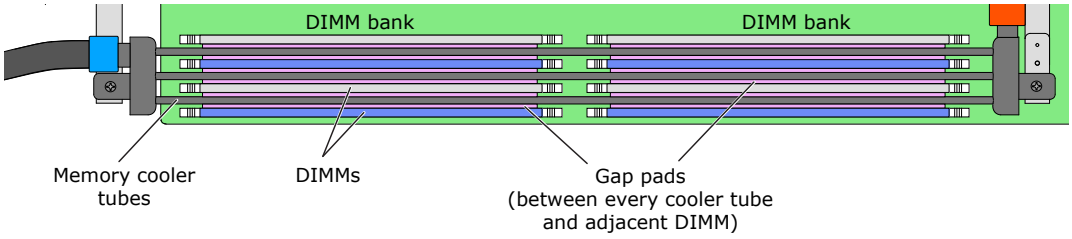
Prerequisites

- Part numbers: 101007300 - Thermal gap pads, 20 mm X 120 mm

About this task

Thermal gap pads provide a thermal conductive interface between the DIMMs and the memory liquid-cooling tubes, as shown in the following figure. A gap pad fills the uneven space between a DIMM and cooling tube and transfers heat to the memory cooling tube.

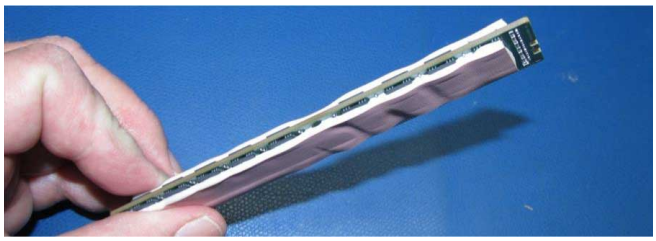
The gap pads are manufactured on a roll. For a GB622X-TP blade with memory cooling tubes (S2600TP, 16 DIMMs), 24 gap pads are used.

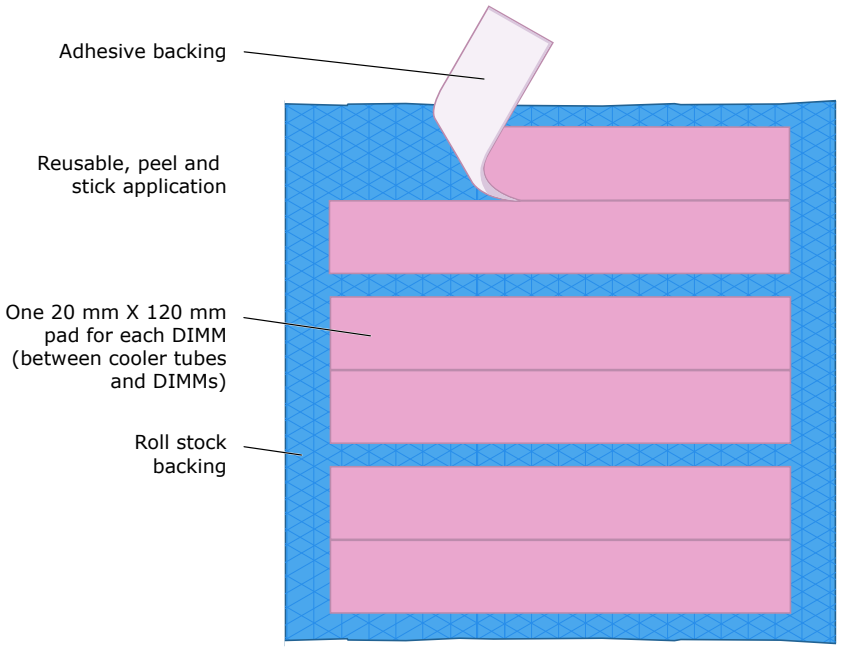


Application (refer to the following figure)

- The pads have an adhesive on one side for sticking them the DIMMs.
- If care is taken, a gap pad on a DIMM may be repositioned.
- Special care should be taken when removing a pad to avoid tearing or delamination.
- DIMM modules can be removed/replaced with the memory coolers in place.
- A defective DIMM can be replaced by moving the gap pad from the defective DIMM to the replacement DIMM.

Thermal gap pads attached to DIMM





GB622X Cooling Assembly Replacement

Prerequisites

- The GB622X blade is removed from the subrack and is placed on a stable ESD-safe work surface.
- Thermal grease on the processors is removed using isopropyl alcohol and wipes or a lint free cloth.
- Part numbers:
  - 101273200 - Heatsink Kit - Liquid cooling, dual CPU pumps, KP motherboard
  - 101273300 - Heatsink Kit - Liquid cooling, dual CPU pumps, TP motherboard
  - 101273400 - Heatsink Kit - Liquid cooling, dual CPU pumps and memory tubes, TP motherboard

About this task

This procedure describes replacing a processor and memory cooling assembly. Refer to *GB622X Exploded Views* on page 15.

Procedure

Remove Processor and Memory Cooling Assembly

1. Remove both memory cooler covers.
2. Disconnect both of the pump power cords from the node IFB (FAN1, FAN2).
3. Remove the three screws holding the cooling loop connectors to the rear of the GreenBlade chassis.

4. Remove the four screws holding the memory coolers to the mounting brackets.

5. Lift the memory cooling tubes from each side out from between the DIMMs. Set the cooling tubes on top of the DIMMs so the entire assembly can be removed in one motion once the processor pumps are disconnected.

6. Begin to hand loosen the screws on each pump following a diagonal/crisscross pattern.

   Proceed to loosen the screws by giving each screw two rotations. Repeat this process by loosening each screw two rotations, each time, until all screws are loosened.

7. Grasp a pump in each hand and lift the pumps straight up off the processor. Gently rotate your wrists to cradle the memory cooling tubes in your hands and wrists. Set the entire assembly aside upside down on an ESD-safe work surface.

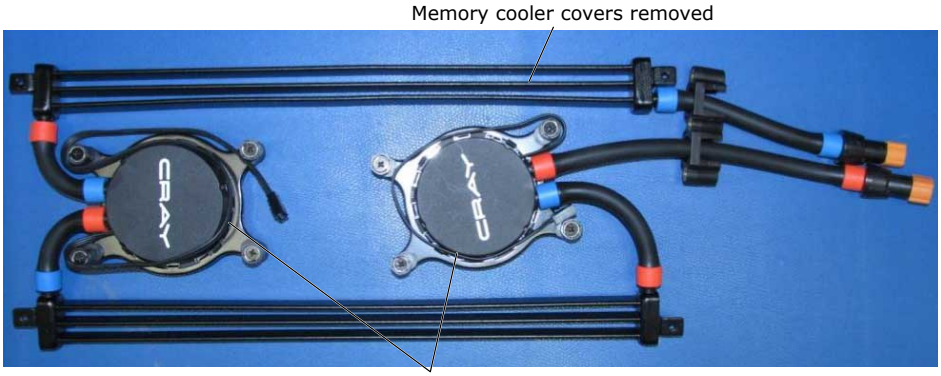
Prepare Replacement Cooling Assembly

8. Place the new cooling assembly (heatsink kit) on the work surface near the GB622X blade.

9. Carefully remove the packaging.

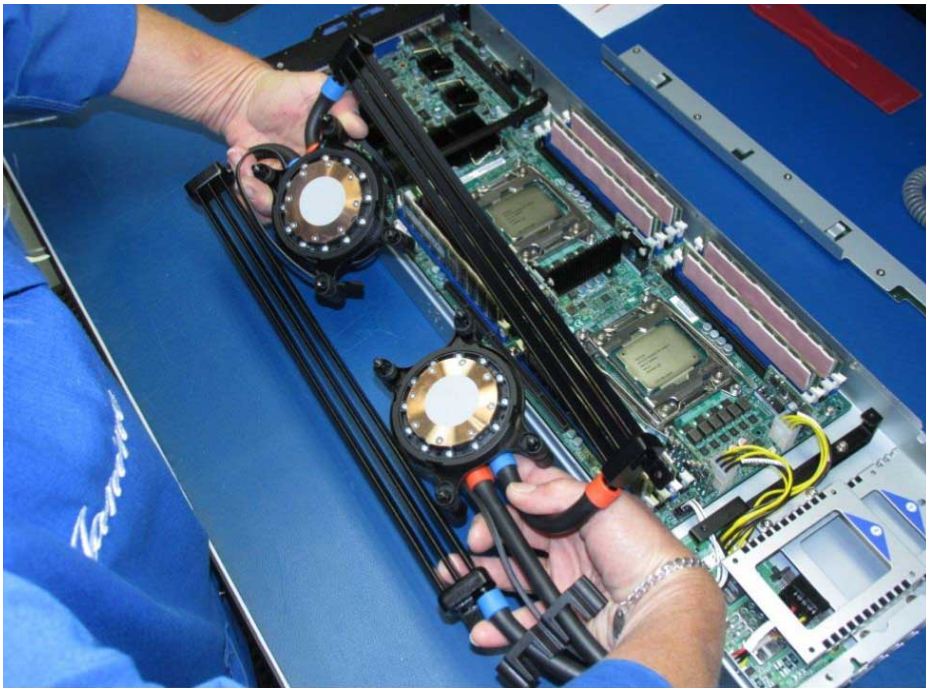
   CAUTION: Cooling assembly kits are factory filled with cooling fluid. Handle the kit assemblies carefully to prevent damage to any of the sealed connections or cooling tubes.

