TYAN

TN71-BP012

Service Engineer's Manual

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Notice for the USA
Compliance Information Statement (Declaration of Conformity Procedure) DoC FCC Part 15: This device complies with part 15 of the FCC Rules

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:
- This device must not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesirable operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Notice for Canada

This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la Classe A est conforme à la norme NMB-003 du Canada.

Notice for Europe (CE Mark)
This product is in conformity with the Council Directive 2004/108/EC.

CAUTION: Lithium battery included with this board. Do not puncture, mutilate, or dispose of battery in fire. There will be danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by manufacturer. Dispose of used battery according to manufacturer instructions and in accordance with your local regulations.

About this Manual

This manual is intended for trained service technician/personnel with hardware knowledge of computers. Components inside the compartments should be serviced only by a trained service technician/personnel. This manual is aimed to provide you with instructions on installing your TYAN TN71-BP012.

How this guide is organized

This guide contains the following parts:

Chapter 1: Overview
This chapter provides an introduction to the TYAN TN71-BP012 barebones and standard parts list, describes the external components, gives an overview of the product from different angles.

Chapter 2: Setting Up
This chapter covers procedures on installing the processors, memory modules, hard drivers and other optional parts.

Chapter 3: Replacing the Pre-installed Components
This chapter covers the removal and replacement procedures for pre-installed components.

Chapter 4: Mainboard Information
This chapter lists the hardware setup procedures that you need to abide by when installing system components. It includes description of the jumpers and connectors on the motherboard.

Chapter5: Petitboot Bootloader
This chapter describes the Petitboot menu program. The menu program lets you modify basic configuration settings. The settings are then stored in a NVRAM partition that retains the information even when the power is turned off.

Chapter 6: Diagnostics
This chapter introduces the Hostboot initial program loads (IPLs) progress codes The table describes the type of checkpoints that may occur during the IPLs portion of the Hostboot: BIOS codes and technical terms to provide better service for the customers.

Appendix:
This chapter provides the cable connection table, the FRU parts list for reference of system setup, and technical support in case a problem arises with your system.

Safety and Compliance Information

Before installing and using TYAN TN71-BP012, take note of the following precautions:

・Read all instructions carefully.

・Do not place the unit on an unstable surface, cart, or stand.

・Do not block the slots and opening on the unit, which are provided for ventilation.

・Only use the power source indicated on the marking label. If you are not sure, contact the power company.

・The unit uses a three-wire ground cable, which is equipped with a third pin to ground the unit and prevent electric shock. Do not defeat the purpose of this pin. If your outlet does not support this kind of plug, contact your electrician to replace your obsolete outlet.

・Do not place anything on the power cord. Place the power cord where it will not be in the way of foot traffic.

・Follow all warnings and cautions in this manual and on the unit case.

・Do not push objects in the ventilation slots as they may touch high voltage components and result in shock and damage to the components.

・When replacing parts, ensure that you use parts specified by the manufacturer.

・When service or repairs have been done, perform routine safety checks to verify that the system is operating correctly.

・Avoid using the system near water, in direct sunlight, or near a heating device.

・Cover the unit when not in use.

Safety Information

Retain and follow all product safety and operating instructions provided with your equipment. In the event of a conflict between the instructions in this guide and the instructions in equipment documentation, follow the guidelines in the equipment documentation.

Observe all warnings on the product and in the operating instructions. To reduce the risk of bodily injury, electric shock, fire and damage to the equipment, observe all precautions included in this guide.

You must become familiar with the safety information in this guide before you install, operate, or service TYAN products.

Symbols on Equipment

⚠	**Caution**. This symbol indicates a potential hazard. The potential for injury exists if cautions are not observed. Consult equipment documentation for specific details.
🚫	**Caution.** Slide-mounted equipment is not to be used as a shelf or a work space.
⚡	**Warning.** This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.
🔥	**Warning**. This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists. To reduce risk of injury from a hot component, allow the surface to cool before touching.

General Precautions

• Follow all caution and warning instructions marked on the equipment and explained in the accompanying equipment documentation.

Machine Room Environment

• This device is for use only in a machine room or IT room.

• Make sure that the area in which you install the system is properly ventilated and climate-controlled.

• Ensure that the voltage and frequency of your power source match the voltage and frequency inscribed on the electrical rating label of the equipment.

• Do not install the system in or near a plenum, air duct, radiator, or heat register.

• Never use the product in a wet location.

Equipment Chassis

• Do not block or cover the openings to the system.

• Never push objects of any kind through openings in the equipment. Dangerous voltages might be present.

• Conductive foreign objects can produce a short circuit and cause fire, electric shock, or damage to your equipment.

• Lift equipment using both hands and with your knees bent.

Equipment Racks

To avoid injury or damage to the equipment:

• Observe local occupational health and safety requirements and guidelines for manual materials handling.

• Do not attempt to move a rack by yourself; a minimum of two people are needed to move a rack.

• Do not attempt to move a fully loaded rack. Remove equipment from the rack before moving it.

• Do not attempt to move a rack on an incline that is greater than 10 degrees from the horizontal.

• Make sure the rack is properly secured to the floor or ceiling.

• Make sure the stabilizing feet are attached to the rack if it is a single-rack installation.

• Make sure racks are coupled together if it is a multiple-rack installation.

• Make sure the rack is level and stable before installing an appliance in the rack.

• Make sure the leveling jacks are extended to the floor.

• Make sure the full weight of the rack rests on the leveling jacks.

• Always load the rack from the bottom up. Load the heaviest component in the rack first.

• Make sure the rack is level and stable before pulling a component out of the rack.

• Make sure only one component is extended at a time. A rack might become unstable if more than one component is extended.

To avoid damage to the equipment:

• The rack width and depth must allow for proper serviceability and cable management.

• Ensure that there is adequate airflow in the rack. Improper installation or restricted airflow can damage the equipment.

• The rack cannot have solid or restricted airflow doors. You must use a mesh door on the front and back of the rack or remove the doors to ensure adequate air flow to the system.

• If you install the Model in a rack, do not place equipment on top of the unit. It will cause restricted airflow and might cause damage to the equipment.

• Make sure the product is properly matted with the rails. Products that are improperly matted with the rails might be unstable.

• Verify that the AC power supply branch circuit that provides power to the rack is not overloaded. This will reduce the risk of personal injury, fire, or damage to the equipment. The total rack load should not exceed 80 percent of the branch circuit rating. Consult the electrical authority having jurisdiction over your facility wiring and installation requirements.

Equipment Power Cords

• Use only the power cords and power supply units provided with your system. The system might have one or more power cords.

• Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.

• In all European electrical environments, you must ground the Green/Yellow tab on the power cord. If you do not ground the Green/Yellow tab, it can cause an electrical shock due to high leakage currents.

• Do not place objects on AC power cords or cables. Arrange them so that no

one might accidentally step on or trip over them.

• Do not pull on a cord or cable. When unplugging from the electrical outlet, grasp the cord by the plug.

• To reduce the risk of electrical shock, disconnect all power cords before servicing the appliance.

Equipment Batteries

• The system battery contains lithium manganese dioxide. If the battery pack is not handled properly, there is risk of fire and burns.

• Do not disassemble, crush, puncture, short external contacts, or dispose of the battery in fire or water.

• Do not expose the battery to temperatures higher than 60°C (140°F).

• The system battery is not replaceable. If the battery is replaced by an incorrect type, there is danger of explosion. Replace the battery only with a spare designated for your product.

• Do not attempt to recharge the battery.

• Dispose of used batteries according to the instructions of the manufacturer. Do not dispose of batteries with the general household waste. To forward them to recycling or proper disposal, use the public collection system or return them to TYAN, your authorized TYAN partner, or their agents.

Equipment Modifications

• Do not make mechanical modifications to the system. TYAN is not responsible for the regulatory compliance of TYAN equipment that has been modified.

Equipment Repairs and Servicing

• The installation of internal options and routine maintenance and service of this product should be performed by individuals who are knowledgeable about the procedures, precautions, and hazards associated with equipment containing hazardous energy levels.

• Do not exceed the level of repair specified in the procedures in the product documentation. Improper repairs can create a safety hazard.

• Allow the product to cool before removing covers and touching internal

components.

• Remove all watches, rings, or loose jewelry when working before removing covers and touching internal components.

• Do not use conductive tools that could bridge live parts.

• Use gloves when you remove or replace system components; they can become hot to the touch.

• If the product sustains damage requiring service, disconnect the product from the AC electrical outlet and refer servicing to an authorized service provider. Examples of damage requiring service include:

– The power cord, extension cord, or plug has been damaged.

– Liquid has been spilled on the product or an object has fallen into the product.

– The product has been exposed to rain or water.

– The product has been dropped or damaged.

– The product does not operate normally when you follow the operating instructions.

Table of Contents

Chapter 1: Overview

1.1 About the TYAN TN71-BP012

Congratulations on your purchase of the TYAN® TN71-BP012, a highly optimized 2U rack-mountable barebone system. The TN71-BP012 is designed to support single IBM® Power 8 Turismo SCM processor and up to 1024GB 1333MHz DDR3L-RDIMM memory, providing a rich feature set and incredible performance. Leveraging advanced technology from IBM®, the TN71-BP012 server system is capable of offering scalable 32 and 64-bit computing, high bandwidth memory design, and lightning-fast PCI-E bus implementation. The TN71-BP012 not only empowers your company in nowadays IT demand but also offers a smooth path for future application usage.

TYAN® also offers the TN71-BP012 in a version that can support up to fourteen 3.5" fixed hard drives. The TN71-BP012 uses TYAN's latest chassis featuring a robust structure and a solid mechanical enclosure. All of this provides TN71-BP012 the power and flexibility to meet the needs of nowadays server application.

1.2 Product Models

The system board within the Tyan MicroServer blades contain different processors and chipsets, which are defined by the following models:
- **TN71-BP012**: IBM-based platform

1.3   Features

TYAN TN71-BP012 (BSP012T71V14HR-4T-3)

System	**Form Factor**	2U Rackmount
	Gross Weight	21 kg
	Chassis Model	TN71
	Dimension (D x W x H)	28" x 17.72" x 3.43" (711 x 450 x 87mm)
	Barebone	BP012T71V14HR
	Motherboard	SP012GMR
Front Panel	**Buttons**	(1) ID / (1) PWR w/ LED
	LEDs	(1) ID / (1) Warning
	I/O Ports	(1) USB 3.0 port
External Drive Bay	**Type / Q'ty**	3.5" Hot-Swap / (14) *(12) in front need a discrete HBA/RAID adapter to enable / *(2) in rear w/ 2-in-1 HDD tray
	HDD backplane support	SAS 12Gb/s/ SATA 6Gb/s
	Pre-install TYAN Mezz Card	MP012-9235-4I w/SATA 6G to enable (2) 3.5" HDD in rear
	NOTE: In addition to 3.5" hard disk drives, the front and the rear HDD trays support also the installation of 2.5" hard disk drives.	
System Cooling Configuration	**FAN**	(5) 8cm fans
Power Supply	**Type**	RPSU
	Efficiency	80 plus Platinum
	Redundancy	1+1
	Serviceability	Hot-swap
	Input Range	AC 100-127V/12.47A / AC 200-240V/7.08A
	Frequency	47 - 63 Hertz
	Output Watts	1,200 Watts / *100-127V support 1,000 Watts only
Processor	**Supported CPU Series**	IBM POWER8 Turismo SCM processor
	Socket Type / Q'ty	IBM POWER8 Turismo SCM/ (1)
	Thermal Design Point (TDP) wattage	Up to 190W
	Pre-install Processor	(1) IBM POWER8 8-Core 3.325 GHz processor
Chipset	**Switch IC**	(1) PLX PEX8748
	Chipset	(4) IBM Centaur Memory Buffers
Memory	**Supported DIMM Qty**	(32) DIMM slots
	DIMM Type / Speed	DDR3L-RDIMM 1333
	Capacity	Up to 1,024GB
	Memory voltage	1.35V

	Pre-install Memory	(8) R-DDR3L 16GB (Samsung R-DDR3L)
	PCI-E	(1) PCI-E Gen3 x16 slots / (3) PCI-E Gen3 x8 slots
Expansion Slots	Pre-install TYAN Mezz Card	MP012-9235-4I / MP012-B840-4T
	Port Q'ty	(1) PHY / (4) 10GbE ports
LAN	Pre-install TYAN LAN Mezz Card	(1) MP012-B840-4T Qlogic10GbE LAN Mezz Card
	PHY	Broadcom BCM5221 PHY (dedicated for IPMI connection)
Storage	Pre-install HDD/SSD	(2) 4TB HDDs (Toshiba)
	Connector type	D-Sub 15-pin
Graphic	Resolution	Up to 1920x1200
	Chipset	Aspeed AST2400
	USB	(4) USB ports (1 USB3.0 at front, 2 USB3.0 at rear, 1 USB1.1 at rear for BMC F/W update only)
I/O Ports	COM	(1) DB-9 COM port
	VGA	(1) D-Sub 15-pin port
	RJ-45	(4) 10GbE, (1) PHY dedicated for IPMI
	Chipset	Aspeed AST2400
	Voltage	Monitors voltage for CPU, memory, chipset & power supply
System Monitoring	Temperature	Monitors temperature for CPU & memory & system environment
	LED	Over temperature warning indicator / Fan & PSU fail LED indicator
	Onboard Chipset	Onboard Aspeed AST2400
Server Management	AST2400 IPMI Feature	IPMI 2.0 compliant baseboard management controller (BMC) / Supports storage over IP and remote platform-flash / USB 2.0 virtual hub
	Brand / ROM Size	IBM / 64MB
PNOR	Features	Boot from USB device / CD-ROM / Storage / PXE via LAN / IPMI Support / Device Tree / Console Redirection / OCC (Power Management) / Petitboot Bootloader (PPC64)
Regulation	FCC (DoC)	Class A
	CE (DoC)	Yes
	Operating Temp.	10° C ~ 35° C (50° F~ 95° F)
Operating Environment	Non-operating Temp.	- 40° C ~ 70° C (-40° F ~ 158° F)
	In/Non-operating Humidity	90%, non-condensing at 35° C
RoHS	RoHS 6/6 Compliant	Yes
Package Contains	Barebone	(1) TN71-BP012 Barebone w/MP012-9235-4I SATA 6G Mezz Card
	Manual	(1) Web User's manual / (1) Quick Installation Guide

	Others	(8) R-DDR3L 16GB (Samsung R-DDR3L) / (1) IBM POWER8 8-Core 3.325 GHz processor / (1) MP012-B840-4T Qlogic10GbE LAN Mezz Card / (2) 4TB HDDs (Toshiba)

TYAN TN71-BP012 (BSP012T71V14HR-4T-4)

System	**Form Factor**	2U Rackmount
	Gross Weight	21 kg
	Chassis Model	TN71
	Dimension (D x W x H)	28" x 17.72" x 3.43" (711 x 450 x 87mm)
	Barebone	BP012T71V14HR
	Motherboard	SP012GMR
Front Panel	**Buttons**	(1) ID / (1) PWR w/ LED
	LEDs	(1) ID / (1) Warning
	I/O Ports	(1) USB 3.0 port
External Drive Bay	**Type / Q'ty**	3.5" Hot-Swap / (14) *(12) in front need a discrete HBA/RAID adapter to enable / *(2) in rear w/ 2-in-1 HDD tray
	HDD backplane support	SAS 12Gb/s/ SATA 6Gb/s
	Pre-install TYAN Mezz Card	MP012-9235-4I w/SATA 6G to enable (2) 3.5" HDD in rear
	NOTE: In addition to 3.5" hard disk drives, the front and the rear HDD trays support also the installation of 2.5" hard disk drives.	
System Cooling Configuration	**FAN**	(5) 8cm fans
Power Supply	**Type**	RPSU
	Efficiency	80 plus Platinum
	Redundancy	1+1
	Serviceability	Hot-swap
	Input Range	AC 100-127V/12.47A / AC 200-240V/7.08A
	Frequency	47 - 63 Hertz
	Output Watts	1,200 Watts / *100-127V support 1,000 Watts only
Processor	**Supported CPU Series**	IBM POWER8 Turismo SCM processor
	Socket Type / Q'ty	IBM POWER8 Turismo SCM/ (1)
	Thermal Design Point (TDP) wattage	Up to 190W
	Pre-install Processor	(1) IBM POWER8 10-Core 2.926 GHz processor
Chipset	**Switch IC**	(1) PLX PEX8748
	Chipset	(4) IBM Centaur Memory Buffers
Memory	**Supported DIMM Qty**	(32) DIMM slots
	DIMM Type / Speed	DDR3L-RDIMM 1333

