



# **ACC/ARTM-7221/SCSI**

## **Installation Guide**

**6806800F01A**

March 2008

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# About this Manual

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## Overview of Contents

This manual is intended for users qualified in electronics or electrical engineering. Users must have a working understanding of AdvancedTCA and telecommunications.

## Abbreviations

This document uses the following abbreviations:

Abbreviation	Definition
ATA	Advanced Technology Attachment
AdvancedTCA	Advanced Telecommunications Computing Architecture
ANSI	American National Standards Institute
ARTM	AdvancedTCA Rear Transition Module
EMC	Electromagnetic Compatibility
EMV	Elektromagnetische Vertraeglichkeit
EN	European Norm
FCC	Federal Communications Commission
GmbH	Gesellschaft mit beschraenkter Haftung
HDD	Hard Disk Drive
IEC	International Electric Code
IPMC	Intelligent Platform Management Controller
IPMI	Intelligent Platform Management Interface
LFM	Linear Feet per Minute
LUN	Logical Unit Number
MMC	Mezzanine Management Controller
NEBS	Network Equipment Building System
OOS	Out-Of-Service
PCI	Peripheral Component Interconnect
PICMG	PCI Industrial Computer Manufacturers Group
PMC	PCI Mezzanine Card
RTM	Rear Transition Module

Abbreviation	Definition
RoHS	Restriction of the use of Certain Hazardous Substances
S.M.A.R.T.	Software Maintenance and Reference Tool
SAS	Serial Attached SCSI
SATA	Serial ATA
SCSI	Small Computer System Interface
TBD	To Be Defined
TS	Time Slot
UL	Underwriters Laboratory Inc.
USB	Universal Serial Bus

## Conventions

The following table describes the conventions used throughout this manual.

Notation	Description
0x00000000	Typical notation for hexadecimal numbers (digits are 0 through F), for example used for addresses and offsets
0b0000	Same for binary numbers (digits are 0 and 1)
<b>bold</b>	Used to emphasize a word
Screen	Used for on-screen output and code related elements or commands in body text
<b>Courier + Bold</b>	Used to characterize user input and to separate it from system output
<i>Reference</i>	Used for references and for table and figure descriptions
File > Exit	Notation for selecting a submenu
<text>	Notation for variables and keys
[text]	Notation for software buttons to click on the screen and parameter description
...	Repeated item for example node 1, node 2, ..., node 12
.	Omission of information from example/command that is not necessary at the time being
..	Ranges, for example: 0..4 means one of the integers 0,1,2,3, and 4 (used in registers)
	Logical OR

Notation	Description
The notation for a warning consists of a yellow triangle with a black exclamation mark, followed by a red rectangular background with the word "WARNING" in white capital letters. Below this, there are three lines of placeholder text represented by 'x's. The notation for a caution consists of a yellow triangle with a black exclamation mark, followed by a yellow rectangular background with the word "CAUTION" in black capital letters. Below this, there are three lines of placeholder text represented by 'x's.	Indicates a hazardous situation which, if not avoided, could result in death or serious injury
The notation for a notice consists of a blue rectangular background with the word "NOTICE" in white capital letters. Below this, there are three lines of placeholder text represented by 'x's.	Indicates a property damage message
The notation for important information consists of a lightbulb icon with a yellow glow inside a white square. Below it, there are three lines of placeholder text represented by 'x's.	No danger encountered. Pay attention to important information

# Summary of Changes

Order No.	Rev.	Date	Description
224618	AA	January 2005	First draft
224618	AB	March 2005	Changed Force Computers to Motorola throughout the document (includes logo, addresses etc.); renamed ARTM-720/SCSI (Force name) to ARTM-7120/SCSI (new Motorola name)
224618	AC	December 2005	Updated front panel description; editorial changes; included 3D graphics; included IPMI information; updated connector description; renamed RTM to new official name: ACC/ARTM-7221/SCSI; added power requirements and critical temperature limits; renamed RTM to ACC/ARTM-7221/SCSI (new official product name)
224618	AD	April 2006	Update for final release
6806800 F01A		March 2008	Update document to Emerson style (logo, copyright, etc.)

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## About this Manual

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In "Area of Interest" select "Technical Documentation". Be sure to include the title, part number, and revision of the manual and tell us how you used it.