10. Check that both processor power cables are wrapped/retained around the mounting screws to prevent the cords from getting caught under the pumps during installation.



11. If using a kit that includes memory coolers, remove both memory cooler covers before installing the kit.

12. Lift the assembly by grasping each pump and cradling the hoses and memory coolers in your hands and wrists as shown.

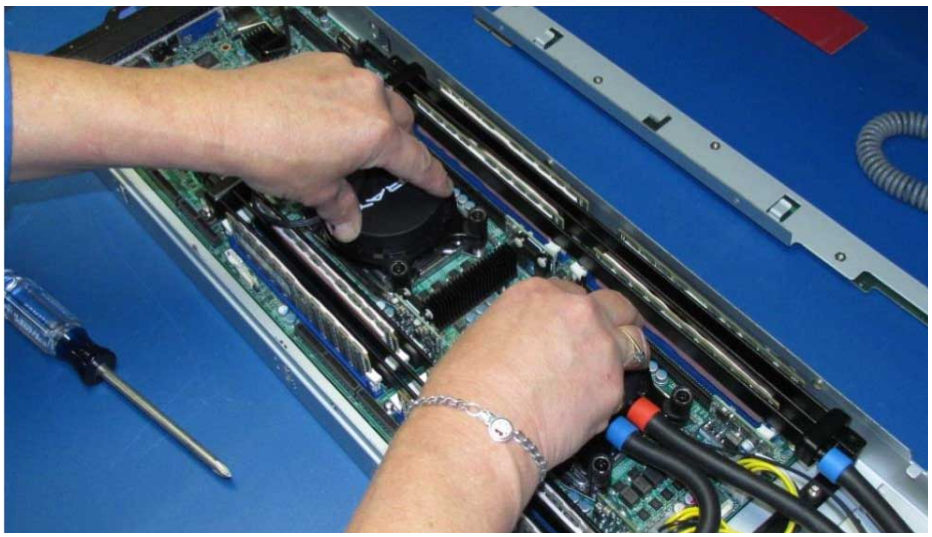


13. Check that thermal interface material is applied to the cold plates on each pump.

Install Pumps

14. Carefully position the memory coolers on top of the DIMMs while holding the pumps.

15. Align the mounting screws on each pump with the threaded holes of the heatsink studs while lowering the assembly.



16. Begin to hand tighten the screws on each pump following a diagonal pattern. Do not fully tighten the screws at this point.

17. Check that the pump power cords and coolant tubes are placed where they won't be pinched or kinked when the pumps and memory coolers are completely fastened.

18. Complete hand tightening the pump screws in the same diagonal pattern. Torque to 9 lb-ft.

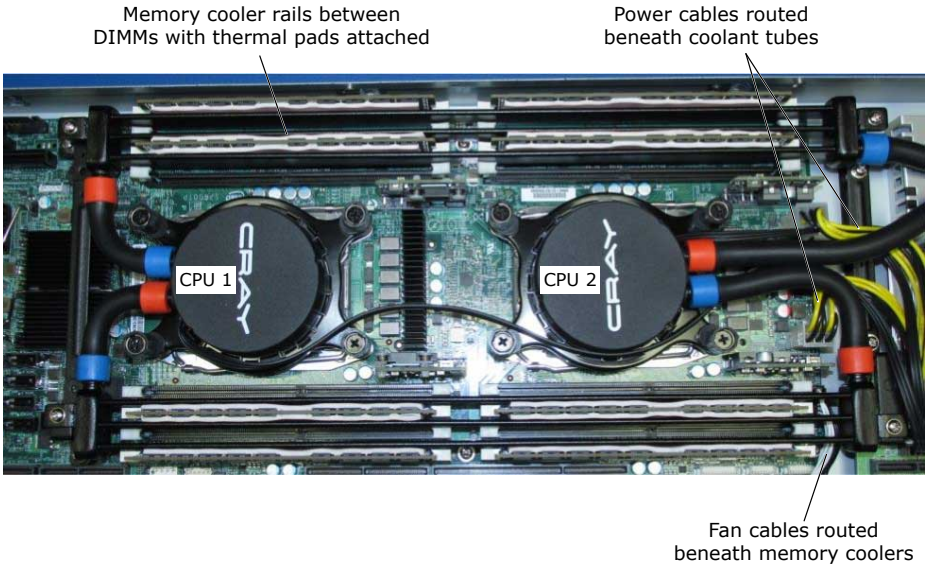
19. Route the pump power connector cords and plug them into the correct fan connectors on the node IFB. (CPU 1 to FAN1, CPU 2 to FAN2)

Fasten Memory Coolers

20. Adjust the memory coolers to fit in between the DIMM slots.

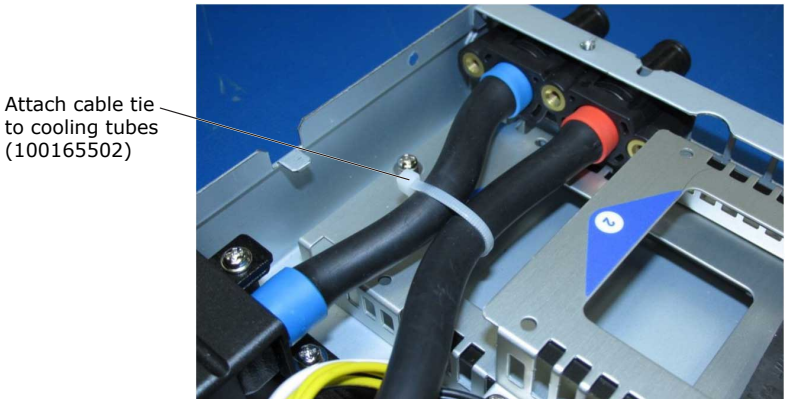
21. Check that the fan and power cables between the motherboard and node IFB are not pinched/obstructed when the memory coolers are fully seated.

22. Secure the memory coolers to the mounting brackets with four M3 screws (included).



Connect Quick Connectors to Blade Chassis

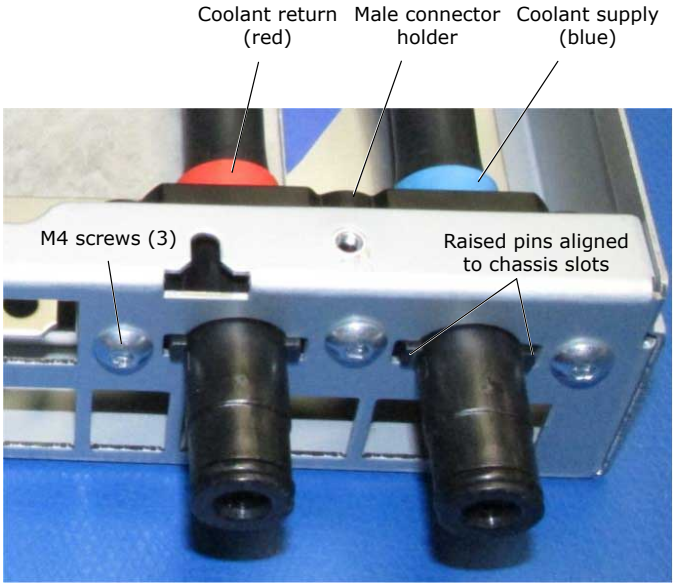
23. Attach a cable tie around the two cooling tubes as shown to restrain the tubes from resting against the metal lower-drive bracket.



24. Remove the protective orange caps from each male quick connector.

25. Attach the connector holder to the red and blue male connectors.

26. Align the pins on the male connector holder to the slots in the chassis as shown below. Screw the connector holder to the chassis with three M4 screws (included).



Complete the Installation

27. Install the memory cooler covers.

28. Reassemble disk drives, PCI cards, or other components/parts that were removed before replacing the processor/memory cooling assembly.

PCIe Card Installation

Prerequisites

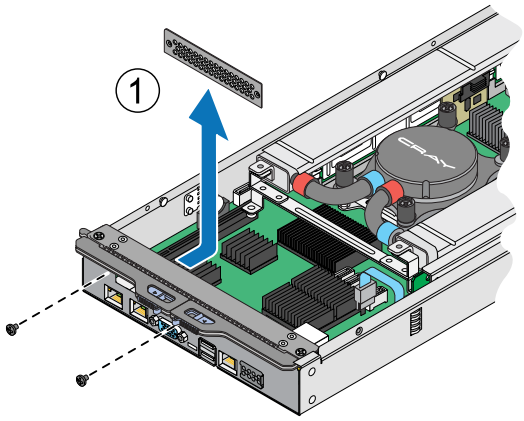
- **Part Numbers:**
  - Refer to *CS400-LC Spare Part Numbers* on page 6 for available PCIe add-on cards.
  - Refer to *PCI Card Brackets* for a list of mounting brackets to be used with the available PCIe add-on cards.

About this task

This procedure describes how to install an add-on card into a GreenBlade chassis. Refer to the corresponding step numbers in the following figures. To remove a PCIe card, follow the steps in reverse.

Procedure

1. If necessary, remove the blank PCI slot bracket from the front panel.



2. Many PCIe cards require removal of the manufacturer's bracket before installing the card in a GreenBlade chassis. Refer to the figure below.