	Capacity	Up to 1,024GB
	Memory voltage	1.35V
	Pre-install Memory	(16) R-DDR3L 16GB (Samsung R-DDR3L)
Expansion Slots	PCI-E	(1) PCI-E Gen3 x16 slots / (3) PCI-E Gen3 x8 slots
	Pre-install TYAN Mezz Card	MP012-9235-4I / MP012-B840-4T
LAN	Port Q'ty	(1) PHY / (4) 10GbE ports
	Pre-install TYAN LAN Mezz Card	(1) MP012-B840-4T Qlogic10GbE LAN Mezz Card
	PHY	Broadcom BCM5221 PHY (dedicated for IPMI connection)
Storage	Pre-install HDD/SSD	(2) 4TB HDDs (Toshiba)
Graphic	Connector type	D-Sub 15-pin
	Resolution	Up to 1920x1200
	Chipset	Aspeed AST2400
I/O Ports	USB	(4) USB ports (1 USB3.0 at front, 2 USB3.0 at rear, 1 USB1.1 at rear for BMC F/W update only)
	COM	(1) DB-9 COM port
	VGA	(1) D-Sub 15-pin port
	RJ-45	(4) 10GbE, (1) PHY dedicated for IPMI
System Monitoring	Chipset	Aspeed AST2400
	Voltage	Monitors voltage for CPU, memory, chipset & power supply
	Temperature	Monitors temperature for CPU & memory & system environment
	LED	Over temperature warning indicator / Fan & PSU fail LED indicator
Server Management	Onboard Chipset	Onboard Aspeed AST2400
	AST2400 IPMI Feature	IPMI 2.0 compliant baseboard management controller (BMC) / Supports storage over IP and remote platform-flash / USB 2.0 virtual hub
PNOR	Brand / ROM Size	IBM / 64MB
	Features	Boot from USB device / CD-ROM / Storage / PXE via LAN / IPMI Support / Device Tree / Console Redirection / OCC (Power Management) / Petitboot Bootloader (PPC64)
Regulation	FCC (DoC)	Class A
	CE (DoC)	Yes
Operating Environment	Operating Temp.	10° C ~ 35° C (50° F~ 95° F)
	Non-operating Temp.	- 40° C ~ 70° C (-40° F ~ 158° F)
	In/Non-operating Humidity	90%, non-condensing at 35° C
RoHS	RoHS 6/6 Compliant	Yes

Package Contains	Barebone	(1) TN71-BP012 Barebone w/MP012-9235-4I SATA 6G Mezz Card
	Manual	(1) Web User's manual / (1) Quick Installation Guide
	Others	(1) MP012-B840-4T Qlogic10GbE LAN Mezz Card / (1) IBM POWER8 10-Core 2.926 GHz processor / (16) R-DDR3L 16GB (Samsung R-DDR3L) / (2) 4TB HDDs (Toshiba)

TYAN TN71-BP012 (BSP012T71V14HR-4T-5)

System	Form Factor	2U Rackmount
	Gross Weight	21 kg
	Chassis Model	TN71
	Dimension (D x W x H)	28" x 17.72" x 3.43" (711 x 450 x 87mm)
	Barebone	BP012T71V14HR
	Motherboard	SP012GMR
Front Panel	Buttons	(1) ID / (1) PWR w/ LED
	LEDs	(1) ID / (1) Warning
	I/O Ports	(1) USB 3.0 port
External Drive Bay	Type / Q'ty	3.5" Hot-Swap / (14) *(12) in front need a discrete HBA/RAID adapter to enable / *(2) in rear w/ 2-in-1 HDD tray
	HDD backplane support	SAS 12Gb/s/ SATA 6Gb/s
	Pre-install TYAN Mezz Card	MP012-9235-4I w/SATA 6G to enable (2) 3.5" HDD in rear
	NOTE: In addition to 3.5" hard disk drives, the front and the rear HDD trays support also the installation of 2.5" hard disk drives.	
System Cooling Configuration	FAN	(5) 8cm fans
Power Supply	Type	RPSU
	Efficiency	80 plus Platinum
	Redundancy	1+1
	Serviceability	Hot-swap
	Input Range	AC 100-127V/12.47A / AC 200-240V/7.08A
	Frequency	47 - 63 Hertz
	Output Watts	1,200 Watts / *100-127V support 1,000 Watts only
Processor	Supported CPU Series	IBM POWER8 Turismo SCM processor
	Socket Type / Q'ty	IBM POWER8 Turismo SCM/ (1)
	Thermal Design Point (TDP) wattage	Up to 190W
	Pre-install Processor	(1) IBM POWER8 10-Core 2.926 GHz processor
Chipset	Switch IC	(1) PLX PEX8748

Memory	Chipset	(4) IBM Centaur Memory Buffers
	Supported DIMM Qty	(32) DIMM slots
	DIMM Type / Speed	DDR3L-RDIMM 1333
	Capacity	Up to 1,024GB
	Memory voltage	1.35V
	Pre-install Memory	(32) R-DDR3L 16GB (Samsung R-DDR3L)
Expansion Slots	PCI-E	(1) PCI-E Gen3 x16 slots / (3) PCI-E Gen3 x8 slots
	Pre-install TYAN Mezz Card	MP012-9235-4I / MP012-B840-4T
LAN	Port Q'ty	(1) PHY / (4) 10GbE ports
	Pre-install TYAN LAN Mezz Card	(1) MP012-B840-4T Qlogic10GbE LAN Mezz Card
	PHY	Broadcom BCM5221 PHY (dedicated for IPMI connection)
Storage	Pre-install HDD/SSD	(2) 1TB SSD (Micron)
Graphic	Connector type	D-Sub 15-pin
	Resolution	Up to 1920x1200
	Chipset	Aspeed AST2400
I/O Ports	USB	(4) USB ports (1 USB3.0 at front, 2 USB3.0 at rear, 1 USB1.1 at rear for BMC F/W update only)
	COM	(1) DB-9 COM port
	VGA	(1) D-Sub 15-pin port
	RJ-45	(4) 10GbE, (1) PHY dedicated for IPMI
System Monitoring	Chipset	Aspeed AST2400
	Voltage	Monitors voltage for CPU, memory, chipset & power supply
	Temperature	Monitors temperature for CPU & memory & system environment
	LED	Over temperature warning indicator / Fan & PSU fail LED indicator
Server Management	Onboard Chipset	Onboard Aspeed AST2400
	AST2400 IPMI Feature	IPMI 2.0 compliant baseboard management controller (BMC) / Supports storage over IP and remote platform-flash / USB 2.0 virtual hub
PNOR	Brand / ROM Size	IBM / 64MB
	Features	Boot from USB device / CD-ROM / Storage / PXE via LAN / IPMI Support / Device Tree / Console Redirection / OCC (Power Management) / Petitboot Bootloader (PPC64)
Regulation	FCC (DoC)	Class A
	CE (DoC)	Yes
Operating Environment	Operating Temp.	10° C ~ 35° C (50° F~ 95° F)
	Non-operating Temp.	- 40° C ~ 70° C (-40° F ~ 158° F)

	In/Non-operating Humidity	90%, non-condensing at 35° C
RoHS	**RoHS 6/6 Compliant**	Yes
Package Contains	**Barebone**	(1) TN71-BP012 Barebone w/MP012-9235-4I SATA 6G Mezz Card
	Manual	(1) Web User's manual / (1) Quick Installation Guide
	Others	(1) MP012-B840-4T Qlogic10GbE LAN Mezz Card / (1) IBM POWER8 10-Core 2.926 GHz processor / (16) R-DDR3L 16GB (Samsung R-DDR3L) / (2) 1TB SSD (Micron)

L10 system configuration table (for Channel)

L10	**Model: TN71-BP012**	**IBM Power8 Processors**	**Memory**		**Hard Drives**	
Config.	**SKU**	**Cores**	**Size**	**Qty**	**Size**	**Qty**
1	BSP012T71V14HR-4T-3	8	16 GB	8	4 TB	2
2	BSP012T71V14HR-4T-4	10	16 GB	16	4 TB	2
3	BSP012T71V14HR-4T-5	10	16 GB	32	1 TB SSD	2

1.4　Standard Parts List

This section describes TN71-BP012 package contents and accessories. Open the box carefully and ensure that all components are present and undamaged. The product should arrive packaged as illustrated below.

1.4.1　Box Contents

TN71-BP012 Chassis Kit
● (1) 2U chassis
● (1) 12-Ports 6G/12G HDD backplane board: M1271T71-BP12-12
● (1) Front panel Button/LED board: M1715T71-FPB
● (1) PDB board: M1619T71-D-PDB
● (1) TPM board: TM-TPM-IBM-W
● (1) Internal 2-Ports HDD backplane board -1: M1272T71-BP6-2
● (1) Internal 2-Ports HDD backplane board -2: M1273T71-BP6-2IO
● (1) Storage Mezz Card: MP012-9235-4I
● (1) LAN Mezz Card
● (5) Fan Modules
● (2) Power Supply Modules

1.4.2　Accessories

If any items are missing or appear damaged, contact your retailer or browse to TYAN's website for service: http://www.tyan.com
The web site also provides information of other TYAN products, as well as FAQs, compatibility lists, BIOS settings, etc.

Accessory Kit
● (2) US Power Cord
● (2) EU Power Cord
● (3) Screw Packs

1.5   About the Product

The following views show you the product.

1.5.1   System Front View

HDD Sequence

HDD2	HDD5	HDD8	HDD11
HDD1	HDD4	HDD7	HDD10
HDD0	HDD3	HDD6	HDD9

No.	Description
1	USB3.0 Port
2	Front Panel Board
3	Power On/Off Button with green LED
4	ID Button
5	ID LED (blue color)
6	FAULT LED (amber color)
7	(12) 3.5" SAS/SATA 6G/12G hot-swap HDDs

Front Panel LED Definitions

FPB LED	State	Color	Description
ID LED	On	Blue	System identified
	Off	Off	System not identified
Fault LED	On	Amber	Error occurred in the system
	Off	Off	System works fine
Power LED	On	Green	System powered on
	Blinking	Green	System standing by
	Off	Off	System AC off

HDD LED Definitions

HDD Status LED (orange)
HDD Activity LED (green)

Drive State	Activity LED (Green color)	Status LED (Orange color)
Drive Present, No Activity	Solid On	Off
Drive Present, with Activity	Blinking	Off
Drive Fail	Don't care	Solid On
Drive identify	Don't care	Blinking @ 1Hz
Drive Rebuild	Don't care	Blinking @ 4Hz

1.5.2 System Rear View

No.	Description
1	(1+1) 1000W/1200W RPSU
2	(2) 3.5" 6G SATA HDDs
3	ID LED
4	IPMI/BMC Connector
5	(1) USB1.1 for BMC F/W updates
6	Serial Port
7	VGA Port
8	(2) USB3.0 Ports
9	LAN1 (via Mezz LAN Card)
10	LAN2 (via Mezz LAN Card)
11	LAN3 (via Mezz LAN Card)
12	LAN4 (via Mezz LAN Card)
13	(4) HH-FL PCIE Slots

Rear 2-in-1 HDD Tray

HDD1 LED   HDD0 LED

HDD State	Color	LED Behavior
HDD present, no data transferring	Green	Solid on
HDD present, data transferring	Green	Blinking
HDD not present	Green	OFF

1.5.3   System Top View
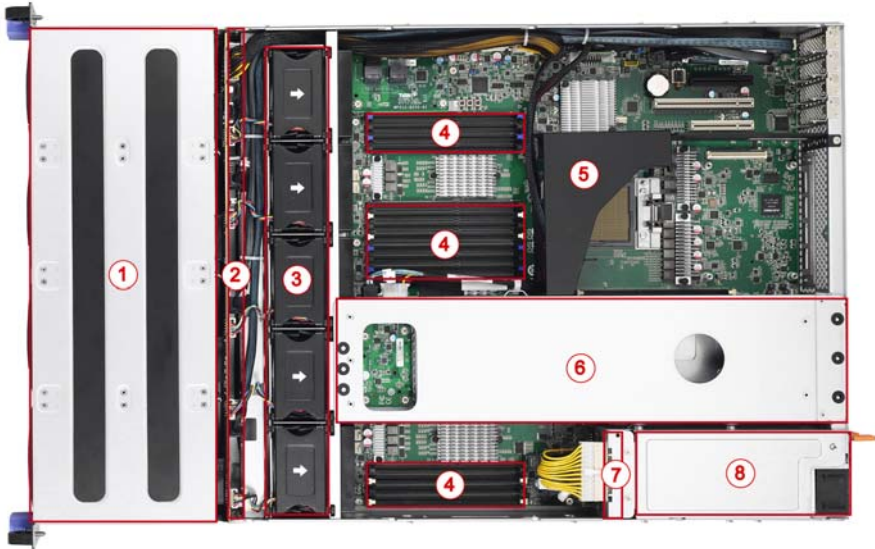
No.	Description
1	(12) 3.5" 6G/12G SAS/SATA hot-swap HDDs
2	HDD Backplane Board
3	System Fans
4	Memory Slots
5	CPU Air Duct
6	(2) 3.5" 6G SATA HDDs
7	Power Distribution Board
8	(1+1) 1000W/1200W RPSU
NOTE: The system is pre-installed with SP012 mainboard.	

Chapter 2: Setting Up

2.0.1　Before you Begin

This chapter explains how to install the CPUs, CPU heatsinks, memory modules, and hard drives. Instructions on inserting add on cards are also given.

2.0.2　Work Area

Make sure you have a stable, clean working environment. Dust and dirt can get into components and cause malfunctions. Use containers to keep small components separated. Putting all small components in separate containers prevents them from becoming lost. Adequate lighting and proper tools can prevent you from accidentally damaging the internal components.

2.0.3　Tools

The following procedures require only a few tools, including the following:

● A cross head (Phillips) screwdriver
● A hex wrench
● A grounding strap or an anti-static pad

Most of the electrical and mechanical connections can be disconnected with your hands. It is recommended that you do not use pliers to remove connectors as it may damage the soft metal or plastic parts of the connectors.

	Caution!
⚠	**1.** To avoid damaging the motherboard and associated components, do not use torque force greater than 7kgf/cm (6.09 lb/in) on each mounting screw for motherboard installation. **2.** Do not apply power to the board if it has been damaged.

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http://www.tyan.com

2.0.4   Precautions

Components and electronic circuit boards can be damaged by discharges of static electricity. Working on a system that is connected to a power supply can be extremely dangerous. Follow the guidelines below to avoid damage to TN71-BP012 or injury to yourself.

- Ground yourself properly before removing the top cover of the system. Unplug the power from the power supply and then touch a safely grounded object to release static charge (i.e. power supply case). If available, wear a grounded wrist strap. Alternatively, discharge any static electricity by touching the bare metal chassis of the unit case, or the bare metal body of any other grounded appliance.

- Avoid touching motherboard components, IC chips, connectors, memory modules, and leads.

- The motherboard is pre-installed in the system. When removing the motherboard, always place it on a grounded anti-static surface until you are ready to reinstall it.

- Hold electronic circuit boards by the edges only. Do not touch the components on the board unless it is necessary to do so. Do not flex or stress circuit boards.

- Leave all components inside the static-proof packaging that they ship with until they are ready for installation.

- After replacing optional devices, make sure all screws, springs, or other small parts are in place and are not left loose inside the case. Metallic parts or metal flakes can cause electrical shorts.

⚠	**CAUTION:** Please note that the following illustrations may not look exactly like the rackmount server you purchased. Therefore, the illustrations should be held for your reference only.

2.1 Installing Motherboard Components

This section describes how to install components on to the motherboard, including CPU, heatsink, air duct, memory modules, HDD and LAN Card.

2.1.1 Removing the Chassis Cover

Follow these instructions to remove the TN71-BP012 chassis cover.

1.   Unscrew the top cover.

2.   Slide the top cover off.

3.   Remove the top cover from the chassis.

2.1.2   Removing the Air Duct
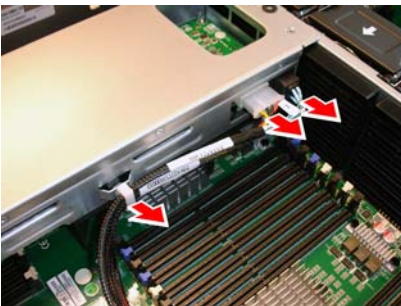
Follow these instructions to remove the TN71-BP012 air ducts.