# Safety Notes

---

**This section provides safety precautions to follow when installing, operating, and maintaining the product.**

**We intend to provide all necessary information to install and handle the product in this manual. However, as the product is complex and its usage manifold, we do not guarantee that the given information is complete. If you need additional information, ask your Emerson representative.**

**The product has been designed to meet the standard industrial safety requirements. It must not be used except in its specific area of office telecommunication industry and industrial control.**

**Only personnel trained by Emerson persons qualified in electronics or electrical engineering are authorized to install, remove or maintain the product. The information given in this manual is meant to complete the knowledge of a specialist and must not be taken as replacement for qualified personnel.**

## EMC

**The RTM has been tested in a standard Emerson system and found to comply with the limits for a Class A digital device in this system, pursuant to part 15 of the FCC Rules, EN 55022 Class A respectively. These limits are designed to provide reasonable protection against harmful interference when the system is operated in a commercial environment.**

**The RTM generates and uses radio frequency energy and, if not installed properly and used in accordance with this guide, may cause harmful interference to radio communications. Operating the system 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.**

## Installation

### Damage of Circuits

Electrostatic discharge and incorrect RTM installation and removal can damage circuits or shorten their life.

Before touching the RTM or electronic components, make sure that you are working in an ESD-safe environment.

### RTM Malfunctioning

Incorrect RTM installation and removal can result in RTM malfunctioning.

When plugging the RTM in or removing it, do not press on the face plate but use the handles.

### Data loss

Removing the RTM with the system power on and the blue LED on the front blade still flashing causes data loss.

Before removing the RTM from a powered system, power down the slot by opening the lower handle of the front blade and wait until the blue LED is permanently ON.

### RTM Damage

Installing the RTM with other blades than the PENT/ATCA-7221 damages the RTM.

Only install the RTM with the Emerson PENT/ATCA-7221 blade.

## Operation

### RTM damage

High humidity and condensation on the RTM surface causes short circuits.

Do not operate the RTM outside the specified environmental limits. Make sure the RTM is completely dry and there is no moisture on any surface before applying power. Do not operate the RTM below 0°C.

### RTM Overheating and RTM Damage

Operating the RTM without sufficient forced air cooling may lead to RTM overheating and thus RTM damage.

When operating the RTM, make sure that sufficient forced air cooling is available in the shelf.

When operating the RTM in areas of electromagnetic radiation ensure that the RTM is bolted on the system and the system is shielded by enclosure.

Make sure that contacts and cables of the RTM cannot be touched while the RTM is operating.

## RJ-45 Connector

### **RTM and telephone damage**

#### **E1/T1 interfaces on face plate**

On the face plate, RJ-45 connectors are used for different interfaces. Mismatching the interfaces, i.e. connecting a telephone or an E1/T1 network to the serial interfaces labeled as COM or connecting a serial device to a RJ-45 connector labeled as E1/T1 may damage the telephone or the RTM.

Therefore, only connect E1/T1 networks to RJ-45 connectors labeled as E1/T1 ports and only connect serial devices to RJ-45 connectors labeled as COM.

## Environment

Always dispose of used RTMs according to your country's legislation, if possible in an environmentally acceptable way.





# Sicherheitshinweise

---

Dieser Abschnitt enthält Sicherheitshinweise, die bei Installation, Betrieb und Wartung des Produkts zu beachten sind.

Wir sind darauf bedacht, alle notwendigen Informationen, die für die Installation und den Betrieb erforderlich sind, in diesem Handbuch bereit zu stellen. Da es sich jedoch um ein komplexes Produkt mit vielfältigen Einsatzmöglichkeiten handelt, können wir die Vollständigkeit der im Handbuch enthaltenen Informationen nicht garantieren. Falls Sie weitere Informationen benötigen sollten, wenden Sie sich bitte an die für Sie zuständige Geschäftsstelle von Emerson.

Das Produkt erfüllt die für die Industrie geforderten Sicherheitsvorschriften und darf ausschließlich für Anwendungen in der Telekommunikationsindustrie und im Zusammenhang mit Industriesteuerungen verwendet werden.

Installation, Wartung und Betrieb dürfen nur von durch Emerson ausgebildetem oder im Bereich Elektronik oder Elektrotechnik qualifiziertem Personal durchgeführt werden. Die in diesem Handbuch enthaltenen Informationen dienen ausschließlich dazu, das Wissen von Fachpersonal zu ergänzen, können es aber in keinem Fall ersetzen.

## EMV

Das RTM wurde in einem Emerson Standardsystem getestet. Es erfüllt die für digitale Geräte der Klasse A gültigen Grenzwerte in einem solchen System gemäß den FCC-Richtlinien Abschnitt 15 bzw. EN 55022 Klasse A. Diese Grenzwerte sollen einen angemessenen Schutz vor Störstrahlung beim Betrieb des RTMs in Gewerbe- sowie Industriegebieten gewährleisten.

Das RTM arbeitet im Hochfrequenzbereich und erzeugt Störstrahlung. Bei unsachgemäßem Einbau und anderem als in diesem Handbuch beschriebenen Betrieb können Störungen im Hochfrequenzbereich auftreten.

**Warnung!** Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen. In diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen.

## Installation

### **Beschädigung von Schaltkreisen**

Elektrostatische Entladung und unsachgemäßer Ein- und Ausbau des RTMs kann Schaltkreise beschädigen oder ihre Lebensdauer verkürzen.