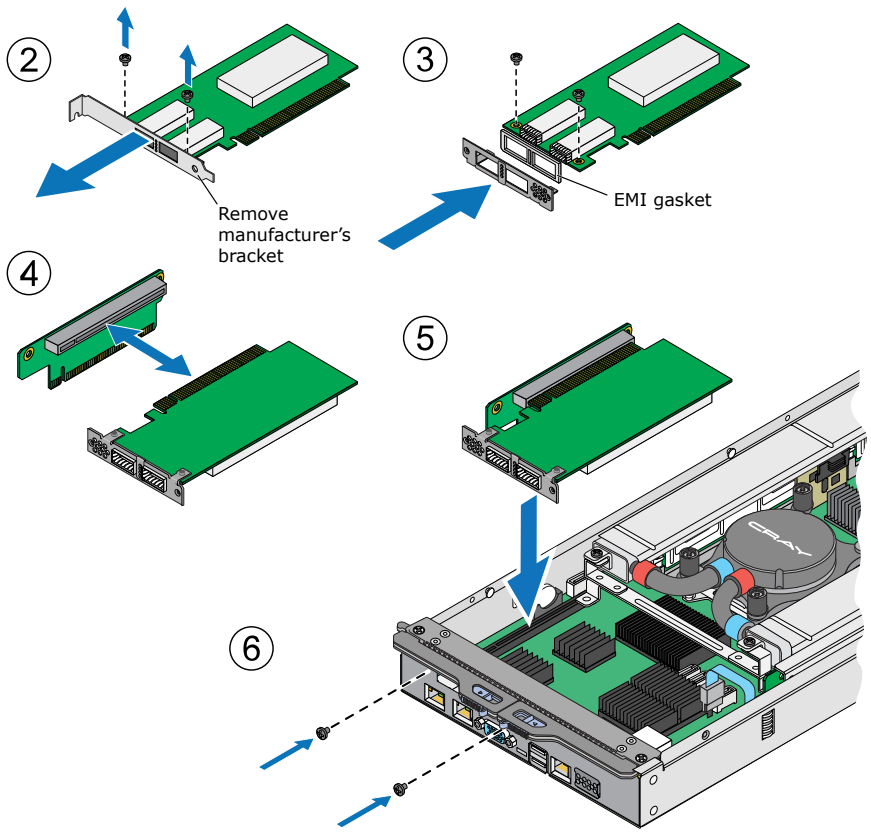
3. Attach a mounting bracket and EMI gasket to the PCI card.

   A custom Cray PCI mounting bracket is needed to install most PCI cards into a GreenBlade chassis. Cray has custom brackets and EMI gaskets for supported add-on cards.

4. Attach the slot 1 PCI riser card to the add-on card as shown.

5. Install the PCI card assembly into the chassis by inserting the riser card into the open PCI slot 1 connector.

6. Secure the bracket to the front panel using two M3-0.50 X 4mm screws. Check that the EMI gasket and bracket are not obstructing any LEDs or light pipes.



SATA SSD Replacement

About this task

This procedure describes how to replace an internal SSD in a GreenBlade chassis. For many of the steps, refer to the corresponding number in the following figure.

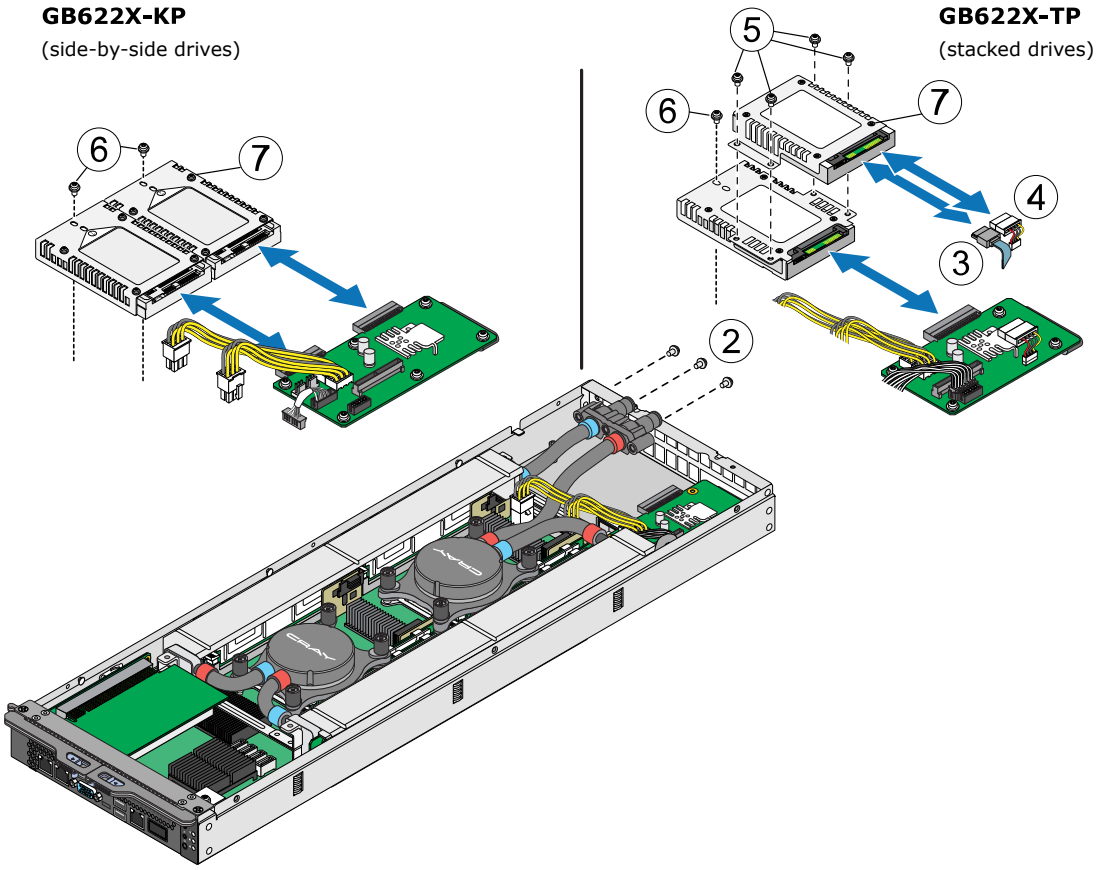
Refer to *CS400-LC Spare Part Numbers* on page 6 for a list of available GreenBlade SSD drives.

Procedure

1. Remove the GreenBlade chassis from the subrack and place it on a stable ESD-safe work surface. Remove the cover.

2. GB622X-TP (bottom drive removal). Remove the three screws holding the cooling loop connector bracket to the chassis. Refer to the following figure.

   To provide enough room to remove/install the bottom drive in the stacked configuration, remove the cooling connector bracket and rest it on the end of the chassis.



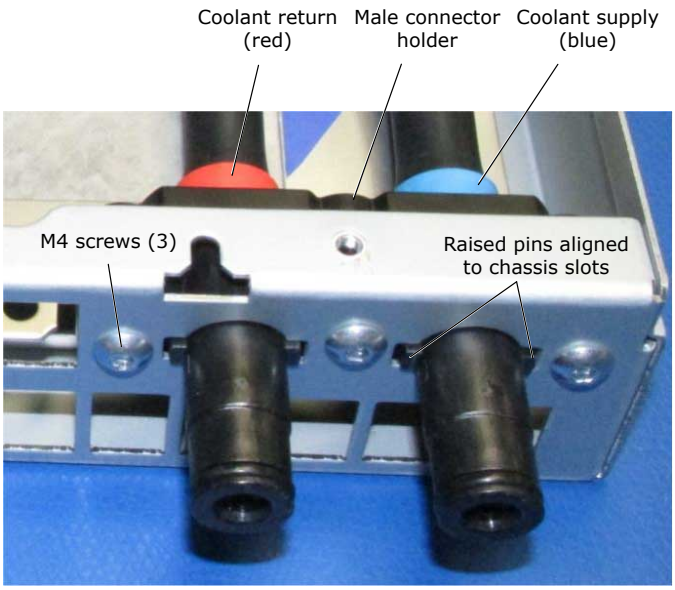
3. GB622X-TP: Disconnect the SATA cable from the top (number 2) drive.
4. GB622X-TP: Disconnect the 5-pin power cable from the top (number 2) drive.
5. GB622X-TP: Remove the four screws that mount the top drive bracket to the bottom bracket.

   The top drive and bracket can then be removed from the chassis.
6. Remove the screw(s) [6/32X5/16] that mount the drive brackets to the base of the chassis.

   The remaining drives can now be disconnected from the chassis.
7. The SSD is attached to the drive bracket by four screws [M3X4.0].
8. After replacing a drive(s), reconnect the drive/cables.
9. Reconnect the cooling loop connector bracket to the rear of the chassis.

CAUTION:

- **Make sure the raised pins on the connector bracket align with the slots in the chassis as shown below.**
- If they are not aligned, the rear edge of the chassis could bend when tightening the three screws and the coolant connectors may not align to the blind mate connectors when the GB622X is inserted into the subrack.