1.   Take off the CPU air duct.

2.   Unscrew to take off the PCI air duct.
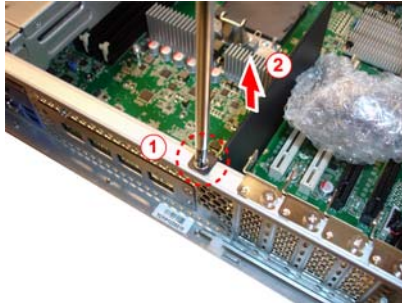
3.   Disconnect the cables.

4.   Take off the 2-in-1 HDD tray.

5.   Remove the HDD air duct.
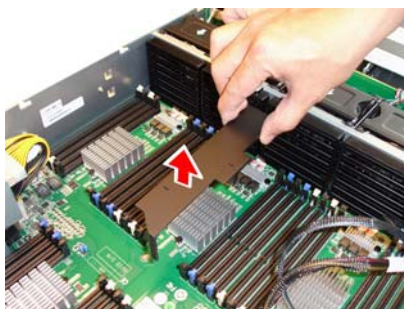
2.1.3   Installing the CPU, Heatsink and Air Duct

Follow the steps below on installing the process, heatsink and air duct.

1.   Unclip to take out the hex wrench.

2.   Take out the protection cap.
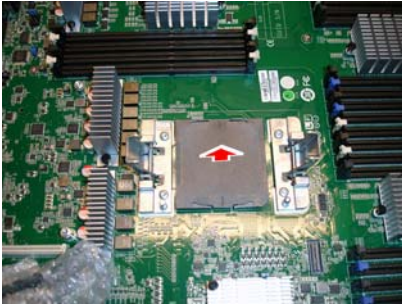
3.   Place the CPU into the socket and make sure that the gold arrow is located in the right direction.

4.   Attach the thermal pad onto the CPU.

5.   Pull the clips to place the heatsink on top of the CPU.
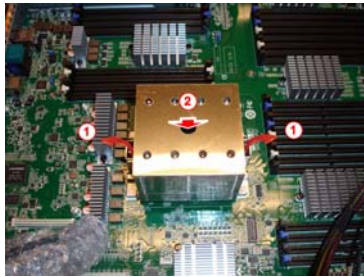
6.   Use the hex wrench to secure the heatsink to the chassis.

7.   Place the air duct on top of the heatsink as shown below.

2.1.4   Installing the Memory

Follow these instructions to install the memory modules onto the motherboard.

1.   Locate the memory slots on the motherboard.

2.   Press the memory slot locking levers in the direction of the arrows as shown in the following illustration.

3.   Align the memory module with the slot.   When inserted properly, the memory slot locking levers lock automatically onto the indentations at the ends of the module.   Follow the recommended memory population table to install the other memory modules.

DIMM Population Table

DIMM configurations including frequency and information on DMI bandwidth:

Peak System Memory Bandwidth							
Port AB		Port CD		DMI Frequency (Gb/s)	DRAM Frequency (Gb/s)	Peak DMI Bandwidth (GB/s)	Peak DRAM Bandwidth (GB/s)
Slot 1 (Ranks)	Slot 0 (Ranks)	Slot 1 (Ranks)	Slot 0 (Ranks)				
Empty	1	Empty	Empty	9.6	1.333	115.2	85.3
Empty	Empty	Empty	1	9.6	1.333	115.2	85.3
Empty	1	Empty	1	9.6	1.333	115.2	170.6
1	1	1	1	9.6	1.333	115.2	170.6
Empty	2	Empty	Empty	9.6	1.333	115.2	85.3
Empty	Empty	Empty	2	9.6	1.333	115.2	85.3
Empty	2	Empty	2	9.6	1.333	115.2	170.6
2	2	2	2	9.6	1.333	115.2	170.6
Empty	4	Empty	Empty	9.6	1.333	115.2	85.3
Empty	Empty	Empty	4	9.6	1.333	115.2	85.3
Empty	4	Empty	4	9.6	1.333	115.2	170.6
4	4	4	4	8	1.066	96	136.4

NOTE:
- Blue Highlights shows DIMM ranks in each slot.
- Yellow highlights show reduced peak bandwidth.
- Green highlights show preferred configurations for max sustained bandwidth.
- Actual usable system memory bandwidth is dependent on the application and the amount of memory installed in the system. Memory bandwidth to the processor is delivered over the DMI interface from the P8 Memory Buffer to the processor. Bandwidth to the processor is combination of the bandwidth from the DRAM and the bandwidth from the internal cache in the P8 Memory Buffer. Although the cache can supply bandwidth to the processor, to achieve peak memory bandwidth levels DIMMs should be installed so that the peak DRAM bandwidth is greater than the peak DMI bandwidth.
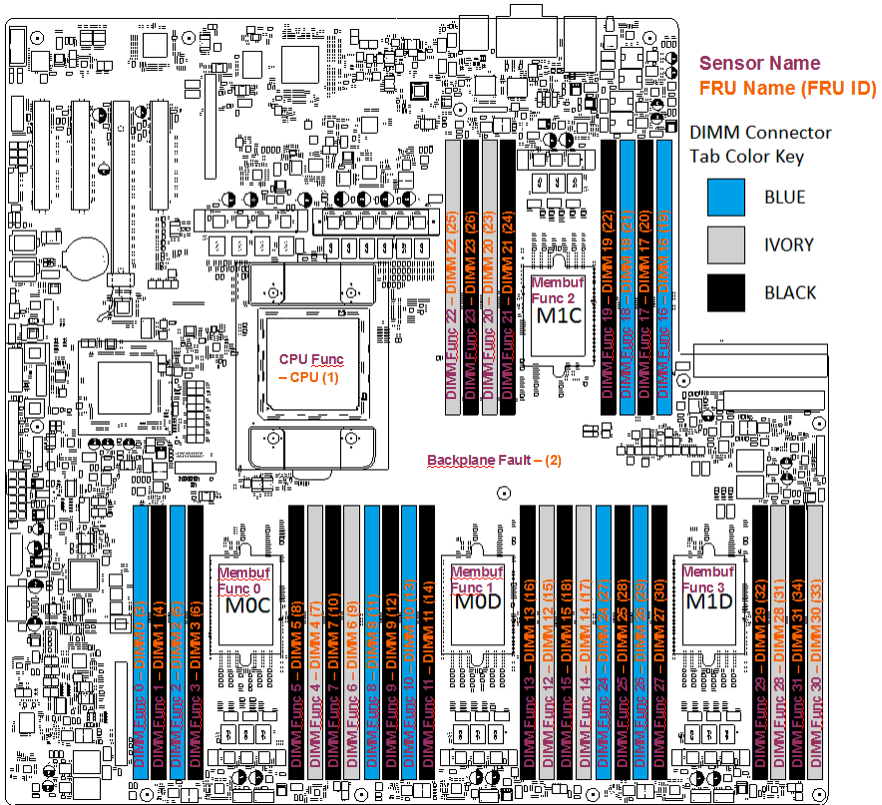
DIMM Plug Rules

Recommended DIMM plug sequence:

| P8 memory buffer	Port(s)	Slot	DIMM qty	DIMM connector tab color	Sequence
M0-C and M1-C	A and B	0	4	Blue	1
M0-D and M1-D	A and B	0	4	Blue	2
M0-C, M0-D, M1-C and M1-D	C and D	0	8	Ivory	3
M0-C, M0-D, M1-C and M1-D	A, B, C and D	1	16	Black	4

NOTE:
- DIMMs should all be the same size when progressing in this recommended sequence.
- These are simplified rules to gurantee the same or better BW and latency for all workloads after an upgrade.
- All DIMM connector housings are black.

Sensor Name
FRU Name (FRU ID)

DIMM Connector
Tab Color Key

BLUE
IVORY
BLACK

CPU Func
– CPU (1)

Membuf
Func 2
M1C

Membuf
Func 0
M0C

Membuf
Func 1
M0D

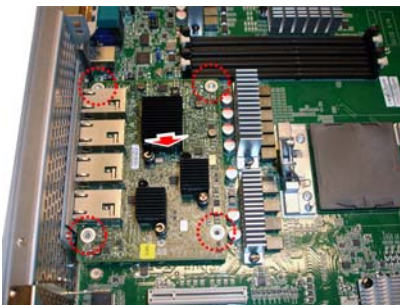Membuf
Func 3
M1D

Backplane Fault – (2)

2.1.5   Installing the LAN Mezz Card

Follow these instructions to install the LAN Mezz Card.

1.   Locate the four screw holes for the LAN Mezz Card
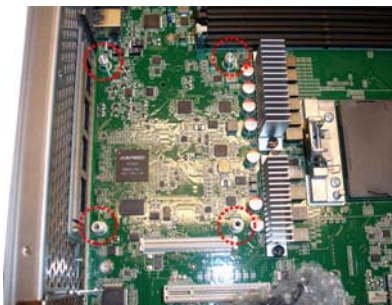
2.   Place the LAN Mezz card onto the holes and secure it with four screws.

2.1.6   Installing Hard Drives

Follow these instructions to install (12) Front & (2) Rear 3.5" hard drives.

Warning!!! Always install the hard disk drive to the chassis after the chassis is secured on the rack.

2-in-1 HDD Cage

1.   Push the latch to pull the hard disk cage out.

2.   (Option 1: 3.5" HDD)
      Place a 3.5" hard drive into the HDD cage and push the HDD in the direction as the arrow shows to secure the hard disk drive.

3. Follow the same procedures to install the second hard disk drive.

4. (Option 2: 2.5" HDD)
Place 2.5" hard drives into the HDD cage.

5. Turn the HDD cage over and secure the hard drives to the HDD cage with 8 screws.

6.   Reinsert the HDD cage into the chassis.

Front HDD Trays

1.   Push the latch to pull the hard disk tray out.

2. (Option 1: 3.5" HDD)
   Place a 3.5" hard drive into the HDD tray and secure the HDD with 4 HDD screws.
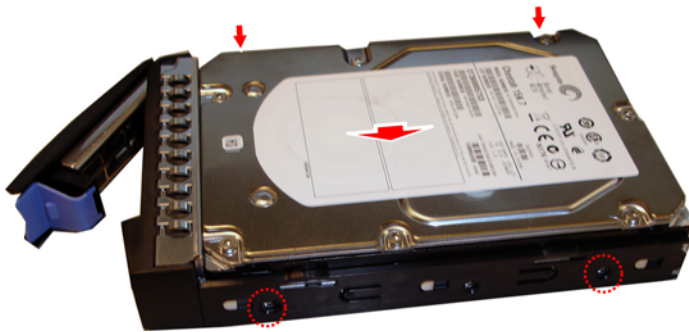
3. (Option 2: 2.5" HDD)
   Place a 2.5" hard drive into the HDD tray. Turn the HDD tray over and secure the HDD with 4 screws.
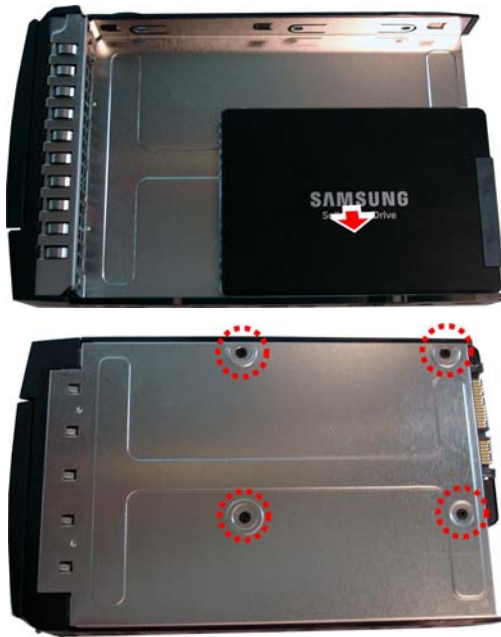
4.   Reinsert the HDD tray into the chassis.

NOTE

Chapter 3: Replacing Pre-Installed Components

3.0.1   Introduction

This chapter explains how to replace the pre-installed components, including the SP012 Motherboard, M1271T71-BP12-12 12-Ports 6G/12G HDD Backplane Board, M1715T71-FPB Front Panel Board, M1619T71-D-PDB Power Distribution Board, MP012-9235-4I Storage Mezz Card, System Fan and Power Supply Unit etc.

3.0.2   Disassembly Flowchart

The following flowchart outlines the disassembly procedures.
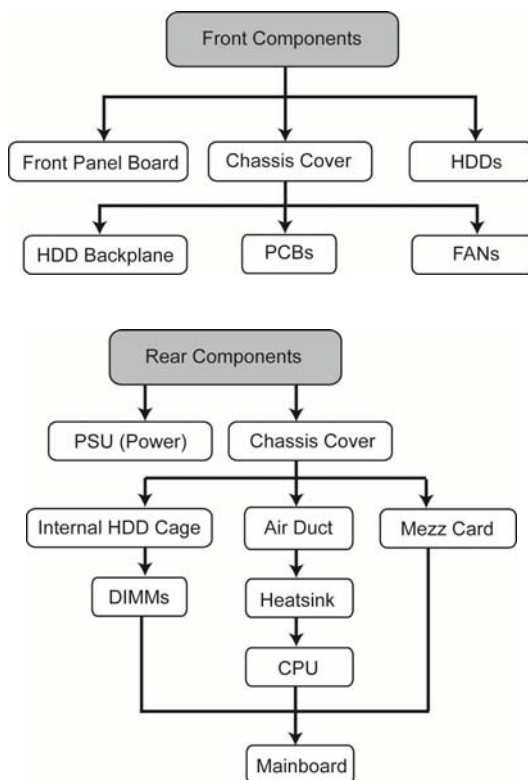
3.1   Removing the Cover

Before replacing any parts you must remove the chassis cover. Follow Section
2.1.1   Removing the Chassis Cover (page **31**) to remove the cover of the
TN71-BP012.

3.2   Replacing Motherboard Components

Follow these instructions to replace motherboard components, including the
motherboard.

3.2.1   Disconnecting All Motherboard Cables

Before replacing the motherboard or certain components, remove cables
connected to the motherboard. Follow these instructions to remove all cables.

1.   Disconnect all cables.
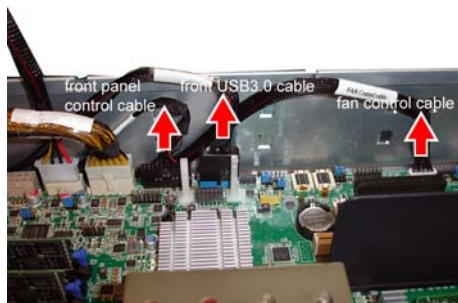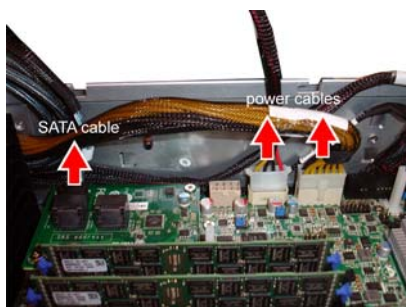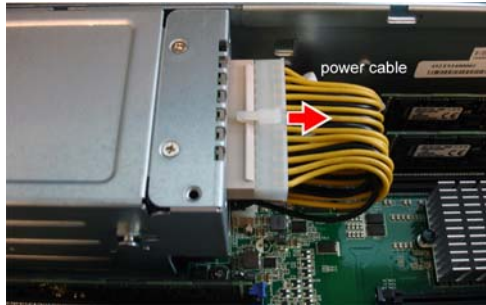
3.2.2   Removing the Motherboard

After removing all of the aforementioned cables, follow the instructions below to remove the motherboard from the chassis.

1.   Remove the processor, heat sink and air ducts if installed.

2.   Remove the 13 screws securing the motherboard to the chassis.

3.   Carefully lift the motherboard from the chassis.

3.3   Replacing the Storage Mezz Card

Follow these instructions to replace the MP012-9235-4I Storage Mezz Card.

1.   Unscrew the Storage Mezz Card and disconnect the cable connected to the card.

2.   Lift the card to replace with a new one. Follow the procedures in reverse order to reinstall a new Storage Mezz Card.

3.4   Replacing the Power Distribution Board

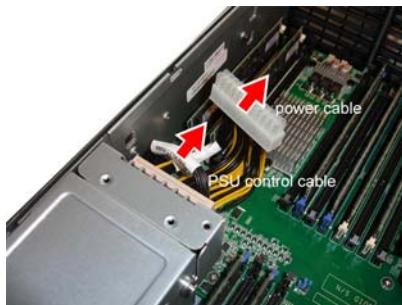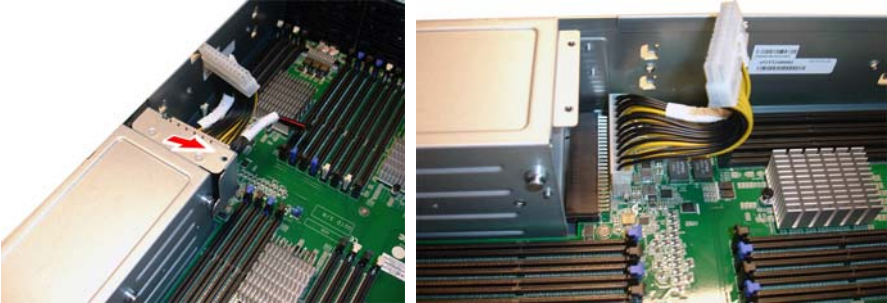Follow these instructions to replace the M1619T71-D-PDB Power Distribution Board.