Bevor Sie das RTM oder elektronische Komponenten berühren, vergewissern Sie sich, daß Sie in einem ESD-geschützten Bereich arbeiten.

### **Fehlfunktion des RTMs**

Unsachgemäßer Ein- und Ausbau des RTMs kann zu Fehlfunktion des RTMs führen.

Drücken Sie beim Ein- und Ausbau des RTMs nicht auf die Frontblende, sondern benutzen Sie die Griffe.

### **Beschädigung des RTMs**

Wenn Sie das RTM nicht zusammen mit dem PENT/ATCA-7221 Front Blade installieren, wird das RTM beschädigt.

Installieren Sie das RTM deshalb nur zusammen mit dem Emerson PENT/ATCA-7221 Front Blade.

### **Datenverlust**

Wenn Sie das RTM aus einem eingeschaltetem System herausziehen während die blaue LED auf dem Front Blade noch blinkt, gehen Daten verloren.

Bevor Sie das RTM aus einem eingeschaltetem System herausziehen, müssen Sie den Steckplatz durch Oeffnen des unteren Griffs am Front Blade ausschalten und warten bis die blaue LED auf dem Front Blade permanent leuchtet.

## Betrieb

### **Überhitzung und Beschädigung des RTMs**

Betreiben Sie das RTM ohne Zwangsbelüftung, kann das RTM überhitzt und schließlich beschädigt werden.

Bevor Sie das RTM betreiben, müssen Sie sicher stellen, dass das Shelf über eine ausreichende Zwangskühlung verfügt.

Wenn Sie das RTM in Gebieten mit starker elektromagnetischer Strahlung betreiben, stellen Sie sicher, dass das RTM mit dem System verschraubt ist und das System durch ein Gehäuse abgeschirmt ist.

Stellen Sie sicher, dass Anschlüsse und Kabel des RTMs während des Betriebs nicht versehentlich berührt werden können.

## RJ-45 Stecker

### **Beschädigung des RTMs und des Telefons**

#### **RJ-45 Stecker an der Frontblende**

Die RJ-45 Stecker an der Frontblende werden für verschiedene Schnittstellen verwendet, die nicht verwechselt werden dürfen. Wenn Sie ein Telefon oder ein E1/T1 Netzwerk an eines der mit COM gekennzeichneten seriellen Stecker anschließen oder wenn Sie ein serielles Gerät an die mit E1/T1 gekennzeichneten Stecker anschließen, kann das Telefon oder das RTM beschädigt werden.

Schließen Sie deshalb nur E1/T1 Netze an die mit E1/T1 gekennzeichneten Stecker an und schließen Sie nur serielle Geräte an die mit COM gekennzeichneten Stecker an.

## Umweltschutz

Entsorgen Sie alte RTMs stets gemäß der in Ihrem Land gültigen Gesetzgebung, wenn möglich immer umweltfreundlich.



## 1.1 About This Manual

This Installation Guide provides the information you need to install and use the ACC/ARTM-7221/SCSI. Furthermore, you may also need the *PENTI/ATCA-7221 Reference Guide*.

### 1.1.1 Organization of This Document

This installation guide is organized as follows.

Table 1-1 Manual Organization

Chapter	Content Description
Using This Guide	Lists all conventions and abbreviations used in this manual and outlines the revision history
Other Sources of Information	Lists related documentation and specifications
Safety Notes	Describes the safety information which have to be observed before and during installation and during operation.
Sicherheitshinweise	German translation of the chapter "Safety Notes"
Introduction	Lists the interfaces/features and standards the RTM complies with
Installation	Describes: <ul style="list-style-type: none"><li>● Requirements (environmental, power, and backplane requirements)</li><li>● On-board connectors</li><li>● RTM installation</li><li>● Face plate LEDs and connectors</li><li>● Backplane connectors</li><li>● Sensors and other devices connected to the Intelligent Platform Management Interface Controller (IPMC)</li></ul>

### 1.1.2 Feedback

We welcome and appreciate your comments on our documentation. We want to know what you think about our manuals and how we can make them better. Mail comments to:

- Emerson Network Power - Embedded Computing GmbH  
Lilienthalstraße 15  
85579 Neubiberg  
Germany
- Email: [reader-comments@mcg.mot.com](mailto:reader-comments@mcg.mot.com)

In all your correspondence, please list your name, position, and company. Be sure to include the title, part number, and revision of the manual and tell how you used it.

## 1.2 Features

The ACC/ARTM-7221/SCSI is a rear transition module (RTM) which provides easy access to I/O signals of the Emerson PENT/ATCA-7221 front blade. The I/O signals are available via the zone 3 connectors.