Processor and Heatsink Replacement

Prerequisites

- The 2600 motherboard is removed from the chassis and is placed on a stable ESD-safe work surface.
- **Part Numbers:**
  - Refer to *CS400-LC Spare Part Numbers* on page 6 for a list of all spare processor models and common supplies and tools.
- **Tools:**
  - Phillips screwdriver, #2
  - Vacuum pen
  - Plastic putty knife
- **Supplies:**
  - Isopropyl alcohol, 90% or higher concentration
  - Clean, lint-free cloth
  - Thermal paste/grease

About this task

This procedure describes how to replace a passive heatsink and processor from an Intel® S2600 motherboard.

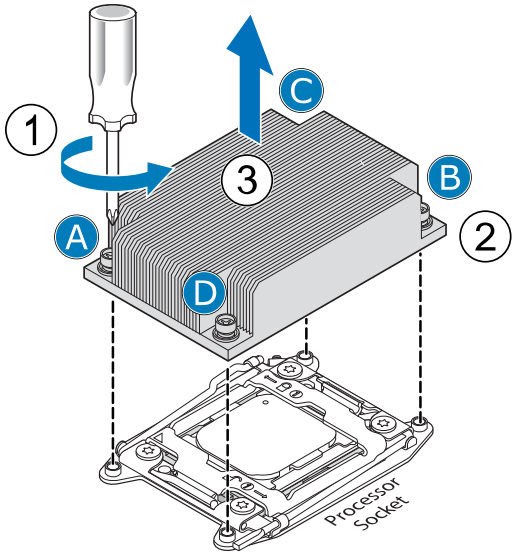
Motherboards are not shipped with processors installed. Processors, heatsinks, and memory DIMMs must be removed from the defective motherboard and installed on the replacement motherboard.

Procedure

Remove Heatsink

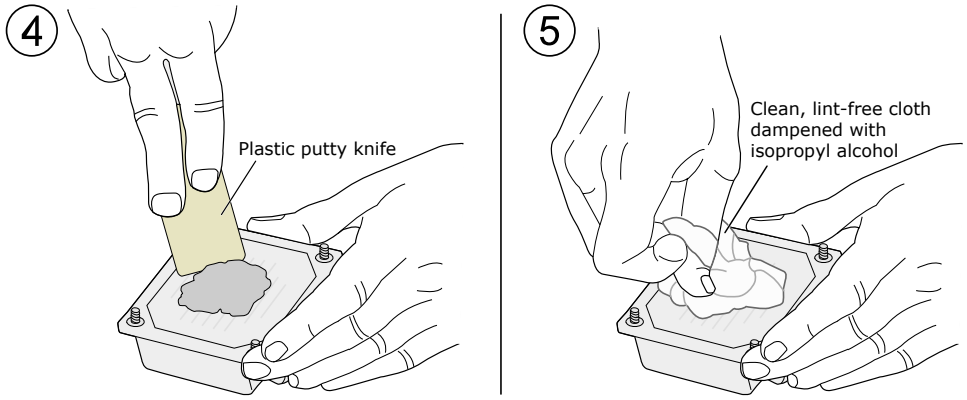
The heatsink is attached to the processor socket with captive fasteners. Use a #2 Phillips screwdriver to loosen four screws located on the heatsink corners in a diagonal pattern.

1. Start with one screw (A) and loosen it by giving it two rotations. Refer to the following figure.
2. Proceed to loosen the remaining screws (B, C and D) by giving each two rotations. Repeat this process by loosening each screw two rotations, each time, until all screws are loosened.
3. Lift the heatsink straight up.



Clean Heatsink and Processor

4. Use a plastic putty knife to remove excess thermal interface material (paste/grease) from the heatsink.
5. Clean the heatsink with a clean, lint-free cloth dampened with isopropyl alcohol. Make sure the cloth is not dripping. Do not use paper towel as it will leave lint behind.



6. Clean the processor with a new cloth dampened with isopropyl alcohol. Take your time to prevent any alcohol or thermal paste debris from contaminating the processor socket.

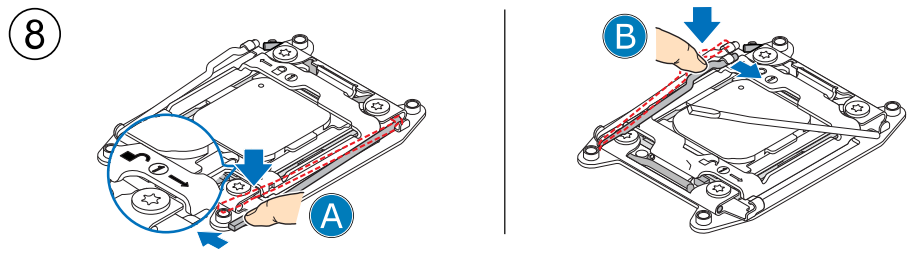
7. Use a dry cloth to dry the processor and heatsink so they are ready for a new application of thermal paste.

Remove Processor

8. Unlatch the processor load plate as shown in the following figure.

a. First, release the lever handle marked with the "Unlock (1)" symbol

b. Next, release the second lever handle.

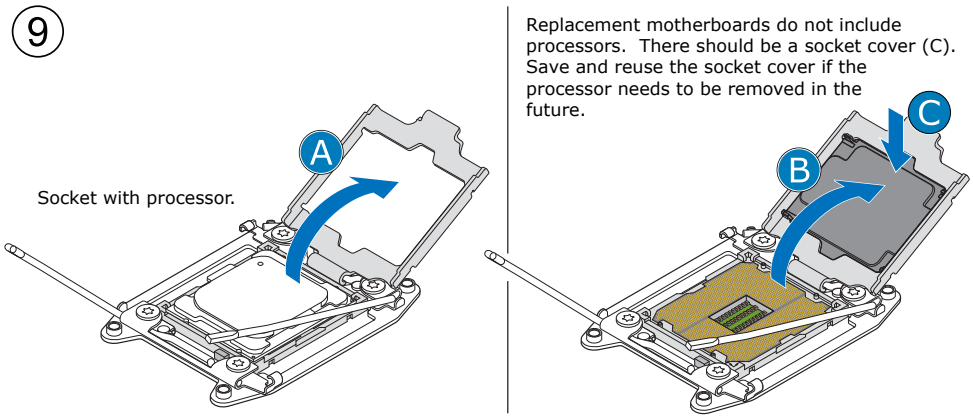


9. Open the load plate.

a. Lift the load plate.

b. For a replacement motherboard, open the latch taking care not to touch any of the pins inside the socket.

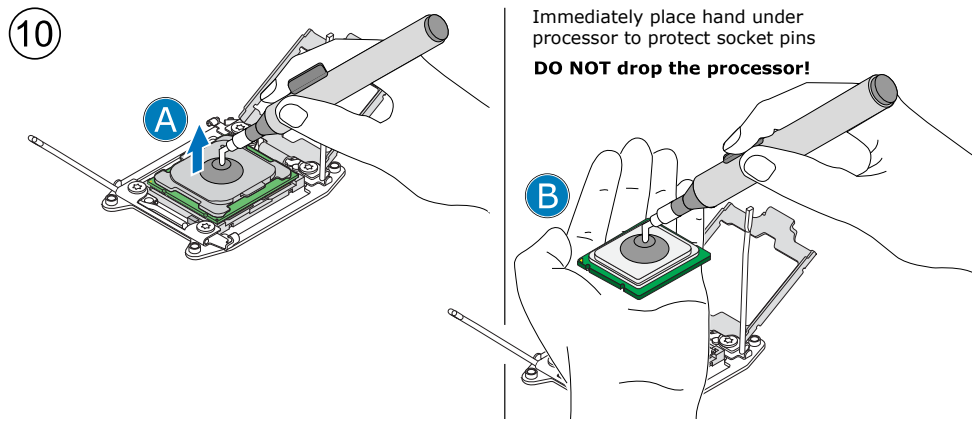
c. Remove the socket cover from the load plate by pressing it out.



10. Remove the processor. Cray Service recommends using a vacuum pen to install and remove processors.

a. Carefully lift the processor out of the socket. DO NOT drop the processor on the socket pins.

b. Immediately place your other hand underneath the processor to protect the socket pins. Place the processor on an ESD-safe work surface.



Install Replacement Processor

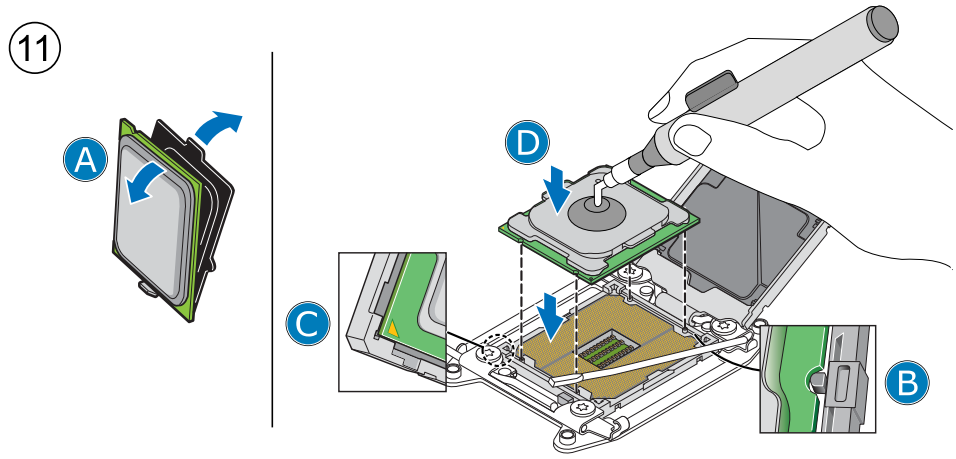
11. Install the replacement processor.

a. If necessary, remove the processor from its packaging. Carefully remove the protective cover from the bottom side of the processor, taking care not to touch any contacts.