1.   Remove the power supply modules.
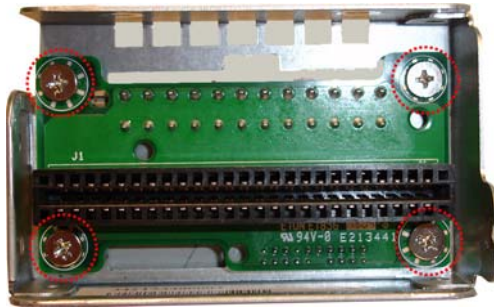

2.   Unscrew the PDB Cage.

3.   Disconnect the power cable and PSU control cable.
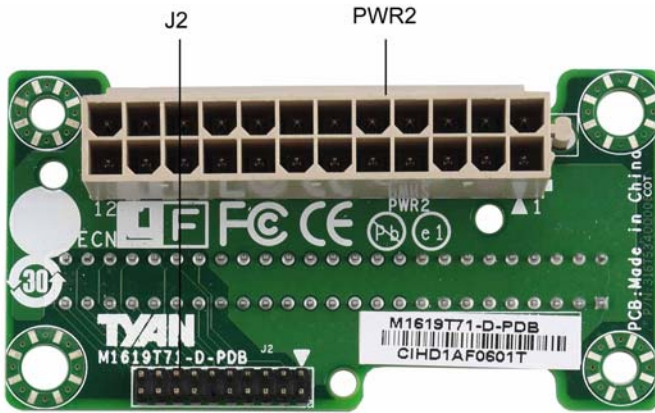
4.   Push the PDB Cage aside to slip it off.

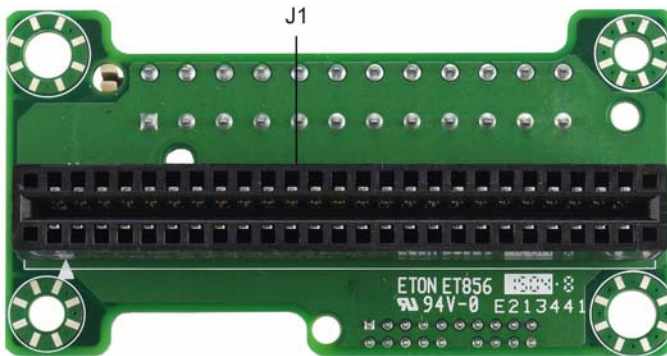5.   Unscrew the power distribution board to replace a new one.

6.   Follow the steps described earlier in reverse order to reinstall the power
      distribution board into the chassis.

3.4.1   Power Distribution Board Features

<u>Front View</u>

<u>Rear View</u>

Form Factor	W75xL39xT2.0mm, 6-layer PCB
Connectors	(1) 50-pin PSU Connector (J1) (1) 24-pin Power Connector (PWR2) (1) 20-pin PSU Connector (J2)

3.4.2   Pin Definitions

J1: 50-Pin PSU Connector

PIN NUMBER	NET NAME	PIN NUMBER	NET NAME
1	GND	50	GND
2	GND	49	GND
3	GND	48	GND
4	GND	47	GND
5	GND	46	GND
6	GND	45	GND
7	GND	44	GND
8	GND	43	GND
9	GND	42	GND
10	VCC12	41	VCC12
11	VCC12	40	VCC12
12	VCC12	39	VCC12
13	VCC12	38	VCC12
14	VCC12	37	VCC12
15	VCC12	36	VCC12
16	VCC12	35	VCC12
17	VCC12	34	VCC12
18	VCC12	33	VCC12
19	PSU_A0	32	PSU_SDA
20	PSU_A1	31	PSU_SCL
21	VCC12_STB	30	PSU_PSON
22	PSU_SMART_ON	29	PSU_SMBALERT
23	PSU_12LS	28	PSU_RETURN_S
24	PSU_PRESANT_N	27	PSU_12VRS
25	PSU_PS_KILL	26	PSU_PWOK

PWR2: 24-Pin Power Connector

PIN NUMBER	NET NAME	PIN NUMBER	NET NAME
1	GND	24	VCC12
2	GND	23	VCC12
3	GND	22	VCC12
4	GND	21	VCC12
5	GND	20	VCC12
6	GND	19	VCC12
7	GND	18	VCC12
8	GND	17	VCC12
9	GND	16	VCC12
10	GND	15	VCC12
11	GND	14	VCC12
12	GND	13	VCC12

J2: 20-Pin PSU Connector

PIN NUMBER	NET NAME	PIN NUMBER	NET NAME
1	GND	11	PSU_A1
2	PSU_SDA	12	NC
3	VCC12_STB	13	PSU_SMART_ON
4	PSU_SCL	14	PSU_RETURN_S
5	VCC12_STB	15	PSU_12LS
6	PSU_PSON	16	PSU_12VRS
7	GND	17	PSU_PRESANT_N
8	PSU_SMBALERT	18	PSU_PWOK
9	PSU_A0	19	PSU_PS_KILL
10	GND	20	GND

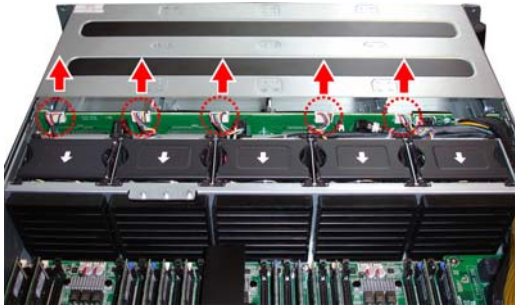## 3.5   Replacing the HDD Backplane Board

Follow these instructions to replace the M1271T71-BP12-12 12-Ports HDD
Backplane Board.

1.   Pull all front HDD trays out.

2.   Disconnect all fan cables.

3.   Take out the fan modules.

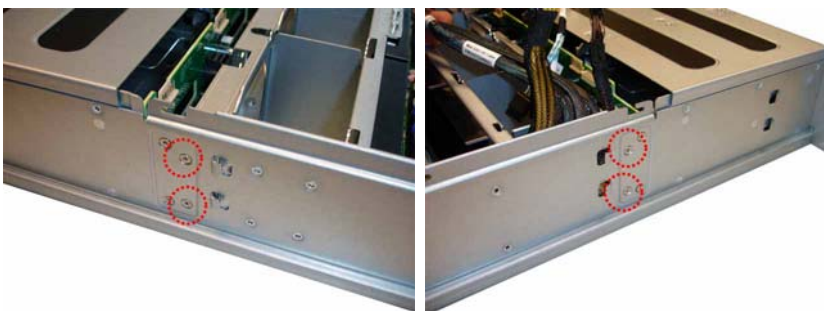4.   Disconnect the power cable and FAN control cable.

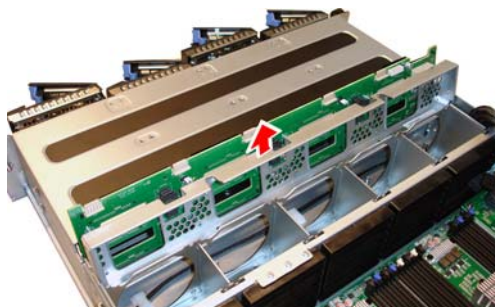5.   Disconnect the 3pcs Mini-SAS HD cable.

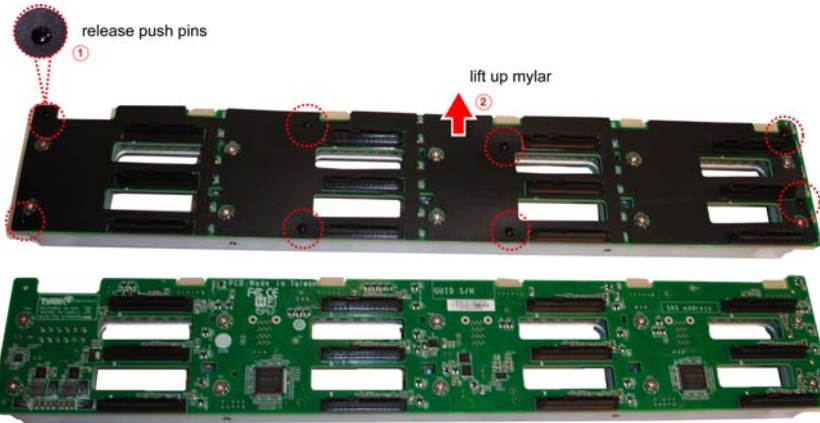6.   Unscrew the HDD BP bracket.

7.   Loose the screws on both sides of the chassis.

8.   Take out the HDD BP board.

9. Release 8 push pins to lift the mylar.

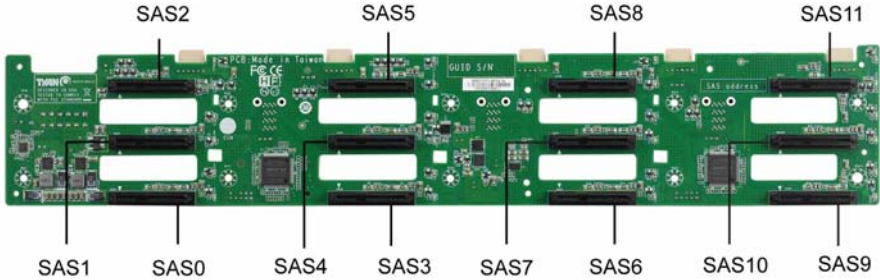
10. Loose ten screws to replace with a new HDD BP Board.

11. Reinstall the HDD BP Board into the chassis following the steps in reverse.
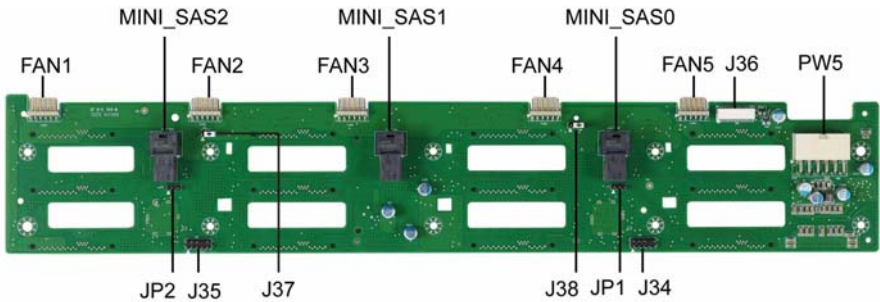
3.5.1   HDD BP Board Features

Here shows the M1271T71-BP12-12 HDD Backplane Board in details.

Front view:

Rear view:

Form Factor	W429.8 x L78.4 (mm), 8-layer PCB
Specifications	(12) SAS/SATA HDD Connector connected to HDD (SAS0~11) (3) Mini-SAS HD Connector connected to MB (MINI_SAS0~2) (1) 12-pin Power Connector connected to MB (PW5) (1) 30-pin Fan Connector connected to MB (J36) (5) 6-pin Fan Connector connected to Fan (FAN1~5)
LEDs	(12) HDD Active LEDs (12) HDD Fault LEDs

3.5.2   Connector Pin Definitions

PW5: 12-pin Power Connector

Definition	Pin	Pin	Definition
GND	1	7	VDD_12_RUN
GND	2	8	VDD_12_RUN
GND	3	9	VDD_12_RUN
GND	4	10	VDD_12_RUN
GND	5	11	VDD_12_RUN
GND	6	12	VDD_12_RUN

J36: 30-pin FAN Connector

Definition	Pin	Pin	Definition
FAN_TACH1	1	2	FAN_TACH6
FAN_TACH2	3	4	FAN_TACH7
FAN_TACH3	5	6	FAN_TACH8
FAN_TACH4	7	8	FAN_TACH9
FAN_TACH5	9	10	FAN_TACH10
GND	11	12	GND
CON_PWM2	13	14	CON_PWM1
FAN_TACH11	15	16	KEY
FAN_TACH12	17	18	KEY
KEY	19	20	CON_PWM3
KEY	21	22	GND
FAN_TACH13	23	24	FAN_TACH15
FAN_TACH14	25	26	FAN_TACH16
CON_PWM4	27	28	CON_PWM6
GND	29	30	GND

FAN1~FAN5: 6-pin FAN Connector

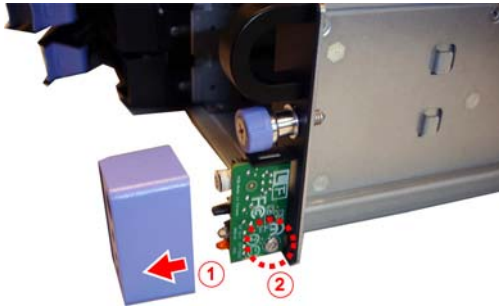| Definition	Pin	Pin	Definition
VDD_12_FAN1	1	2	GND
CON_PWM1	3	4	FAN_TACH1
VDD_12_FAN1	5	6	GND

3.6 Replacing the Front Panel Board

Follow these instructions to replace the M1715T71-FPB Front Panel Board.

1. Unscrew the front panel bezel.
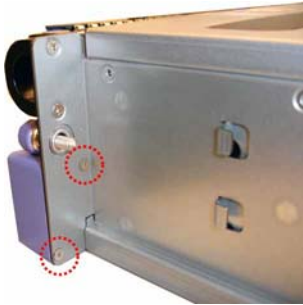
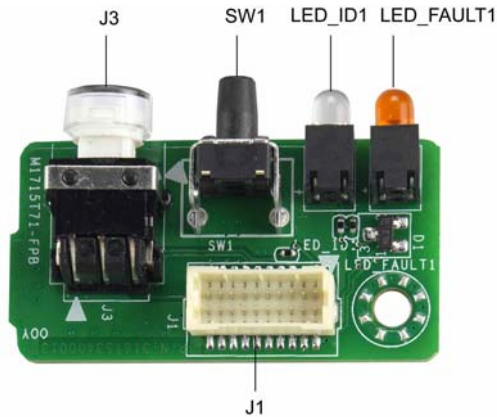2. Take out the front panel bezel and unscrew the Front Panel Board.

3. Disconnect the Front Panel control cable.

4. Reinstall the Front Panel Board into the chassis following the steps in reverse.

3.6.1 Front Panel Board Features

Here shows the M1715T71-FPB Front Panel Board in details.

| Form Factor	W37xL19xT1.6mm, 2-layer PCB
Specifications	(1) Front Panel Board Connector (J1) (1) Power Button with green color Power LED (J3) (1) ID Button (SW1) (1) blue color ID LED (LED_ID1) (1) orange color FAULT LED (LED_FAULT1)

3.6.2 Connector Pin Definitions

J1: Front Panel Board Connector

| Definition	Pin	Pin	Definition
FP_PW_LED_PW	1	11	FP_PWR_BTN_N
VCC_FPB	2	12	NC
NC	3	13	GND
FP_ID_LED_PW	4	14	NC
FP_PW_LED_GND	5	15	NC
FP_ID_LED_N	6	16	FP_SMB_DAT
NC	7	17	GND
BMC_HW_FAULT_N	8	18	FP_SMB_CLK
NC	9	19	FP_IDLED_BTN_N
BMC_SYS_FAULT_N	10	20	NC

3.7   Replacing the USB Board

Follow these instructions to replace the M1714T71-USB USB Board.
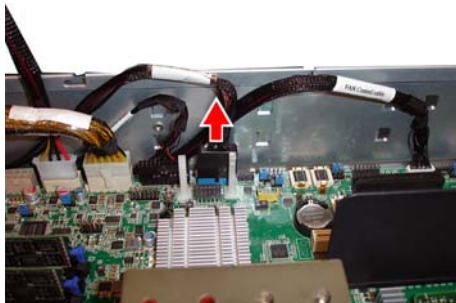
1.   Unscrew 4 screws to release the USB board bezel and mounting ear.
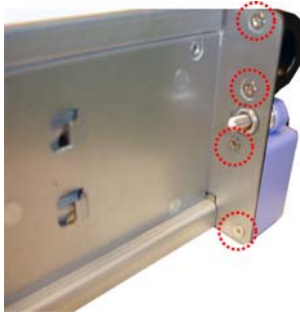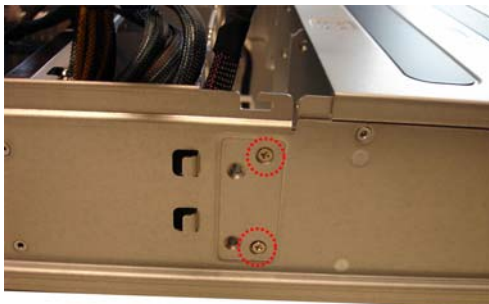

2.   Take out the USB Board bezel.
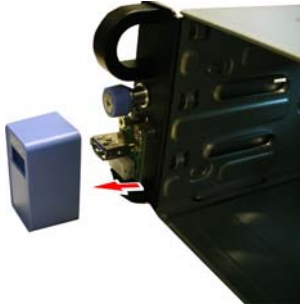
3.   Disconnect the Front USB3.0 Cable.

4.   Unscrew the USB Board bracket.

5.   Slide to take out the USB Board bracket.
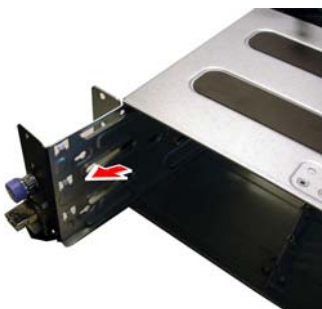
6.   Unscrew the USB Board to replace with a new one.