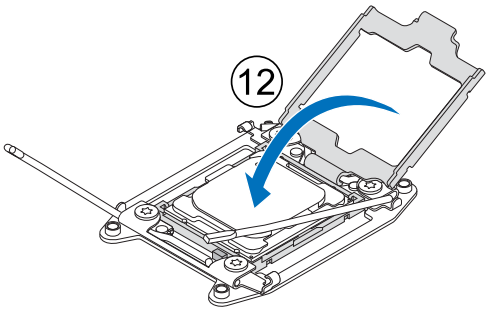
b. Orient the processor with the socket so that the processor cutouts match the four orientation posts on the socket.

c. Note the location of a gold key at the corner of the processor.

d. Carefully place (DO NOT drop) the processor into the socket. Hold the processor down with your finger as you release the vacuum pencil.



12. Close the load plate. Carefully lower the load plate down over the processor.

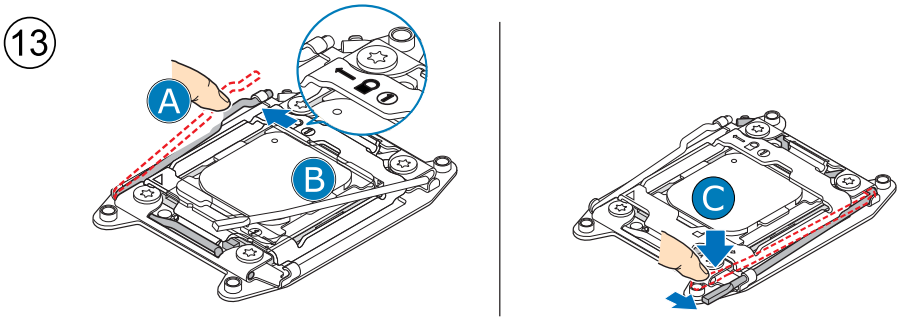


13. Lock the load plate.

a. Push down on the locking lever marked with the "Lock (1)" symbol.

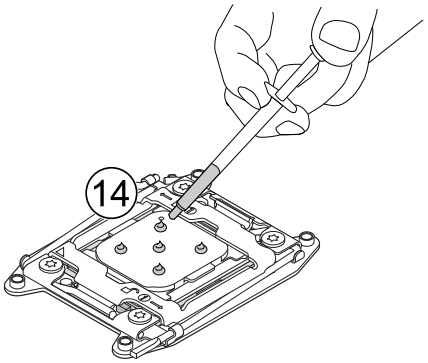
b. Slide the tip of the lever under the notch in the load plate. Make sure the load plate tab engages under the socket lever when fully closed.

c. Repeat the steps to latch the locking lever on the other side. Latch the levers in the order shown.



Install Heatsink

14. Apply thermal grease to the heatsink as shown. Apply 5 small dabs/drops of thermal grease in an X pattern. Do not spread the grease. (If using a new heatsink, remove the protective film covering the thermal interface material on the bottom side of the heat sink; no grease is needed for this situation.)



15. Attach the heatsink. Position the heatsink fins in the proper orientation.

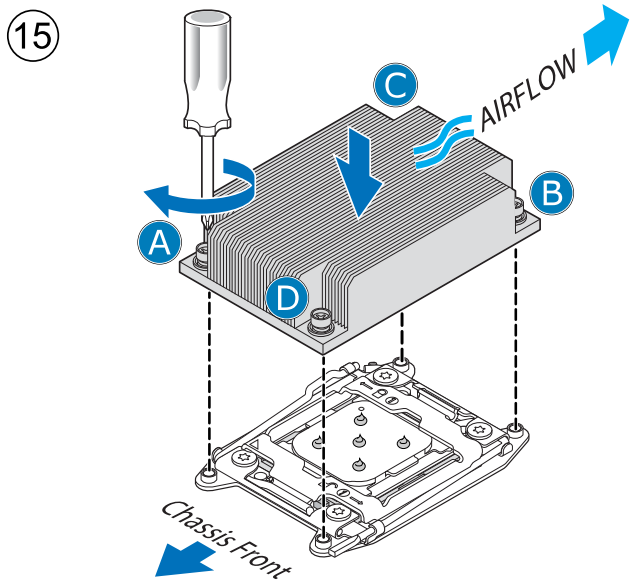
a. Start with screw A and engage the screw threads by giving it two rotations. (Do not fully tighten.)

b. Proceed to screw B and engage screw threads by giving it two rotations. Continue by engaging screws C and D.

c. Continue by giving each screw, using the same pattern, two rotations each time until each screw is lightly tightened. Torque each screw to 8 inch-lbs.

CAUTION:

- **The heatsinks for processor 1 and processor 2 are different.**
- S2600 motherboards use two different heatsinks for processors 1 and 2. The two heatsinks are not interchangeable. Using the wrong heatsink will cause serious thermal damage. A heatsink (and socket cover) is required even if no processor is installed.



DIMM Replacement

Prerequisites

- **Part Numbers:**
  - 100944700 - DIMM, 8GB DDR4-2133 Reg dual rank 2RX8
  - 100961800 - DIMM, 16GB DDR4-2133 Reg dual rank ECC 1.2V 1GX4
  - 101107700 - DIMM, 32GB DDR4-2133 Reg dual rank ECC 1.2V 1GX4

About this task

This procedure describes how to replace DIMM modules.

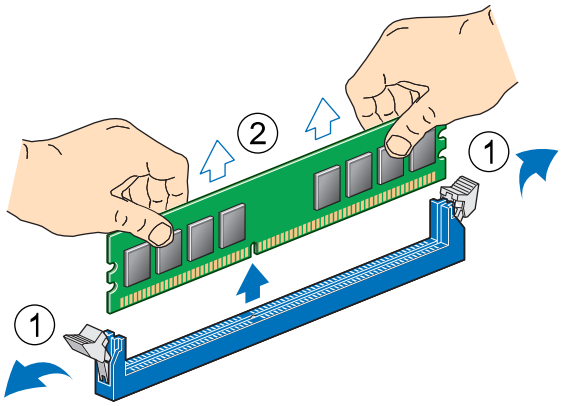
Motherboards are not shipped with processors or DIMMs installed. Processors, heatsinks, and DIMMs must be removed from the defective motherboard and installed on the replacement motherboard.

Procedure

Remove DIMM

1. Press down on the DIMM latches to unseat the DIMM from the DIMM socket. The DIMM lifts from the socket.

2. Holding the DIMM by the edges, lift it straight up from the socket and set the DIMM on an ESD-safe work surface. If the DIMM will not be reinstalled soon, store it in an anti-static package.

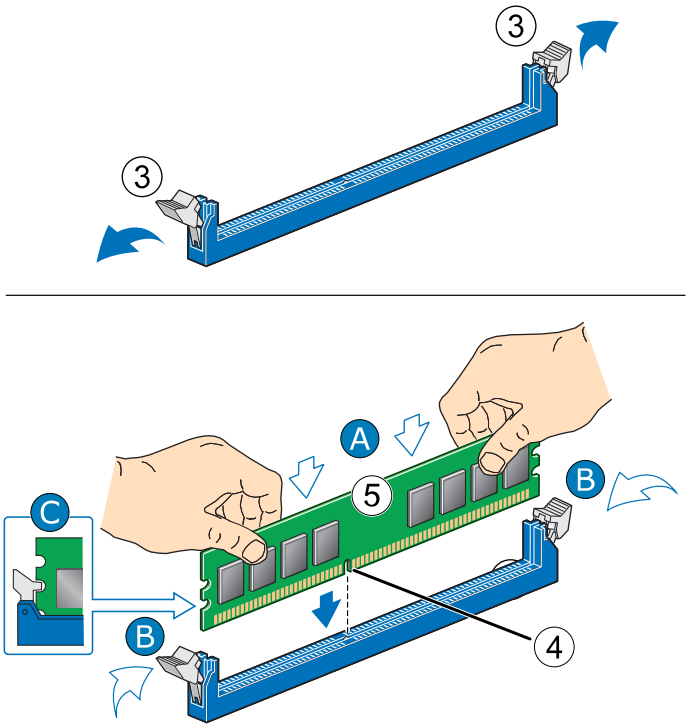


Install DIMM

3. Make sure the clips at either end of the DIMM socket are pushed outward to the open position.

4. Holding the DIMM by the edges, remove it from its anti-static package. Position the DIMM above the socket. Align the notch on the bottom edge of the DIMM with the key in the DIMM socket.

5. Insert the bottom edge of the DIMM into the socket (A). When the DIMM is inserted, push down on the top edge of the DIMM until the retaining clips snap into place (B). Make sure the clips are firmly in place (C).



Motherboard Removal

Prerequisites

- The GreenBlade chassis is removed from the subrack placed on a stable ESD-safe work surface. The cover is removed.
- Part Numbers:
  - Refer to *CS400-LC Spare Part Numbers* on page 6 for a list of all spare motherboards.

About this task

This procedure describes how to replace a motherboard in a CS400 series GreenBlade chassis. Refer to *GB622X Exploded Views* on page 15.

- Motherboards are shipped without DIMMs, processors, or heatsinks installed.
- We recommend swapping DIMMs, processors, and heatsinks from the defective motherboard to the replacement motherboard when both motherboards are on a stable ESD-safe work surface. This is the preferred method versus removing or replacing processors and DIMMs from a motherboard mounted in a GreenBlade chassis.
- Make sure the replacement motherboard uses the same firmware revision as the other motherboards in the system.

Procedure

Remove PCIe Card and Bridge Board and Disconnect Cables

1. If necessary, remove the PCIe card assembly.

   Refer to *PCIe Card Installation* on page 24.

2. Remove the bridge board.

3. Disconnect the 2x7 fan control cable from the motherboard.

4. Disconnect the two main power connectors from the motherboard.

5. GB622X-TP: Disconnect the SATA cable from the motherboard. (This cable connects to the top/number 2 drive.)

Remove Cooling Loop Assembly

6. For liquid cooled GreenBlade chassis, remove the cooling loop assembly.

   Refer to *GB622X Cooling Assembly Replacement* on page 20.

Remove Motherboard

7. Remove the front memory cooler bracket. There are two 6-32 x 1/2 screws.

8. Remove the 6 screws (6-32 x 5/16) that secure the motherboard to the chassis. Keep these screws separate from the longer 1/2-in memory cooler bracket screws.

9. Lift the motherboard out of the chassis and place it on an ESD-safe work surface.

Motherboard Installation

About this task

This procedure describes how to install a motherboard in a CS400 series GreenBlade chassis. Refer to *GB622X Exploded Views* on page 15.

Procedure

Install Motherboard

1. Add DIMMs and processors to the replacement motherboard.

2. If necessary, remove the blank InfiniBand (IB) cover from the front panel.

3. Check that an EMI gasket is in position on the inside of the front panel.

4. Check that a motherboard insulator is in position in the bottom of the chassis and the standoffs are not obstructed.

5. Install the motherboard into the chassis.

   Tip/angle the front of the board down into the chassis so the I/O connectors fit into the openings in the front panel. Some pressure may be needed to compress the EMI gasket and align the holes in the motherboard with the standoffs in the chassis. Check that all I/O connectors are clear of any obstruction.

6. Secure the motherboard with six 6-32 x 5/16 screws. Use two 6-32 x 1/2 screws to attach the front memory cooler bracket to the motherboard and chassis.

Install Bridgeboard, PCIe Card, and Connect Cables

7. Install the bridgeboard and PCIe card assembly.
8. Connect the fan control and power cables from the node IFB to the motherboard.

Install Cooling Loop Assembly/Kit

9. Install the cooling loop assembly (heatsink kit).

   Refer to *GB622X Cooling Assembly Replacement* on page 20.

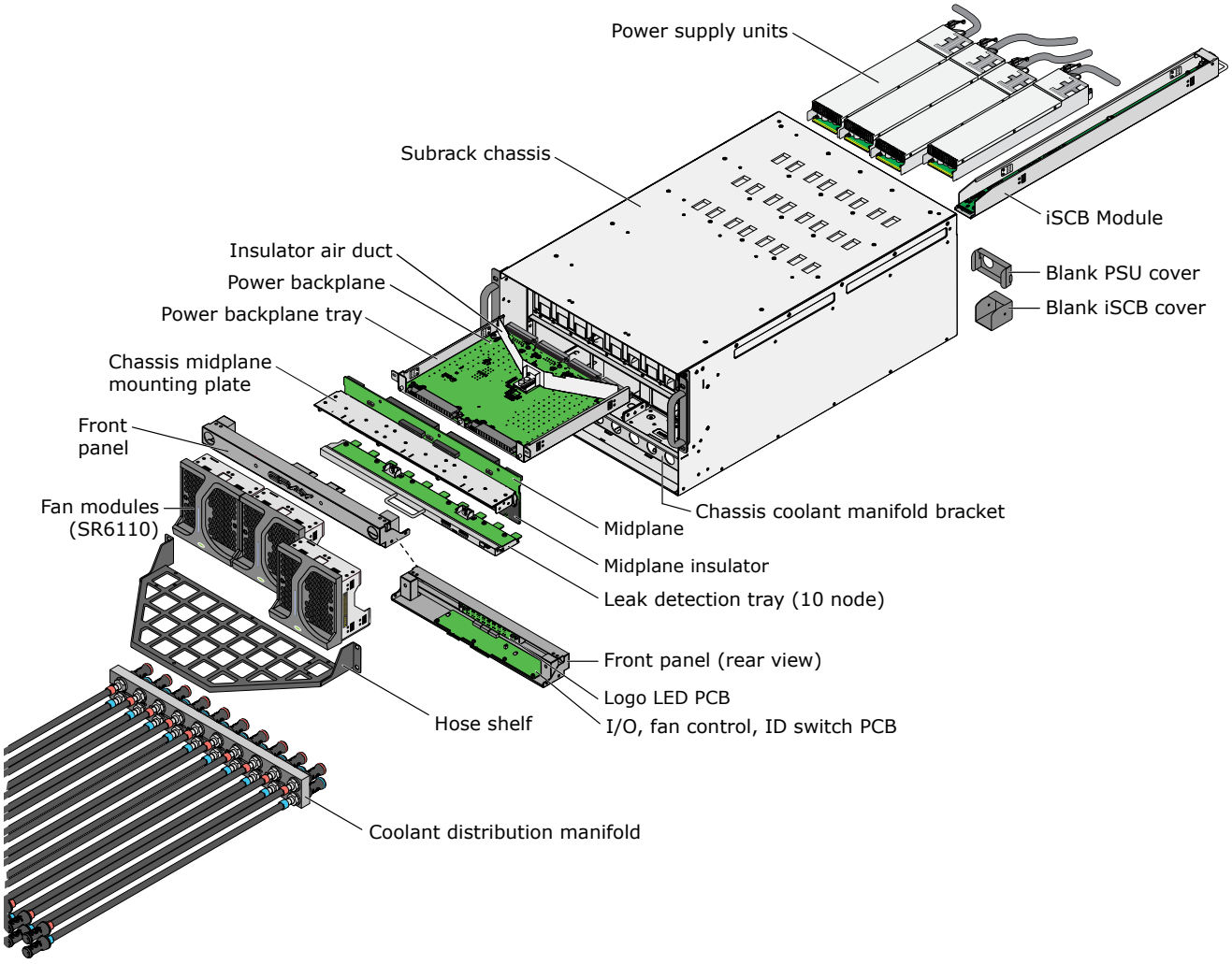
10. GB622X-TP: Connect the SATA cable to the motherboard. (This cable connects to the top/number 2 drive.)

SR6110 Replacement Procedures

The following procedures are included in this section

SR6110 Exploded View

The following exploded parts view shows the internal components of the SR6110. Refer to this illustration when replacing components and performing replacement procedures.



iSCB Module PCBA Replacement

Prerequisites

- Part numbers:
  - 100991400 - iSCB module (for SR6110 subrack)
  - 22302-0313-10 - iSCB module PCBA - I/O, network, GB2 Gemini, 10/100, RJ45, reset/LED
  - 22309-0005-04 - iSCB module PCBA - CPU, GB2 IMX253 (plug into midplane)

About this task

This CS400-LC procedure describes how to replace either of the two printed circuit board assemblies (PCBAs) in an SR6110 iSCB module. Reverse the process to replace the PCBAs.

Note: The two PCBAs are connected by a 28-pin connector as shown in the figure below. The CPU PCBA must be removed first, before the I/O, network PCBA can be removed.