7.   Reinstall the USB Board bracket into the chassis following the steps in reverse order.

3.8   Replacing the Fans

Follow these instructions to replace the fans.

1.   Disconnect the fan cable.
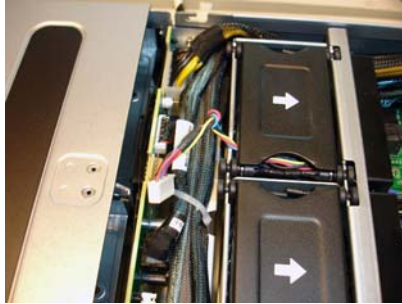
2.   Take out the fan module from the chassis.

3.   Replace the failed fan module with a new one. Follow the procedures
      described earlier in reverse order to reinstall.

3.9   Replacing the Power Supply

The system has two pre-installed Power Supply Units. Please unplug the power cord before you follow these instructions to replace the power supply units.

1.   Press the latch to pull the power supply out.

2.   After replacing a new power supply, press the latch to push the power supply back into the chassis.

Chapter 4: Mainboard Information

You are now ready to install your motherboard.

How to install our products right… the first time

The first thing you should do is read this user's manual. It contains important information that will make configuration and setup much easier. Here are some precautions you should take when installing your motherboard:

(1) Ground yourself properly before removing your motherboard from the antistatic bag. Unplug the power from your computer power supply and then touch a safely grounded object to release static charge (i.e. power supply case). For the safest conditions, MiTAC recommends wearing a static safety wrist strap.

(2) Hold the motherboard by its edges and do not touch the bottom of the board, or flex the board in any way.

(3) Avoid touching the motherboard components, IC chips, connectors, memory modules, and leads.

(4) Place the motherboard on a grounded antistatic surface or on the antistatic bag that the board was shipped in.

(5) Inspect the board for damage.

The following pages include details on how to install your motherboard into your chassis, as well as installing the processor, memory, disk drives and cables.

	Caution!
⚠	**1.** To avoid damaging the motherboard and associated components, do not use torque force greater than 7kgf/cm (6.09 lb/in) on each mounting screw for motherboard installation. **2.** Do not apply power to the board if it has been damaged.

4.1 Board Image
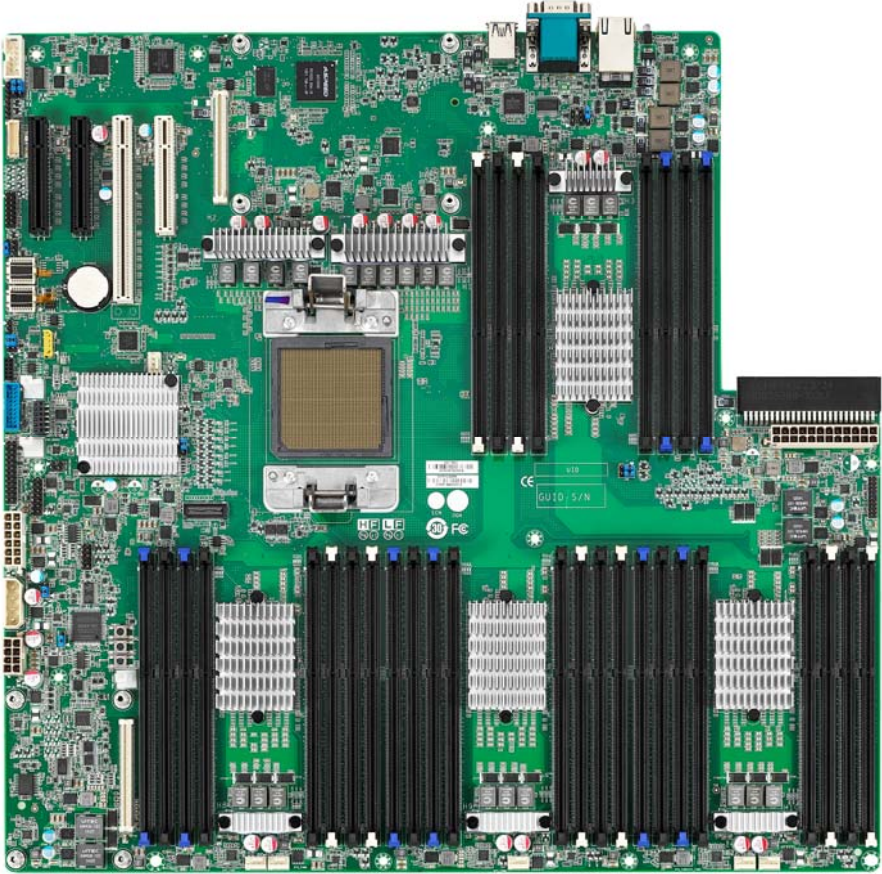
SP012

This picture is representative of the latest board revision available at the time of publishing. The board you receive may not look exactly like the above picture.

4.2 Block Diagram

SP012 Block Diagram

4.3 Mainboard Mechanical Drawing

4.4 Board Parts, Jumpers and Connectors

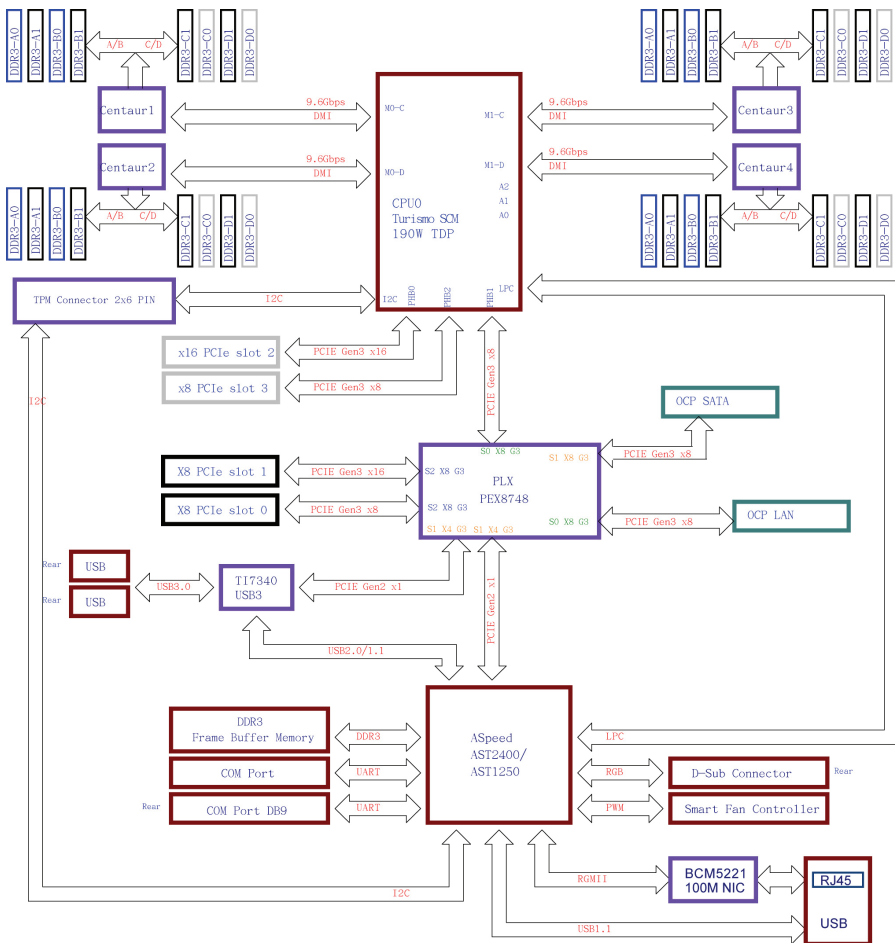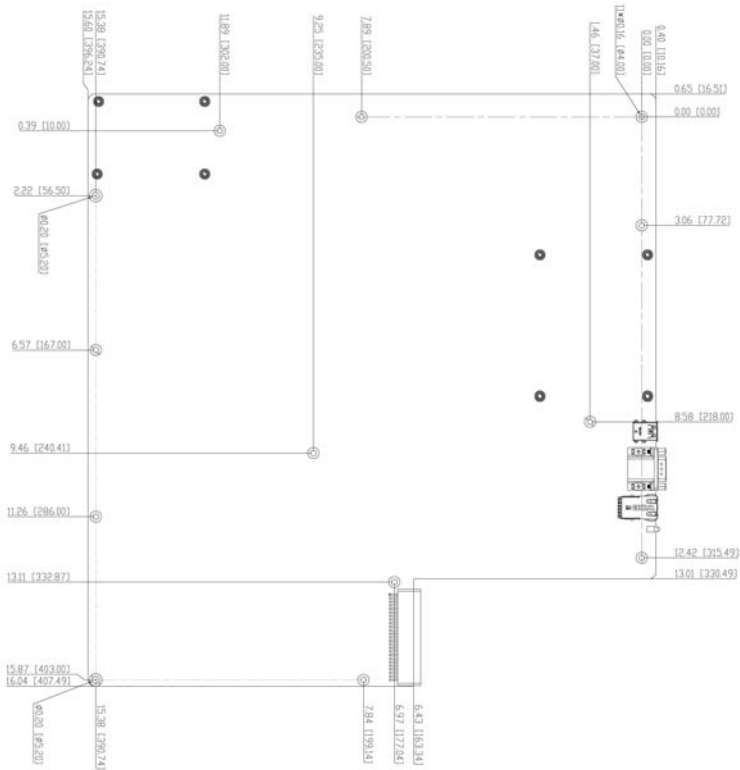This diagram is representative of the latest board revision available at the time of publishing. The board you receive may not look exactly like the above diagram. The DIMM slot nu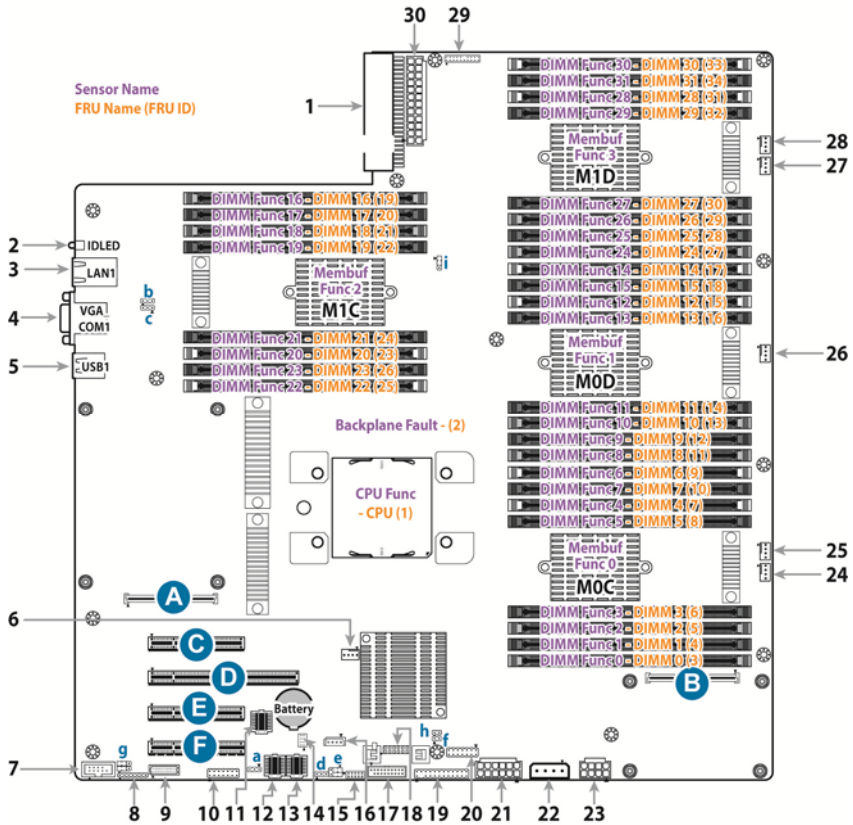mbers shown above can be used as a reference when reviewing the DIMM population guidelines shown later in the manual.   For the latest board revision, please visit our web site at http://www.tyan.com.

Jumpers & Connectors

Connectors	
1. Power Supply Connector (PWR1)	16. IPMB Connector (IPMB1)
2. ID LED Button	17. USB3.0 Header (USB3_2)
3. LAN Port +USB Connector (LAN1)	18. TPM Header (J47)
4. VGA+COM Connector (VGA_COM1)	19. Front Panel Header (SSI_FP1)
5. USB3.0+USB3.0 Connector (USB1)	20. BMC JTAG Header (J16)
6. FAN Connector (CPU0_FAN)	21. Power Connector (PWR3)
7. COM Connector (COM2)	22. Power Connector (12V+5V, PWR4)
8. TUSB JTAG Header (J13)	23. Power Connector (GPU+12V, PWR5)
9. SYS_FAN Header (J48)	24. Fan Connector (SYS_FAN1)
10. APSS JTAG Header (J8)	25. Fan Connector (SYS_FAN2)
11. Golden BMC Flash Socket (BMC2)	26. Fan Connector (SYS_FAN3)
12. Primary BMC Flash Socket (BMC1)	27. Fan Connector (SYS_FAN4)
13. PNOR Socket (BIOS1)	28. Fan Connector (SYS_FAN5)
14. SPI Debug Connector (BIOS_DEBUG1)	29. PSU Signal Header (J46)
15. VPD Header (J9)	30. Power Connector (PWR2)
Slots	
A. OCP Slot (x8, J4)	D. PCIE_SLOT0 PCI-E CPU Slot (x16)
B. OCP Slot (x8, J6)	E. PCIE_SLOT2 PCI-E PLX Slot (x8)
C. PCIE_SLOT1 PCI-E CPU Slot (x8)	F. PCIE_SLOT3 PCI-E PLX Slot (x8)
Jumpers	
a. SMBUS Header (J14)	f. ID LED SW Header (ID_SW1)
b. SMBUS Header (J15)	g. BMC Debug Header (BMC_DEBUG1/BMC_DEBUG2)
c. SMBUS Header (J18)	h. Chassis Intrusion Pin Header (INTRUSION1)
d. SMBUS Header (J41)	i. CPU FSI Connector (J10)
e. SMBUS Header (J42)	

Jumper Legend

	OPEN - Jumper OFF	Without jumper cover
	CLOSED - Jumper ON	With jumper cover

COM2: COM2 Port Header

Signal	Pin	Pin	Signal
DCD	1	2	DSR
RXD	3	4	RTS
TXD	5	6	CTS
TR	7	8	RI
GND	9	10	KEY

CPU0_FAN: 4-pin FAN Connector

Pin	1	2	3	4
Signal	GND	+12V	Sensor	Control

Use this header to connect the cooling fan to your motherboard to keep the system stable and reliable.
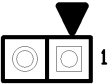
SYS_FAN1~SYS_FAN5: 4-pin FAN Connector

Pin	1	2	3	4
Signal	GND	+12V	Sensor	Control

Use this header to connect the cooling fan to your motherboard to keep the system stable and reliable.
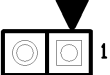
SSI_FP1: Front Panel Connector

Signal	Pin	Pin	Signal
PW_LED_P	1	2	VCC3
KEY	3	4	ID_LED_P
PW_LED_N	5	6	ID_LED_N
HDD_LED	7	8	HW_FAULT-
HDD_ACT_LED	9	10	SYS_FAULT-
PWR_BTN	11	12	LAN1_ACT
GND	13	14	PHY_LED-
RST_BTN	15	16	SMB_DAT
GND	17	18	SMB_CLK
IDLED_BTN	19	20	INTRUDER-
NC	21	22	LAN2LED+
NMI_SW#	23	24	NC
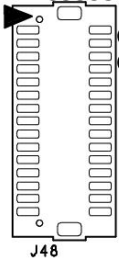
INTRUSION1: Chassis Intrusion Header