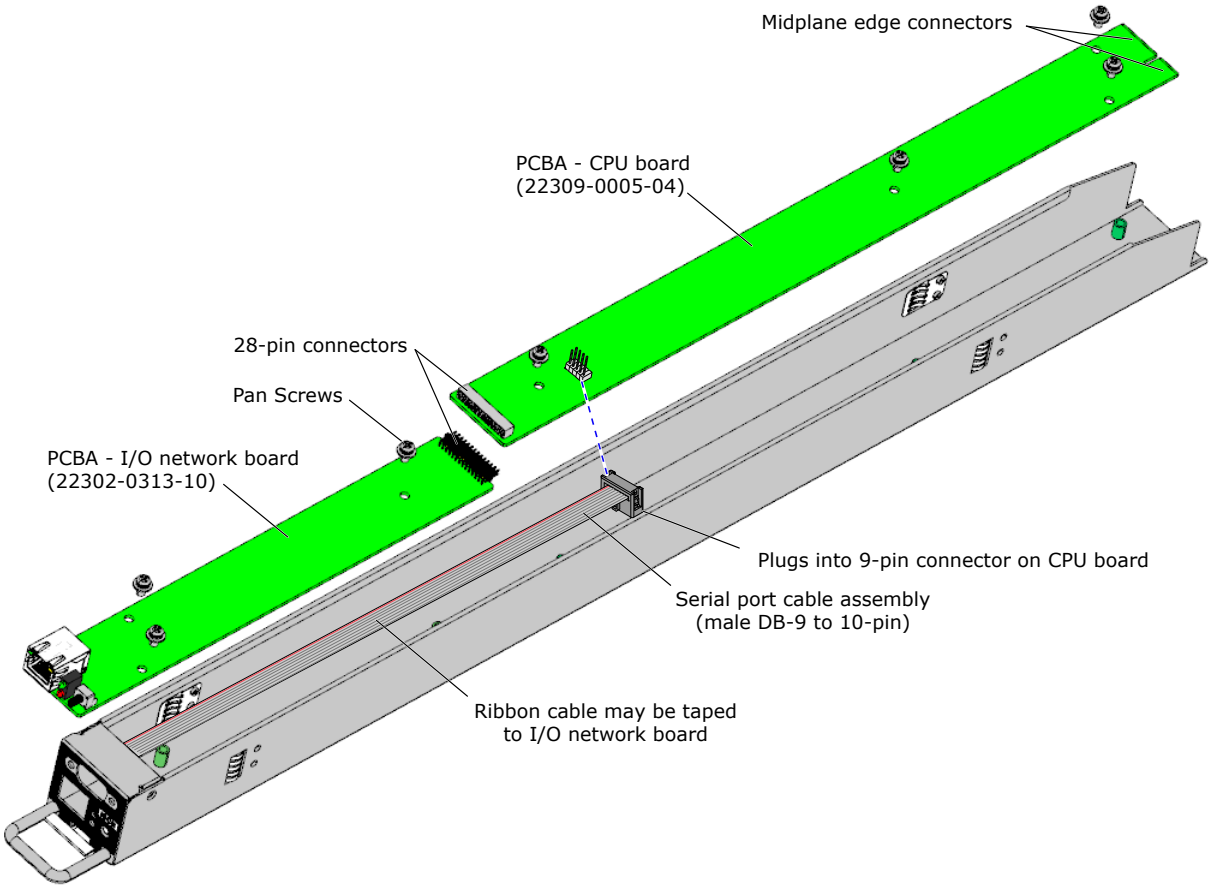
Procedure

iSCB CPU PCBA Removal

1. Disconnect the 9-pin serial port (ribbon cable) connector from the CPU PCBA.
2. Remove the 4 screws from the CPU PCBA.
3. Pull the PCBA to disengage the 28-pin connectors between the two PCBAs.

iSCB I/O, Network PCBA Removal

4. Peel one side of the film tape that secures the ribbon cable to the PCBA. Place the ribbon cable to the side of the iSCB module.
5. Remove the 3 screws from the I/O, network PCBA.



6. Remove the I/O, network PCBA. Remove the piece of film tape and use it to secure the ribbon cable to the replacement PCBA.

Leak Sensor Board Replacement

Prerequisites

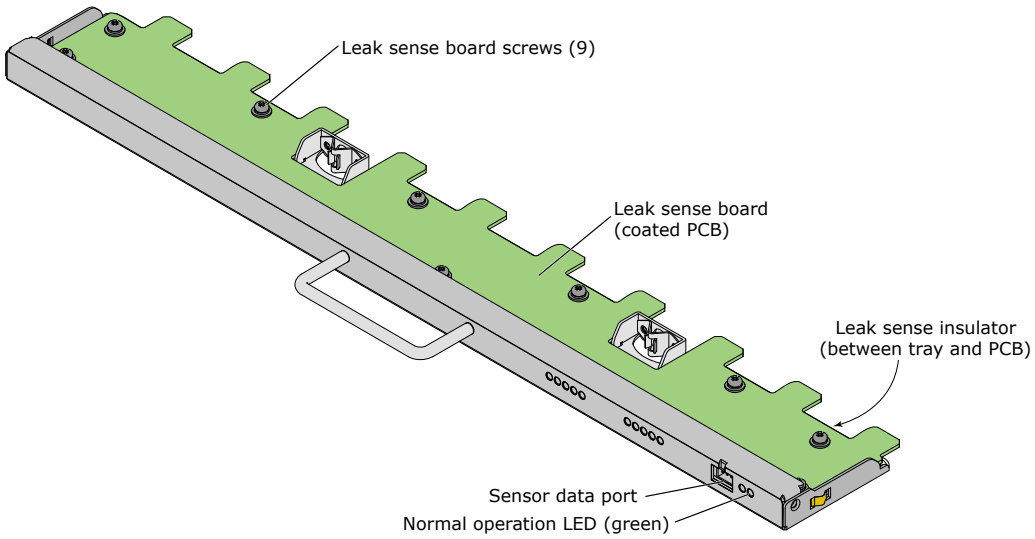
- Part numbers:
  - 22306-0006-05 - PCBA, leak detection, used in 10 node leak detection tray, 12V
  - 22909-0162-01 - Leak sensor cable assembly, 3P-3P

About this task

This procedure describes how to replace the leak sense board in a leak detection tray.

Procedure

1. Disconnect the leak sensor data cable from the port on the front of the leak detection tray.
2. Remove the leak detection tray from the subrack.
3. Remove the leak sense board by removing the 9 screws as shown below.
4. Make sure the insulator between the PCB and the metal tray remains in place. (The insulator has double-coated adhesive tape on the bottom side to hold the insulator in place.)



5. Insert the replacement leak sense board into the tray and secure it using the same 9 screws.
6. Insert the leak detection tray into the subrack.
7. Reconnect the leak sensor data cable to the sensor data port.
8. Verify that **Normal** LED on the front of the tray is lit green.

Fan Assembly Replacement

Prerequisites

- Part numbers:
  - 101192700 - SR6110 fan module, liquid cooled systems (single fan)
  - 23101-0312-10 - SR6110 replacement fan (12 V, 3000 RPM) with LED and cable assembly - fan, tachometer, connector

About this task

This procedure describes how to replace the fan assembly in an SR6110 fan module.

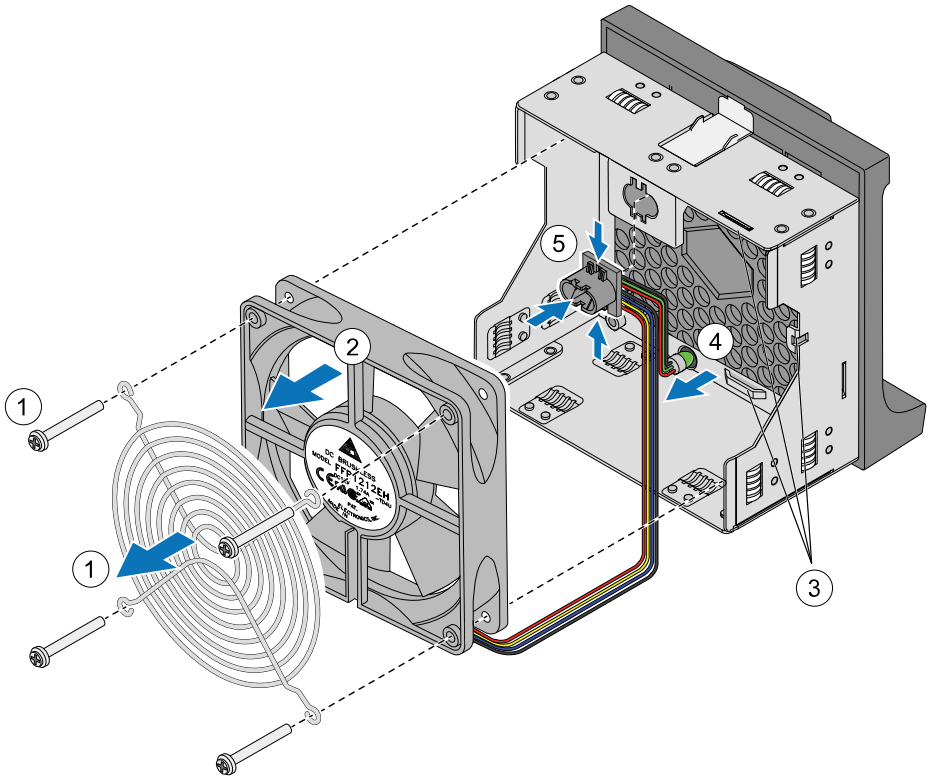
CAUTION

Subrack Fan Unit must be replaced within 10 seconds. Replacement Fan Unit must be available prior to servicing. Unit serviceable only by qualified personnel.

Procedure

Fan Assembly Removal

1. Remove the fan guard (four M4x35 screws)



2. Pull the fan out of the housing far enough to access the cable/wire assembly that is tied/secured to the housing.

3. Remove the wire harness from the friction clips in the fan housing. Use a small wire cutter to cut the cable ties that secure the wire harness to the housing.

4. Pull the LED out from the lens housing.

5. Remove the 6-pin connector from the housing: press on the tabs on the top and bottom of the connector and push it through the back of the housing.

6. Pull the fan and attached wire harness out of the housing. A replacement fan assembly can now be installed.

Fan Assembly Installation

7. Push the 6-pin connector through the back of the housing. The 6-pin connector is keyed, so it will only fit in one way.

8. Insert the LED into the lens housing.

9. Route the cable harness using the friction clips and secure it to the housing using cable ties.

10. Insert the fan into the housing aligning the holes in the corners to the four standoffs in the housing. (The side of the fan with the label faces out.)

11. Attach the fan guard using four M4x35 screws.

SR6110 Manifold Replacement

Prerequisites

- Part numbers: 101253400 - SR6110 cooling manifold, 10 node, quick connect

About this task

This procedure describes how to replace the coolant distribution manifold in the front of an SR6110 subrack. Refer to *SR6110 Exploded View* for an illustration of all SR6110 components.

Procedure

1. Power off all blades/systems in subrack.

2. Disconnect the supply and return lines from the RackCDU. The hoses can hang down over the front of the hose shelf.

3. Unseat all GB622X blades and pull them about 3 inches out of the rack. (The blades can remain in the SR6110 subrack.)

4. Disconnect the leak sensor cable from the leak detection tray.

5. Remove the leak detection tray.

Subrack Removal - Front

6. Remove the manifold from the subrack. (Four M4x25mm screws.)

Prepare Replacement Subrack

7. Remove the orange caps from the replacement manifold.
8. The RackCDU end of the hoses may be bound together. The installation should be easier if the hoses remain bound together until the replacement manifold is installed in the subrack.
9. Install the replacement manifold with the red hoses on the top. Align the two holes in the manifold with the guide pins inside the subrack chassis.
10. Secure the manifold to the subrack with the four screws provided. Torque the screws to 9 inch-pounds.
11. Install the leak detection tray and attach the leak sensor cable.
12. Reseat the GB622 blades.
13. Connect the supply and return hoses to the RackCDU.
14. Check all connections before powering up the system.

SR6110 Replacement

Prerequisites

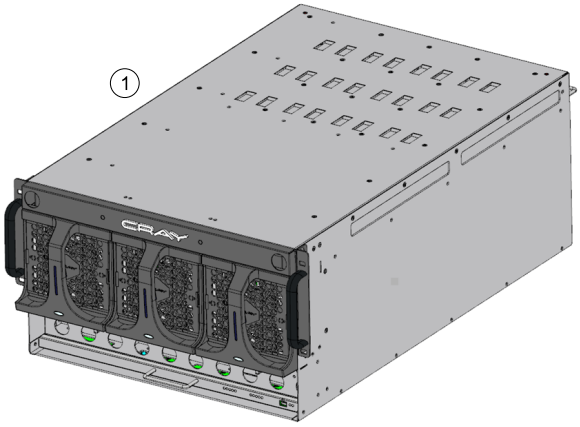
- Part numbers: 101129200 - SR6110 subrack, 6U

About this task

This procedure describes how to remove and replace an entire SR6110 subrack in a CS400-LC cabinet. Components and assemblies need to be removed from the front and rear of the failed subrack before it is removed from the CS400-LC cabinet. Refer to the corresponding step numbers in the following figures.

Procedure

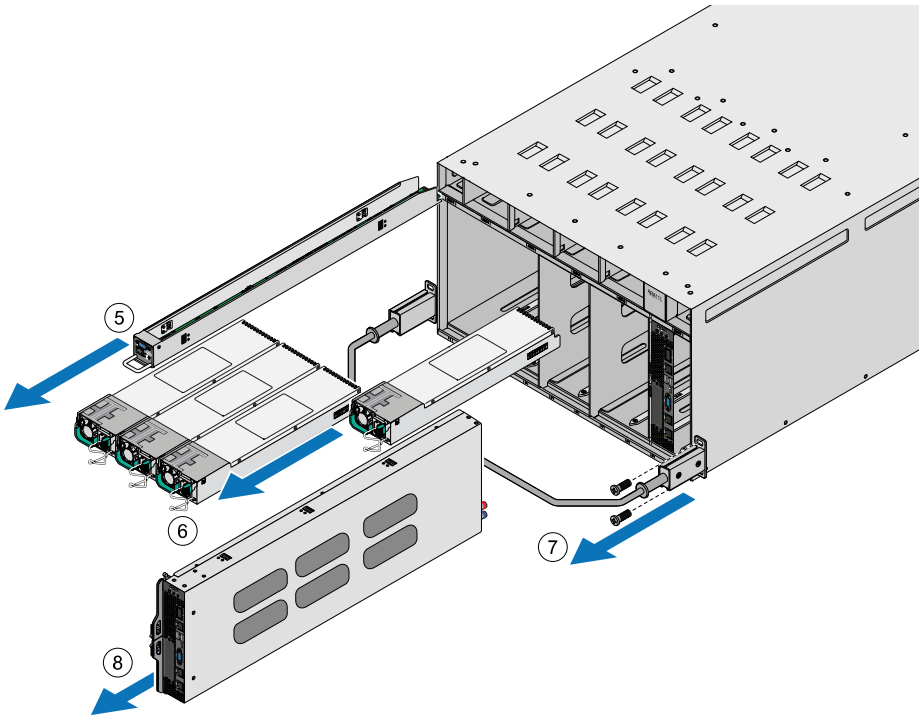
1. Unpack the replacement subrack.



2. Power off all blades/systems in the failed subrack.
3. Open the front and rear doors of the CS400-LC cabinet.

Subrack Component Removal - Rear

4. Disconnect all power cords and data cables connected to the failed subrack.
5. Remove the iSCB module.



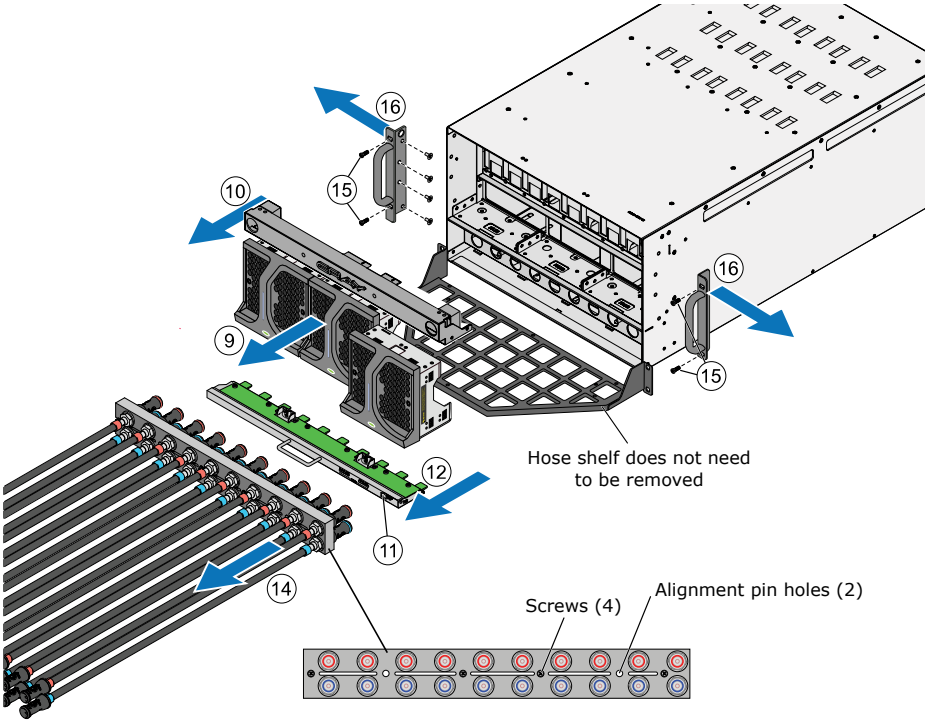
6. Remove the PSUs.
7. Remove the cable management bar (four M6 screws)
8. Remove all GB622X blades.

Subrack Component Removal - Front

9. Remove the three fan modules.

10. Remove the front panel assembly. (Captive screw inside round opening on each side. Unscrew two captive screws and pull out the assembly.)

Note: Write down the positions of the three DIP switches. This will make it easier to properly set the switches in the replacement subrack.



11. Disconnect the leak sensor cable from the leak detection tray.

12. Remove the leak detection tray.

13. Disconnect the supply and return lines from the RackCDU.

14. Remove the manifold from the subrack. (Four M4x25mm screws.)

15. Remove the screws mounting the ear brackets to the rack frame. (Four M6 screws.)

16. Remove both handle brackets from the subrack. (Four M3x4mm flat-head screws on each.)

17. Remove the subrack chassis from the rear of the rack.

SR6110 Installation

About this task

This procedure describes how to install a new or replacement SR6110 subrack.

Procedure

1. Prepare the replacement subrack by **removing** the following components **before** installing it in the rack:
   - Fan modules
   - Control panel assembly
   - Leak detection tray
   - Handle brackets

   Install Subrack in Rack

2. From the rear of the rack, insert the subrack chassis into the rack so it slides on top of the support angles.
3. From the front of the rack, attach the handle brackets to the subrack chassis (four M3x4mm flat-head screws on each).
4. Secure the subrack to the rack frame (four M6 screws).
5. Install the front panel assembly.
6. Set the DIP switches on the front panel.
7. Install the fan modules.
8. Insert the cooling manifold aligning it with the guide pins inside the chassis.
9. Connect the supply and return hoses to the RackCDU.
10. Install the leak detection tray and attach the leak sensor cable.

    Install Modules in Subrack

11. Install the cable management bar and place it in the down position.
12. Install modules:
    - PSUs
    - iSCB module
    - GB622X blades
13. Connect all power cords and data cables. Refer to the numbers on the cable labels.
14. Check all connections before powering up the system.

RackCDU Replacement Procedures

The *RackCDU Service Manual* created by Asetek Inc., provides guidelines for servicing RackCDU systems. This manual includes a list of spare parts and special tools used to replace RackCDU components and sensors. It includes procedures for replacing the control/monitoring box, power supply, quick connectors, and the flow/pressure/leak/level sensors.

Here is a link to the PDF file on the CrayDoc website: *RackCDU Service Manual*.

RackCDU Components