	Signal	Pin	Pin	Signal
1	INTRUDER#	1	2	GND
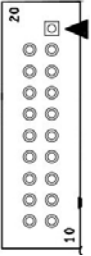
ID_SW1: ID LED SW Header

	Signal	Pin	Pin	Signal
1	IDLED_SW#	1	2	GND

J48: SYS_FAN Header

	Signal	Pin	Pin	Signal
	FAN TACH1	1	2	FAN TACH6
	FAN TACH2	3	4	FAN TACH7
	FAN TACH3	5	6	FAN TACH8
	FAN TACH4	7	8	FAN TACH9
	FAN TACH5	9	10	FAN TACH10
	GND	11	12	GND
	FAN PWM2	13	14	FAN PWM1
	FAN TACH11	15	16	SMBDATA
J48	FAN TACH12	17	18	SMBCLK
	V3P3_AUX	19	20	FAN PWM3
	V3P3_AUX	21	22	GND
	FAN TACH13	23	24	FAN TACH15
	FAN TACH14	25	26	FAN TACH16
	FAN PWM4	27	28	FAN PWM5
	GND	29	30	GND
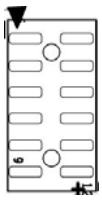
USB3_2: USB3.0 Connector

	Signal	Pin	Pin	Signal
20	VCC1	1	20	KEY
	P0_RX_N	2	19	VCC1
	P0_RX_P	3	18	NC
	GND	4	17	NC
	P0_TX_N	5	16	GND
	P0_TX_P	6	15	NC
	GND	7	14	NC
	P0_N	8	13	GND
	P0_P	9	12	NC
10	OC_N	10	11	NC
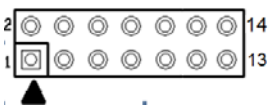
IPMB1: IPMB Pin Header

Pin	1	2	3	4
Signal	BMC_SMB_DATA	GND	BMC_SMB_CLK	NC
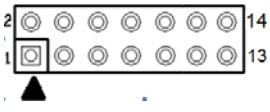
J47: TPM Header

Signal	Pin	Pin	Signal
INTERRUPT	1	2	VCC
RESET	3	4	SMBUS-DAT
INTERRUPT2	5	6	SMBUS-CLK
RESET2	7	8	RESERED
GND	9	10	SDA
NC	11	12	CLK

J8: APSS JTAG Connector

Signal	Pin	Pin	Signal
TMS	1	2	TRST
TDI	3	4	GND
VCC3_AUX	5	6	GND
TDO	7	8	GND
RTCK_R	9	10	GND
TCK	11	12	GND
Rpu 4.7k	13	14	Rpu 4.7k
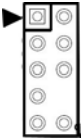
J16: BMC JTAG Connector

Signal	Pin	Pin	Signal
TMS	1	2	TRST
TDI	3	4	GND
VCC3_AUX	5	6	GND
TDO	7	8	GND
RTCK_R	9	10	GND
TCK	11	12	GND
Rpu 4.7k	13	14	Rpu 4.7k
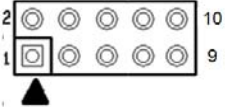
J10: CPU FSI Connector

Signal	Pin	Pin	Signal
NC	1	2	PV_FSI_P_S1CT_FSI_SMD
Rpu 49.9 ohm	3		
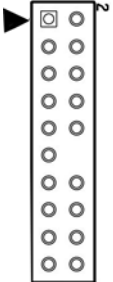
J36: CPLD JTAG Header

	Signal	Pin	Pin	Signal
	TCK	1	2	GND
	TDO	3	4	VCC
	TMS	5	6	NC
	NC	7	8	NC
	TDI	9	10	GND
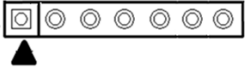
J9: VPD Connector

	Signal	Pin	Pin	Signal
	PWR	1	2	GND
	I2C SDA	3	4	NC
	I2C SCL	5	6	NC
	NC	7	8	NC
	GND	9	10	PWR
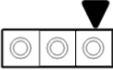
J46: PSU SIGNAL Connector

	Signal	Pin	Pin	Signal
	GND	1	2	SDA
	+12VSB	3	4	SCL
	+12VSB	5	6	PS_ON
	GND	7	8	ALERT
	PSU2_A0	9	10	GND
	PSU2_A1	11	12	KEY
	SMART_ON	13	14	RETURN
	12VSL	15	16	+12V
	PRESENT	17	18	PWOK
	PS_KILL	19	20	GND
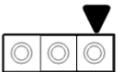
J13: TUSB7340 Debug Connector

	Signal	Pin	Pin	Signal
	TUSB_VCC3	1	2	TMS
	TDI	3	4	TDO
	TCK	5	6	TRST
	GND	7		
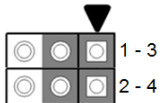
J14/J18/J41: SMBUS Connector

	Signal	Pin	Pin	Signal
	SMB CLK	1	2	GND
	SMB DATA	3		
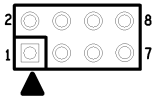
J15: SMBUS Connector

	Signal	Pin	Pin	Signal
	SMB CLK	1	2	SMB DATA
	GND	3		
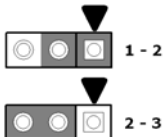
J42: PLX8718 SMBus Select Jumper

	Signal	Pin	Pin	Signal
	BMC_PEX_DATA	1	2	BMC_PEX_CLK
	SMB_DAT1_CN	3	4	SMB_CLK1_CN
	DBG_SMB_DAT	5	6	DBG_SMB_CLK
Pin 1-3, 2-4 closed: I2C to BMC **(Default)**				
Pin 3-5, 4-6 closed: I2C to Debug				

BIOS_DEBUG1: SPI Debug Connector

	Signal	Pin	Pin	Signal
	SPI_CS#	1	2	V3P3
	SPI_DO	3	4	SPI_HOLD#
	SPI_WP#	5	6	SPI_CLK
	G_D	7	8	SPI_DI

BMC_DEBUG1/BMC_DEBUG2: BMC Debug Pin Header

	Signal	Pin	Pin	Signal
	BMC_TXD5/ BMC_RXD5	1	2	TXD_OUT/ RXD_OUT
	BMC_TXD/ BMC_RXD	3		
Pin1-2 closed: Debug Mode **(Default)**				
Pin2-3 closed: Normal Mode				

4.5   Tips on Installing Motherboard in Chassis

Before installing your motherboard, make sure your chassis has the necessary motherboard support studs installed. These studs are usually metal and are gold in color. Usually, the chassis manufacturer will pre-install the support studs. If you are unsure of stud placement, simply lay the motherboard inside the chassis and align the screw holes of the motherboard to the studs inside the case. If there are any studs missing, you will know right away since the motherboard will not be able to be securely installed.
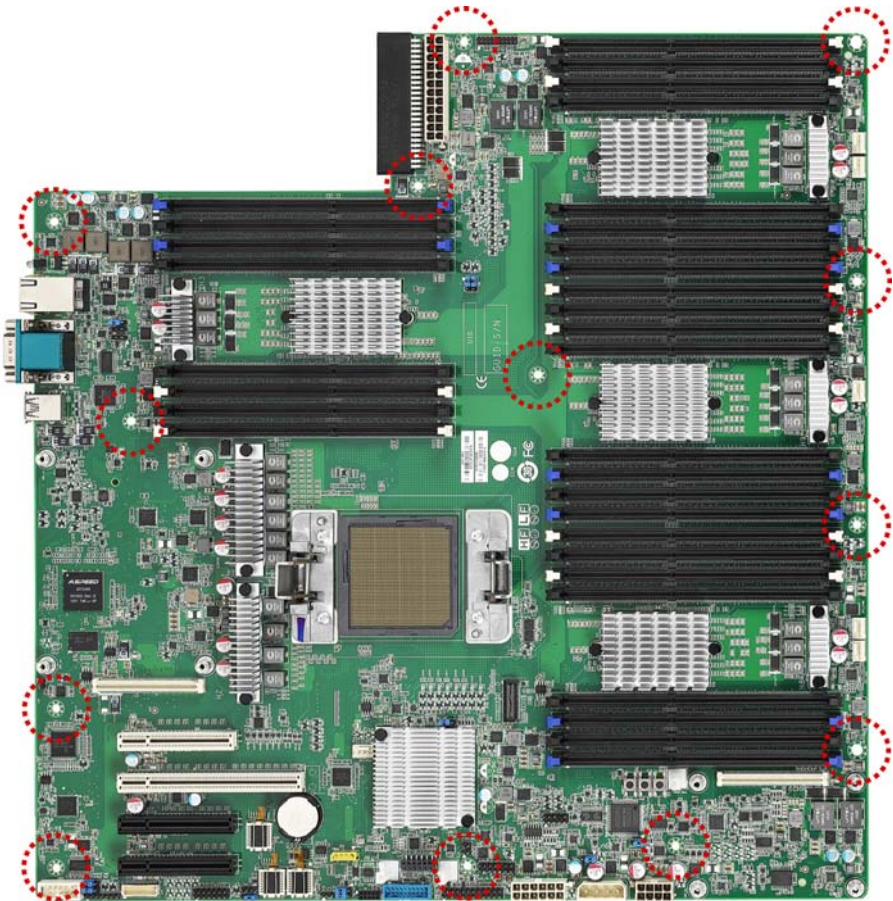
NOTE: Be especially careful to look for extra stand-offs. If there are any stand-offs present that are not aligned with a mounting hole on the motherboard, it will likely short components on the back of the motherboard when installed.   This will cause malfunction and/or damage to your motherboard.

Some chassis include plastic studs instead of metal. Although the plastic studs are usable, MiTAC recommends using metal studs with screws that will fasten the motherboard more securely in place.

Below is a chart detailing what the most common motherboard studs look like and how they should be installed.

Mounting the Motherboard
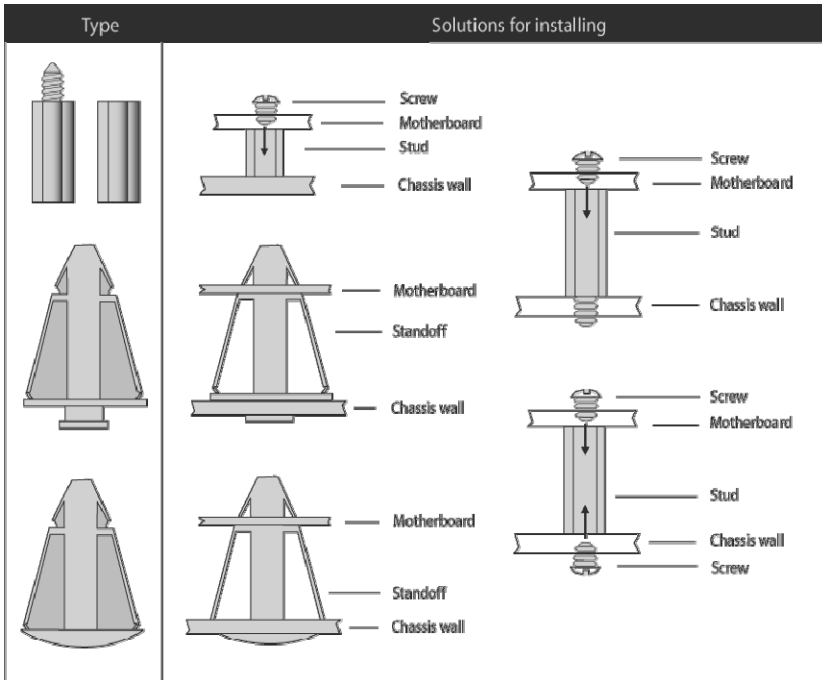
4.6   Memory

Any DIMM vendor can be tried, but only Kingston and Hynix are being characterized and qualified. The most preferred choice of 4Gbit DRAM die rev. from the following vendors are Micron v90B 25nm, Hynix Polaris 25nm & Samsung RevD 25nm.

Centaur does not support 1.5V DDR3 RDIMMs because Centaur DDR phy max operational voltage is 1.433V.

Five 1.35V DDR3 RDIMMs are supported. At Minimum, DIMMs must be plugged in pairs.

- 4GB SR x8 with 4GB DRAM
- 8GB SR x4 with 4GB DRAM
- 8GB DR x8 with 4GB DRAM
- 16GB DR x4 with 4GB DRAM
- 32GB QR x4 with 4GB DRAM

32GB DIMMs in both slot0 and slot1 of any Centaur downstream of the processor socket forces DDR speed to 1066.

DIMM Plug Rules

Recommended DIMM plug sequence:

P8 memory buffer	Port(s)	Slot	DIMM qty	DIMM connector tab color	Sequence
M0-C and M1-C	A and B	0	4	Blue	1
M0-D and M1-D	A and B	0	4	Blue	2
M0-C, M0-D, M1-C and M1-D	C and D	0	8	Ivory	3
M0-C, M0-D, M1-C and M1-D	A, B, C and D	1	16	Black	4

NOTE:
- DIMMs should all be the same size when progressing in this recommended sequence.
- These are simplified rules to gurantee the same or better BW and latency for all workloads after an upgrade.
- All DIMM connector housings are black.

DIMM Population Table

DIMM configurations including frequency and information on DMI bandwidth:

Peak System Memory Bandwidth							
Port AB		Port CD		DMI Frequency (Gb/s)	DRAM Frequency (Gb/s)	Peak DMI Bandwidth (GB/s)	Peak DRAM Bandwidth (GB/s)
Slot 1 (Ranks)	Slot 0 (Ranks)	Slot 1 (Ranks)	Slot 0 (Ranks)				
Empty	1	Empty	Empty	9.6	1.333	115.2	85.3
Empty	Empty	Empty	1	9.6	1.333	115.2	85.3
Empty	1	Empty	1	9.6	1.333	115.2	170.6
1	1	1	1	9.6	1.333	115.2	170.6
Empty	2	Empty	Empty	9.6	1.333	115.2	85.3
Empty	Empty	Empty	2	9.6	1.333	115.2	85.3
Empty	2	Empty	2	9.6	1.333	115.2	170.6
2	2	2	2	9.6	1.333	115.2	170.6
Empty	4	Empty	Empty	9.6	1.333	115.2	85.3
Empty	Empty	Empty	4	9.6	1.333	115.2	85.3
Empty	4	Empty	4	9.6	1.333	115.2	170.6
4	4	4	4	8	1.066	96	136.4

NOTE:

- Blue Highlights shows DIMM ranks in each slot.
- Yellow highlights show reduced peak bandwidth.
- Green highlights show preferred configurations for max sustained bandwidth.
- Actual usable system memory bandwidth is dependent on the application and the amount of memory installed in the system. Memory bandwidth to the processor is delivered over the DMI interface from the P8 Memory Buffer to the processor. Bandwidth to the processor is combination of the bandwidth from the DRAM and the bandwidth from the internal cache in the P8 Memory Buffer. Although the cache can supply bandwidth to the processor, to achieve peak memory bandwidth levels DIMMs should be installed so that the peak DRAM bandwidth is greater than the peak DMI bandwidth.

4.7   Connecting External Devices

Connecting external devices to the motherboard is an easy task. The motherboard supports a number of different interfaces through connecting peripherals. See the following diagrams for the details.

IPMI/BMC Connector   Serial Port
+USB2.0 Port

ID LED   VGA   USB3.0 Ports
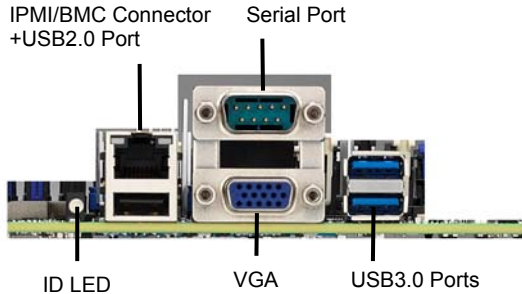
NOTE: Peripheral devices can be plugged straight into any of these ports but software may be required to complete the installation.

Onboard LAN LED Color Definition
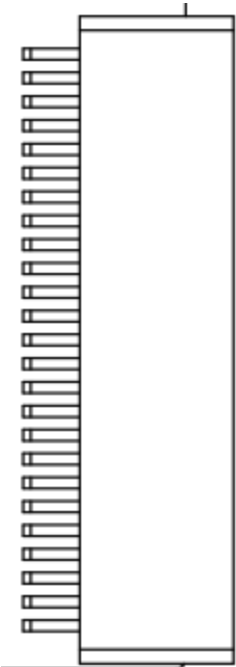
The onboard Ethernet port has green and yellow LEDs to indicate LAN status. The chart below illustrates the different LED states.

10/100/1000 Mbps LAN Link/Activity LED Scheme			
LEFT RIGHT		**Left LED**	**Right LED**
10 Mbps	**Link**	Green	Off
	Active	Blinking Green	Off
100 Mbps	**Link**	Green	Solid Green
	Active	Blinking Green	Solid Green
1000 Mbps	**Link**	Green	Solid Yellow
	Active	Blinking Green	Solid Yellow
No Link		Off	Off
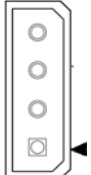
4.8 Installing the Power Supply

There are **five (5)** power connectors on your SP012 motherboard.   The SP012 supports EPS 12V power supply.
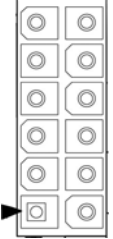
PWR1: 50-pin Power Connector

Signal	Pin	Pin	Signal
-	A1	B1	GND
GND	A2	B2	GND
GND	A3	B3	GND
GND	A4	B4	GND
GND	A5	B5	GND
GND	A6	B6	GND
GND	A7	B7	GND
GND	A8	B8	GND
GND	A9	B9	GND
+12V_IN	A10	B10	+12V_IN
+12V_IN	A11	B11	+12V_IN
+12V_IN	A12	B12	+12V_IN
+12V_IN	A13	B13	+12V_IN
+12V_IN	A14	B14	+12V_IN
+12V_IN	A15	B15	+12V_IN
+12V_IN	A16	B16	+12V_IN
+12V_IN	A17	B17	+12V_IN
+12V_IN	A18	B18	+12V_IN
PSU1_SDA	A19	B19	PSU1_A0
PSU1_SCL	A20	B20	PSU1_A1
PSU1_PSON_N	A21	B21	+12VSB
PSU1_ALERT	A22	B22	PSU1SMART_ON
PSU1_RETURN_S	A23	B23	PSU1_12VLS
PSU1_12VS+	A24	B24	PSU1_PRESENT_N
PSU1_PWOK	A25	B25	PSU1_PS_KILL
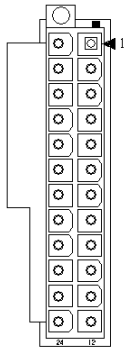
PWR4: 4-pin Power Connector

Signal	Pin	Pin	Signal
+12V	1	2	GND
GND	3	4	+5V
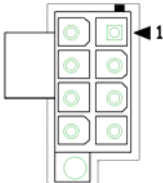
PWR3: HDD + FAN Power Connector

	Signal	Pin	Pin	Signal
	GND	1	7	+12V_HDDA
	GND	1	8	+12V_HDDA
	GND	3	9	+12V_HDDB
	GND	4	10	+12V_HDDB
	GND	5	11	+12VFAN
	GND	6	12	+12VFAN

PWR2: ATX 50-pin Power Connector

	Signal	Pin	Pin	Signal
	GND	1	13	+12V_IN
	GND	2	14	+12V_IN
	GND	3	15	+12V_IN
	GND	4	16	+12V_IN
	GND	5	17	+12V_IN
	GND	6	18	+12V_IN
	GND	7	19	+12V_IN
	GND	8	20	+12V_IN
	GND	9	21	+12V_IN
	GND	10	22	+12V_IN
	GND	11	23	+12V_IN
	GND	12	24	+12V_IN

PWR5: Power Connector for GPU

	Signal	Pin	Pin	Signal
	GND	1	5	+12V_GPU
	GND	2	6	+12V_GPU
	GND	3	7	+12V_GPU
	GND	4	8	+12V_GPU

NOTE:
1. You must unplug the power supply before plugging the power cables to motherboard connectors.
2. Apply 5Vsb power supply with current support below 2A.

Chapter 5: Petitboot Bootloader

5.1 About the Petitboot

The Petitboot is a platform independent bootloader based on the Linux kexec warm reboot mechanism. Petitboot supports loading kernel, initrd and device tree files from Linux mountable file system, plus can load files from the network using various protocols. Petitboot includes command line user interface programs and can boot operating system that includes kexec boot support.

The Petitboot section of this manual is subject to change without notice and is provided for reference purposes only. The settings and configurations of the Petitboot are current at the time of print and are subject to change, and therefore may not match exactly what is displayed on screen.

This section describes the Petitboot menu program. The menu program lets you modify basic configuration settings. The settings are then stored in a NVRAM partition that retains the information even when the power is turned off.

To start the Petitboot menu program:
1. Power on or reboot your system.
2. After the Processor NOR (PNOR) firmware process is complete, the Petitboot menu will automatically show up on the system console output or on the VGA screen.

Note: Once the Petitboot menu program starts, it will scan local boot devices and network interfaces to find boot options that are available to the system. If the boot options exist, after approximately 10 seconds, Petitboot will boot the first option.

5.1.1 Setup Basics

The table below shows how to navigate in the Petitboot menu program using the keyboard.

Key	Function
Left/Right Arrow Keys	Move between characters
Up/Down Arrow Keys	Move between selections
Enter	Open highlighted section or accept the configuration
Tab	Move to the next selection
Tab + Shift Keys	Move to the previous selection
ESC/X Keys	Exit

5.1.2   Getting Help

Pressing [H] will display a help page that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the help page, please press [ESC] or the [X] keys.

5.1.3   In Case of Problems

The best advice is to only alter settings that you thoroughly understand.

If you have trouble booting your computer after making and saving the changes with the Petitboot menu program, you can restart the computer by holding the power button down about 4 seconds then release the button, the computer will shut off.

5.1.4   Setup Variations

Not all systems have the same Petitboot menu layout or options. While the basic look and function of the Petitboot menu remains more or less the same for most systems, the appearance of your menu screen may differ from the charts shown in this section. Each system design and chipset combination requires a custom configuration. In addition, the final appearance of the menu program depends on the system designer. Your system designer may decide that certain items should not be available for user configuration, and remove them from the Petitboot menu program.

NOTE: The following pages provide the details of Petitboot menu. Please be noticed that the Petitboot menu are continually changing due to the Processor NOR (PNOR) firmware updating. The Petitboot menu provided are the most updated ones when this manual is written.   Please visit TYAN's website at http://www.tyan.com for the information of PNOR firmware updating.

5.2   Petitboot Main Menu

In this section, from the top title of Petitboot main menu, it shows you the general information such as the firmware build date (YYYY/MM/DD) on the left and the TYAN product name on the right. A help and status menu is displayed at the lower part of the Petitboot screen. Also, if Petitboot returns a list of boot options that are available to the system, you can select them by below methods:

To select a boot option, press **Enter**.

To make changes to an existing option, type **E** (edit).

To add a new boot option, type **N** (new).

```
Petitboot (dev.20150413)                              TN71-BP012
────────────────────────────────────────────────────────────────

  System information
  System configuration
  Language
  Rescan devices
  Retrieve config from URL
 *Exit to shell




────────────────────────────────────────────────────────────────
 Enter=accept, e=edit, n=new, x=exit, l=language, h=help
 Welcome to Petitboot
```

System information
Display information about the system, including the MAC addresses of each network interface, type **I** (information).

System configuration
Make changes to the system configuration, type **C** (configure).

Language
Set the language for the Petitboot interface, type **L** (language).

Rescan devices
Find new or updated boot options on the system, select the 'Rescan devices' option.

Retrieve config from URL
Retrieve new boot options from a remote configuration file, select the 'Retrieve config from URL' option.

Exit to shell
Close the Petitboot interface, type **X** (exit).

5.3   Petitboot System Information

This screen shows general information about the system type, ID and including the MAC addresses of each network interface for use when configuring boot behaviors.

```
Petitboot System Information
_____

System type: TN71-BP012
System id:    0000000000000000

Network interfaces
eth0:
  MAC:   a0:42:3f:2d:04:4e
  link: down

eth1:
  MAC:   a0:42:3f:2d:04:4f
  link: down

eth2:
  MAC:   a0:42:3f:2d:04:50
  link: down

eth3:
  MAC:   a0:42:3f:2d:04:51
  link: down
_____
x=exit, h=help
```

Petitboot System Information
Read Only

5.4   Petitboot System Configuration

```
Petitboot System Configuration
─────────────────────────────────────────────────────────────

  Autoboot:        ( ) Don't autoboot
                   (*) Autoboot from any disk/network device
                   ( ) Only autoboot from a specific disk/network device

  Timeout:         10      seconds

  Network:         (*) DHCP on all active interfaces
                   ( ) DHCP on a specific interface
                   ( ) Static IP configuration

  DNS Server(s):   _____    (eg. 192.168.0.2)
                   (if not provided by DHCP server)

                   [   OK   ]  [    Help    ]  [   Cancel   ]


─────────────────────────────────────────────────────────────
tab=next, shift+tab=previous, x=exit, h=help
```

Autoboot
There are three possible options for automatic-boot behaviors:
   Don't autoboot / **Autoboot from any disk/network device** /
   Only autoboot from a specific disk/network device

   ● **Don't autoboot:**
Boot options will be listed in the Petitboot menu, but none will be booted automatically. User interaction will be required to continue   past the Petitboot menu. Use this option if you want the machine to wait for an explicit boot selection, or want to interact with Petitboot before booting the system.

   ● **Autoboot from any disk/network device:**
Any boot option that is marked as a default (by bootloader configuration) will be booted automatically after a timeout. Use this option if you want to quickly boot your system without   changing any boot option settings. This is the typical configuration.

- **Only autoboot from a specific disk/network device:**

Only boot options from a single device (specified here) will be booted automatically after a timeout.   Use this option if you have multiple operating system images installed.

Timeout

Specify the length of time, in seconds, that the main menu will be displayed before the default boot option is started. This option is only displayed if autoboot is enabled.

   10   seconds

Network options

There are three possible options for the system network interface:

   DHCP on all active interfaces / **DHCP on a specific interface** /
   Static IP configuration

- **DHCP on all active interfaces:**

Automatically assigns IP addresses to each network interface. Use this option if you have a DHCP server on your network.

- **DHCP on a specific interface:**

Automatically assigns IP addresses to the selected network interface. The other interfaces are not configured. Select this option if you have multiple DHCP servers on different interfaces, but only want to configure a single interface during boot.
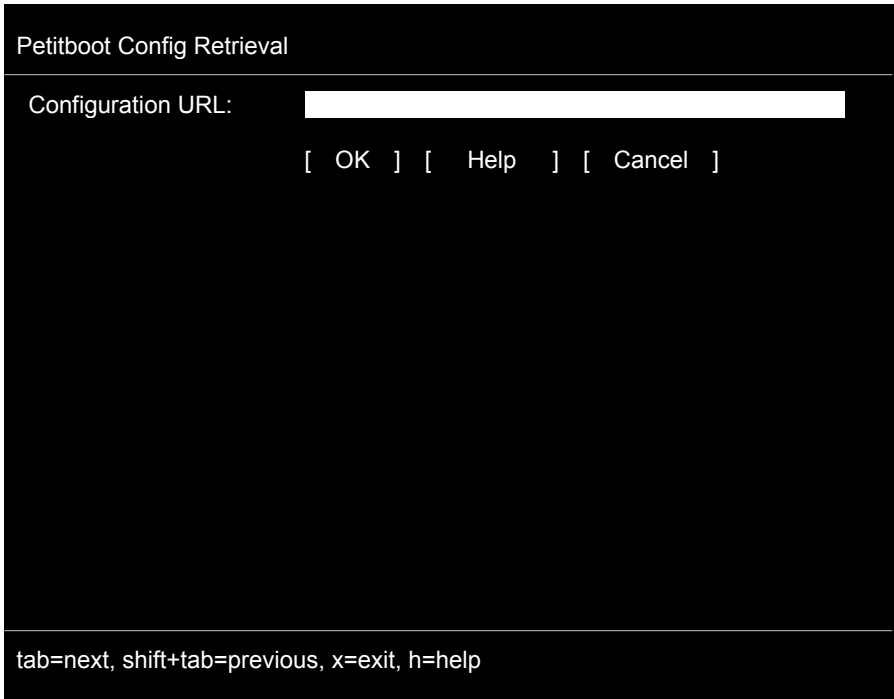
- **Static IP configuration:**

Allows you to specify an IPv4 address and network mask, gateway and a DNS server or servers for a network interface. Select this option if you do not have a DHCP server, or want explicit control of network settings.

DNS Server(s)

Setup the DNS Server(s) IP address for your network interface.

5.5   Petitboot Config Retrieval

```
Petitboot Config Retrieval

  Configuration URL:      [                              ]

                          [  OK  ] [   Help   ] [  Cancel  ]








  tab=next, shift+tab=previous, x=exit, h=help
```

Configuration URL:
Supply a valid URL here to retrieve a remote pxe-boot config file and parse it.

URLs are of the form 'scheme://host/path/to/pxeconffile', such as
tftp://host/pxeconffile or http://host/pxeconffile

5.6   Petitboot Shell

If user selects the 'Exit to Shell' menu item, system will exit the Petitboot program and present the user with a Linux shell prompt. This shell is a busybox based system that includes many of the standard shell commands and Linux utilities.

```
Exiting petitboot. Type 'exit' to return.
/ #
/ #
/ #
```

NOTE

Chapter 6: Diagnostics

NOTE: if you experience problems with setting up your system, always check the following things in the following order:

Memory, Video, CPU

By checking these items, you will most likely find out what the problem might have been when setting up your system. For more information on troubleshooting, check the TYAN website at http://www.tyan.com.

6.1   Flash Utility

Every Processor NOR (PNOR) firmware file is unique for the motherboard it was designed for. For Flash Utilities, PNOR downloads, and information on how to properly use the Flash Utility with your motherboard, please check the TYAN web site at http://www.tyan.com

> **NOTE:** Please be aware that by flashing your PNOR, you agree that in the event of a PNOR flash failure, you must contact your dealer for a replacement PNOR. There are no exceptions. TYAN does not have a policy for replacing PNOR chips directly with end users. In no event will TYAN be held responsible for damages done by the end user.

6.2   Hostboot IPLs Progress Code

The Hostboot initial program loads (IPLs) progress codes are the simple set of checkpoints during the Hostboot firmware boot process. The following table describes the type of checkpoints that may occur during the IPLs portion of the Hostboot:

Checkpoint Ranges Overview

Status of IPLs Range	Description
ISTEP 06.01 – 06.13	IStep 06 - Slave SBE
ISTEP 07.01 – 07.09	IStep 07 - Nest Chiplets
ISTEP 08.01 – 08.08	IStep 08 - EDI, EI Initialization
ISTEP 09.01 – 09.02	IStep 09 - Activate PowerBus
ISTEP 10.01 – 10.14	IStep 10 - Hostboot SBE Centaur Init
ISTEP 11.01 – 11.13	IStep 11 - DMI Training
ISTEP 12.01 – 12.05	IStep 12 - MC Config
ISTEP 13.01 – 13.12	IStep 13 - DRAM Training
ISTEP 14.01 – 14.09	IStep 14 - DRAM Initialization
ISTEP 15.01 – 15.03	IStep 15 - Build Winkle Images
ISTEP 16.01 – 16.04	IStep 16 - Core Activate
ISTEP 18.13 – 18.14	IStep 18 - Establish System SMP
ISTEP 21.01 – 21.03	IStep 21 - Start Payload

Progress Code	Description
IStep 06 – Slave SBE	
ISTEP 06.01	Setup host environment (non-executable istep)
ISTEP 06.02	Hostboot istep ready (non-executable istep)
ISTEP 06.03	Setup the FSI links to slave chips
ISTEP 06.04	Build IPL parameters
ISTEP 06.05	Builds targeting
ISTEP 06.06	Do Gard
ISTEP 06.07	Clear deconfigured states
ISTEP 06.08	Clean up MCS extent regs
ISTEP 06.09	Setup centaur ref clocks
ISTEP 06.10	Update SBE config data area
ISTEP 06.11	Start the SBE engine on slave chips
ISTEP 06.12	Check Slave SBE Complete
ISTEP 06.13	vSBE Init of Slave Chips

Progress Code	Description
IStep 07 – Nest Chiplets	
ISTEP 07.01	Processor attribute update
ISTEP 07.02	PLL Initfile for A, X, PCIe, DMI
ISTEP 07.03	Setup PLL for A, X, PCIe, DMI
ISTEP 07.04	Start clocks on A, X, PCIe chiplets
ISTEP 07.05	Apply scom inits to chiplets
ISTEP 07.06	Apply scom inits to Xbus
ISTEP 07.07	Apply scom inits to Abus
ISTEP 07.08	Apply scom inits to PCIE chiplets
ISTEP 07.09	Apply sequenced scom inits
IStep 08 – EDI, EI Initialization	
ISTEP 08.01	Restore Fabric/EDI Bus eRepair data
ISTEP 08.02	Calibrate Fabric/EDI interfaces
ISTEP 08.03	Advanced pre EI/EDI training
ISTEP 08.04	Run training on internal buses
ISTEP 08.05	Advanced post EI/EDI training
ISTEP 08.06	Load PRD for powerbus domain
ISTEP 08.07	Start listening for attentions
ISTEP 08.08	Lower functional fences on local SMP
IStep 09 – Activate PowerBus	
ISTEP 09.01	Integrate P8 Processor Chip (PgP) Islands into SMP
ISTEP 09.02	Placeholder for secure boot
IStep 10 – Hostboot SBE Centaur Init	
ISTEP 10.01	Hook for PRD to handle reconfig
ISTEP 10.02	TP Chiplet init
ISTEP 10.03	Program Nest PLL
ISTEP 10.04	Setup Nest PLL
ISTEP 10.05	Cen TP Chiplet init 2
ISTEP 10.06	Cen TP Chiplet array init
ISTEP 10.07	Cen TP Chiplet Start clocks
ISTEP 10.08	Cen Chiplet Init
ISTEP 10.09	Chiplet array init
ISTEP 10.10	Cen DTS init
ISTEP 10.11	Cen Scan overrides
ISTEP 10.12	Manual Cen Scans
ISTEP 10.13	Start Cen Nest

Progress Code	Description
ISTEP 10.14	Perform any Cen scom inits
IStep 11 – DMI Training	
ISTEP 11.01	Read out ECID off all Centaurs
ISTEP 11.02	DMI attribute update
ISTEP 11.03	DMI Scom setup on P8 MCS
ISTEP 11.04	Scom setup on centaur
ISTEP 11.05	Restore EDI Bus eRepair data
ISTEP 11.06	Calibrate DMI interfaces
ISTEP 11.07	Advanced pre DMI training
ISTEP 11.08	Run training on MC buses
ISTEP 11.09	Advanced post DMI training
ISTEP 11.10	Initialize EDI Frame
ISTEP 11.11	Load PRD for DMI domain
ISTEP 11.12	Start listening for attentions
ISTEP 11.13	Set the Inband base addresses
IStep 12 – MC Config	
ISTEP 12.01	Collect Master DIMM SPD
ISTEP 12.02	Calculate DIMM voltage
ISTEP 12.03	Calculate DIMM frequency
ISTEP 12.04	Determine effective config
ISTEP 12.05	MSS attribute update
IStep 13 – DRAM Training	
ISTEP 13.01	Disable VDDR on CanContinue loops
ISTEP 13.02	PLL Initfile for MBAs
ISTEP 13.03	Setup PLL for MBAs
ISTEP 13.04	Start clocks on MBAs
ISTEP 13.05	Enable the VDDR3 Voltage Rail
ISTEP 13.06	Perform scom inits to MC and PHY
ISTEP 13.07	Soft reset of DDR PHY macros
ISTEP 13.08	DRAM initialize
ISTEP 13.09	DRAM training
ISTEP 13.10	Advanced DRAM training
ISTEP 13.11	Hand off control to MC
ISTEP 13.12	Pass in all DIMMs on a given power domain
IStep 14 – DRAM Initialization	
ISTEP 14.01	Load PRD for DRAM domain

Progress Code	Description
ISTEP 14.02	MSS Extent Setup
ISTEP 14.03	Mainstore Pattern Testing
ISTEP 14.04	Initialize the thermal sensor
ISTEP 14.05	Configure the Power Systems Host Bridges
ISTEP 14.06	Clean up any MCS/Centaurs
ISTEP 14.07	Setup Memory BARs
ISTEP 14.08	Allow execution from memory
ISTEP 14.09	Perform Memory-Preserving IPL tasks
IStep 15 - Build Winkle Images	
ISTEP 15.01	Build runtime winkle images
ISTEP 15.02	Tell SLW Eng where winkle image is
ISTEP 15.03	Initialize the PORE-SLW engine
IStep 16 - Core Activate	
ISTEP 16.01	Activate master core
ISTEP 16.02	Activate slave cores
ISTEP 16.03	Start background scrub
ISTEP 16.04	Notify FSP drawer IPL complete
IStep 18 - Establish System SMP	
ISTEP 18.13	Create TOD topology
ISTEP 18.14	Start TOD to running state
IStep 21 - Start Payload	
ISTEP 21.01	Host runtime setup
ISTEP 21.02	Host verify HDAT structures
ISTEP 21.03	Start shutdown sequence of Hostboot and start the Payload

NOTE

Appendix I: Cable Connection Tables

1. Front panel control cable

Front panel board M1715T71-FPB to SP012GMR/MB			
Cable	**Front panel BD**	**Connect to**	**SP012GMR/MB**
Front panel control cable	J1	$\longrightarrow$	SSI_FP1

2. Front USB 3.0 board with cable

Cable	**Connect to**	**SP012GMR/MB**
USB 3.0 board with cable	$\longrightarrow$	USB3 2

3. System Fan connection

System Fan to HDD/FAN Backplane board M1271T71-BP12-12		
System Fan	**Connect to**	**HDD/FAN BP Board**
Fan1	$\longrightarrow$	FAN1
Fan2	$\longrightarrow$	FAN2
Fan3	$\longrightarrow$	FAN3
Fan4	$\longrightarrow$	FAN4
Fan5	$\longrightarrow$	FAN5

4. SAS/SATA cable

HDD/FAN Backplane board M1271T71-BP12-12 to RAID card			
Cable	HDD/FAN BP Board	Connect to	RAID card
Mini-SAS HD cable	MINI_SAS0	→	PORTS 0~3
	MINI_SAS1	→	PORTS 4~7
	MINI_SAS2	→	PORTS 8~11

5. FAN control cable

HDD/FAN Backplane board M1271T71-BP12-12 to SP012GMR/MB			
Cable	HDD/FAN BP Board	Connect to	SP012GMR/MB
FAN control cable	J36	→	J48

6. HDD BP power cable

HDD/FAN Backplane board M1271T71-BP12-12 to SP012GMR/MB			
Cable	HDD/FAN BP Board	Connect to	SP012GMR/MB
2*6pin power cable	PW5	→	PWR3

7. Internal 2*port HDD SATA cable & power cable

Internal HDD board M1272T71-BP6-2 to MP012-9235-4I card			
Cable	Internal HDD board	Connect to	MP012-9235-4I
2*port SATA cable	SATA0	→	SATA1

Internal HDD board M1272T71-BP6-2 to SP012GMR/MB			
Cable	Internal HDD board	Connect to	SP012GMR/MB
Big 4pin power cable	PW2	→	PWR4

8. Power supply cable

PSU1 to SP012GMR/MB		
PSU	Connect to	SP012GMR/MB
PSU 1	→	PWR1

PSU2 to M1619T71-D-PDB		
PSU	Connect to	M1619T71-D-PDB
PSU 2	→	J1

M1619T71-D-PDB to SP012GMR/MB			
Cable	PDB	Connect to	SP012GMR/MB
PSU control cable	J2	→	J46
2*12pin power cable	PWR2	→	PWR2

NOTE

Appendix II: FRU Parts Table

TN71-BP012 FRU Parts				
Item	Model Number	Part Number	Picture	Description
Power Supply	FRU-PS-0090	471100000238		1200W PSU
FAN Module	FRU-TS-9130	5412T5340005		15000RPM,80*80*38mm, 6PIN fan
Heatsink & Cooler	FRU-TH-0160	343T53400002		Heatsink
PCBA：MP012-B840-4T	FRU-RC-0170	5411T5340017		MP012-B840-4T LAN Mezz Card
PCBA：MP012-9235-4I	FRU-RC-0180	5411T5340011		Marvell 9235 4-port SATA Mezz Card
CPU	FRU-KP-0010	284110000351		IBM CPU 00UL866
DRAM	FRU-KP-0031	3237T5280001		SAMSUNG SDRAM DDR3，16G
Cable	FRU-CS-0330	332810000514		TF-POWER CORD; SBU, US, 125V, 16 AWG (1.31mm²), 1800mm, AC PWR CORD
	CCBL-0300	332810000281		A/C Power Cord, L=1830mm,EU type

NOTE

Appendix III: Set BMC IP address

There are two ways to set BMC IP. One is via Petitboot shell and the other is via MEGARAC. These two manners are addressed below.

A.1   Via Petitboot to set BMC IP

Step 1. Here shows how to set BMC IP via Petitboot.   Assume the network mode is **DHCP** and its IP is **192.168.88.49**. Connect the server/laptop and Habanero Serial COM1 by RS232 to the USB converter, DB9 cable and DB9 to COM2 cable.
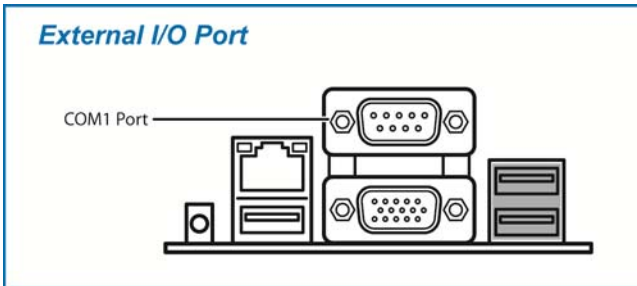
Step 2. Start a PuTTY terminal emulator and fill in serial line and speed as **COM7** and **115200**, and then click **Open** to start connection.

Step 3. Power on Habanero through the front power button.

Power on/off button

Step 4. Move arrow key to Exit to shell when Petitboot menu shows up.

```
Petitboot (dev.20150504)                    TN71-BP012        0000000000000000
qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq
  [Disk: sda2 / f616ab10-d61a-479e-97ec-92f8fa0d813c]
    Ubuntu, with Linux 3.19.0-15-generic (recovery mode)
    Ubuntu, with Linux 3.19.0-15-generic
*   Ubuntu

  System information
  System configuration
  Language
  Rescan devices
  Retrieve config from URL
  Exit to shell




qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq
Enter=accept, e=edit, n=new, x=exit, l=language, h=help
```

Step 5. Displays current BMC network settings by command *ipmitool lan print 1*. For this instance network mode is DHCP and IP is 192.168.88.49.

Step 6. To set a static mode, static IP and mask by command ipmitool lan set 1 ipsrc static ; sleep 1 ; ipmitool lan set 1 ipaddr 192.168.88.149 ; sleep 1 ; ipmitool lan set 1 netmask 255.255.255.0 ; sleep 1 ; ipmitool lan set 1 defgw ipaddr 192.168.88.1 ; then check current BMC network settings by command ipmitool lan print 1, current network mode is static and its IP is 192.168.88.149, type exit to back Petitboot menu.

```
/ # ipmitool lan print 1
[856393033919,3] BT: Host error 0xc1 receiving BT/IPMI response for msg 0x
[856393105610,3] IPMI: Got error response 0xc1
Set in Progress        : Set Complete
Auth Type Support      : MD5
Auth Type Enable       : Callback : MD5
                       : User     : MD5
                       : Operator : MD5
                       : Admin    : MD5
                       : OEM      : MD5
IP Address Source      : Static Address
IP Address             : 192.168.88.149
Subnet Mask            : 255.255.255.0
MAC Address            : a0:42:3f:25:16:82
SNMP Community String  : AMI
IP Header              : TTL=0x40 Flags=0x40 Precedence=0x00 TOS=0x10
BMC ARP Control        : ARP Responses Enabled, Gratuitous ARP Disabled
Gratituous ARP Intrvl  : 0.0 seconds
Default Gateway IP     : 192.168.88.1
Default Gateway MAC    : a0:42:3f:25:16:ca
Backup Gateway IP      : 0.0.0.0
Backup Gateway MAC     : 00:00:00:00:00:00
802.1q VLAN ID         : Disabled
802.1q VLAN Priority   : 0
RMCP+ Cipher Suites    : 0,1,2,3,6,7,8,11,12,15,16,17
```

A.2   Via MEGARAC to set BMC IP

Step 1. Assume BMC IP is 192.168.88.149 and Static mode. Open MEGARAC by a browser and key in https://192.168.88.149, then login as **ADMIN** and password is **admin**.
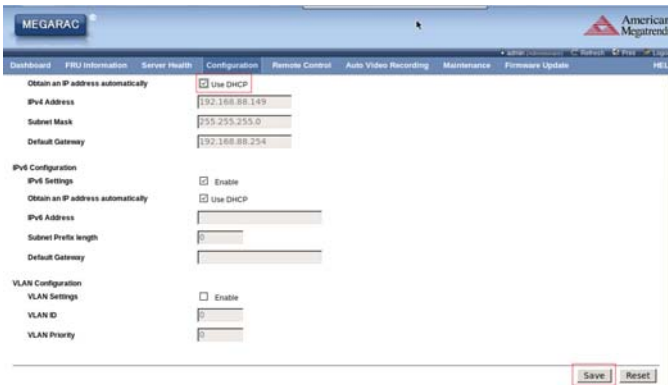

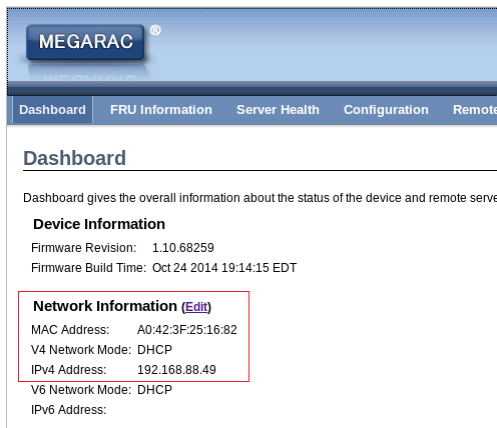**Step 2.** Here shows the network mode is **Static** and its IP is **192.168.88.149**.
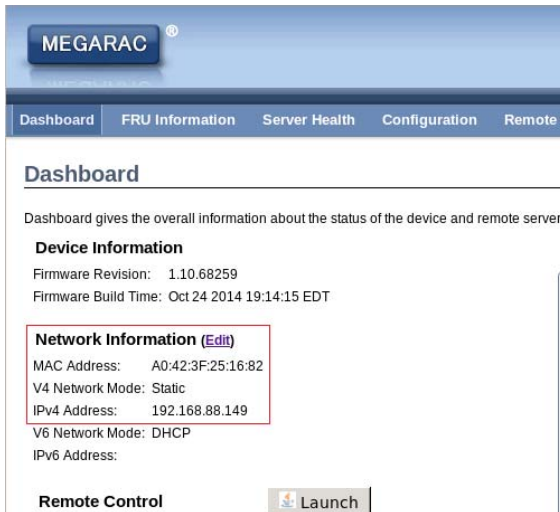
Step 3. Click Network.

Step 4. Check **DHCP** and then click **Save**.

Step 5. Login MEGARAC again to make sure network mode is DHCP. Current network mode is DHCP and IP become DHCP IP 192.168.88.49.

Appendix IV: Technical Support

If a problem arises with your system, you should first turn to your dealer for direct support. Your system has most likely been configured or designed by them and they should have the best idea of what hardware and software your system contains. Hence, they should be of the most assistance for you. Furthermore, if you purchased your system from a dealer near you, take the system to them directly to have it serviced instead of attempting to do so yourself (which can have expensive consequence).

If these options are not available for you then MiTAC International Corporation can help. Besides designing innovative and quality products for over a decade, MiTAC has continuously offered customers service beyond their expectations. TYAN's website (http://www.tyan.com) provides easy-to-access resources such as in-depth Linux Online Support sections with downloadable Linux drivers and comprehensive compatibility reports for chassis, memory and much more. With all these convenient resources just a few keystrokes away, users can easily find their latest software and operating system components to keep their systems running as powerful and productive as possible. MiTAC also ranks high for its commitment to fast and friendly customer support through email. By offering plenty of options for users, MiTAC serves multiple market segments with the industry's most competitive services to support them.

Please feel free to contact us directly for this service at tech-support@tyan.com

Help Resources:

1. See the POST codes section of this manual.
2. See the TYAN's website for FAQ's, bulletins, driver updates, and other information: http://www.tyan.com
3. Contact your dealer for help before calling TYAN.

Returning Merchandise for Service

During the warranty period, contact your distributor or system vendor FIRST for any product problems. This warranty only covers normal customer use and does not cover damages incurred during shipping or failure due to the alteration, misuse, abuse, or improper maintenance of products.

	NOTE:
	A receipt or copy of your invoice marked with the date of purchase is required before any warranty service can be rendered. You may obtain service by calling the manufacturer for a Return Merchandise Authorization (RMA) number. The RMA number should be prominently displayed on the outside of the shipping carton and the package should be mailed prepaid. TYAN will pay to have the board shipped back to you.

TYAN® TN71-BP012 Service Engineer's Manual V1.0

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