The RTM provides the following:

- Interfaces on face plate:
  - OneUSB 2.0
  - Two RJ-45 serial
  - Two Ethernet
  - Two SCSI
  - One keyboard/mouse
  - One SAS
  - Four E1/T1  
Only available if a Emerson PMC-8260/DS1 module is installed on the front blade.
- Interfaces on board:
  - One SAS (for on-board hard disk)
  - One IPMB1

The RTM furthermore incorporates an Mezzanine Management Controller (MMC) based on the Atmega64L controller which provides functionality that is fully compliant to the IPMI V1.5 standard.

## 1.3 Standard Compliances

The RTM meets the standards shown in the table below.

Standard	Description
UL 60950-1 EN 60950-1 IEC 60950-1 CAN/CSA C22.2 No. 60950-1	Legal safety requirements
CISPR 22 CISPR 24 EN 55022 EN 55024 FCC Part 15 EN 300386	EMC requirements on system level
NEBS Standard GR-1089 CORE NEBS Standard GR-63-CORE <sup>1</sup>	NEBS level three - Product is designed to support NEBS level three. The compliance tests must be done with the customer target system.
PICMG 3.0 R.1.0	Defines mechanics, blade dimensions, power distribution, power and data connectors, and system management

1. A test has shown that the RTM is not compliant to the "Unpacked Equipment Shock Criteria" as defined in NEBS GR-63 4.3.2. The test consisted of dropping the RTM from 100mm height. As a result of the test, some locating pins were damaged which fix the two alignment blocks that are required by the PICMG 3.0 specification. Due to the damage, the alignment blocks were allowed to rotate slightly.

**Note:** The product has been designed to meet the directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) Directive



2002/95/EC.

---

Figure 1-1 Declaration of Conformity

## Declaration of Conformity

Emerson Network Power -  
Embedded Computing GmbH

Lilienthalstr. 15  
D-85579 Neubiberg

Declares that the product

Product Name: ACC/ARTM-7221/SCSI

Conforms to the following Product Specifications:

Safety: EN 60950-1/A11:2004  
UL 60950-1:2003  
CAN/CSA-C22.2 No. 60950-1:2003

EMC: EN 55022: 1998 + A1:2000 + A2:2003  
EN 55024: 1998 + A1:2001 + A2:2003  
EN 300386:V1.3.2:2003-05  
47 CFR Part 15 Subpart B (FCC)

Supplementary Information:

The product herewith complies with the requirements  
of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

This product was tested as an integral part of a  
Emerson Network Power defined reference system.



Signature

Neubiberg, 14.02.2008

Quality Management

## 1.4 Mechanical Data

The following table lists physical dimensions and weight of the RTM.

*Table 1-2 Mechanical Data*

Feature	Value
Physical Dimension of PCB	322.25 mm x 70 mm
Weight of RTM	1.0 kg

## 1.5 Ordering Information

When ordering RTM variants, use the order numbers given below.

### 1.5.1 Product Nomenclature

As of the time of writing this guide, the following RTM variant was available. Consult your local Emerson sales representative for a more up-to-date list.

Order Number	Variant name	Description
122644	ACC/ARTM-7221/SCSI	Non-RoHS compliant RTM



## 2.1 Action Plan

To install the RTM, the following steps are necessary and will be described in further detail in the sections of this chapter.

Figure 2-1 Action Plan - Part 1

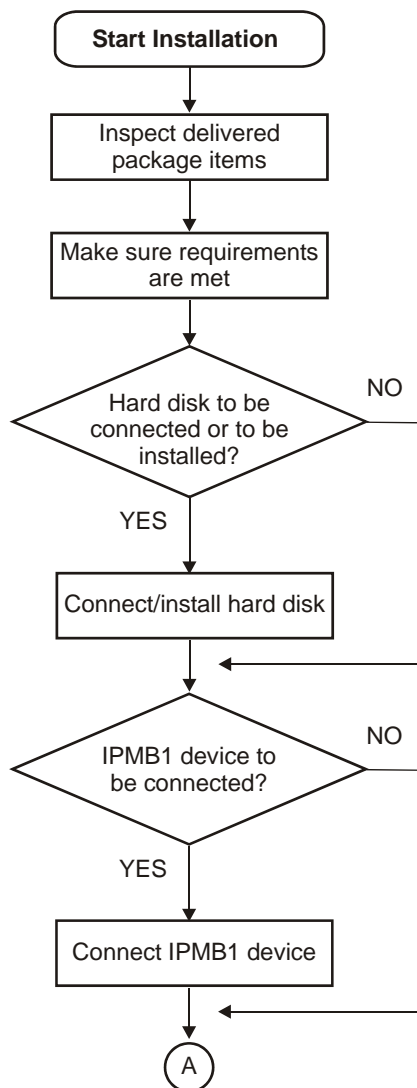
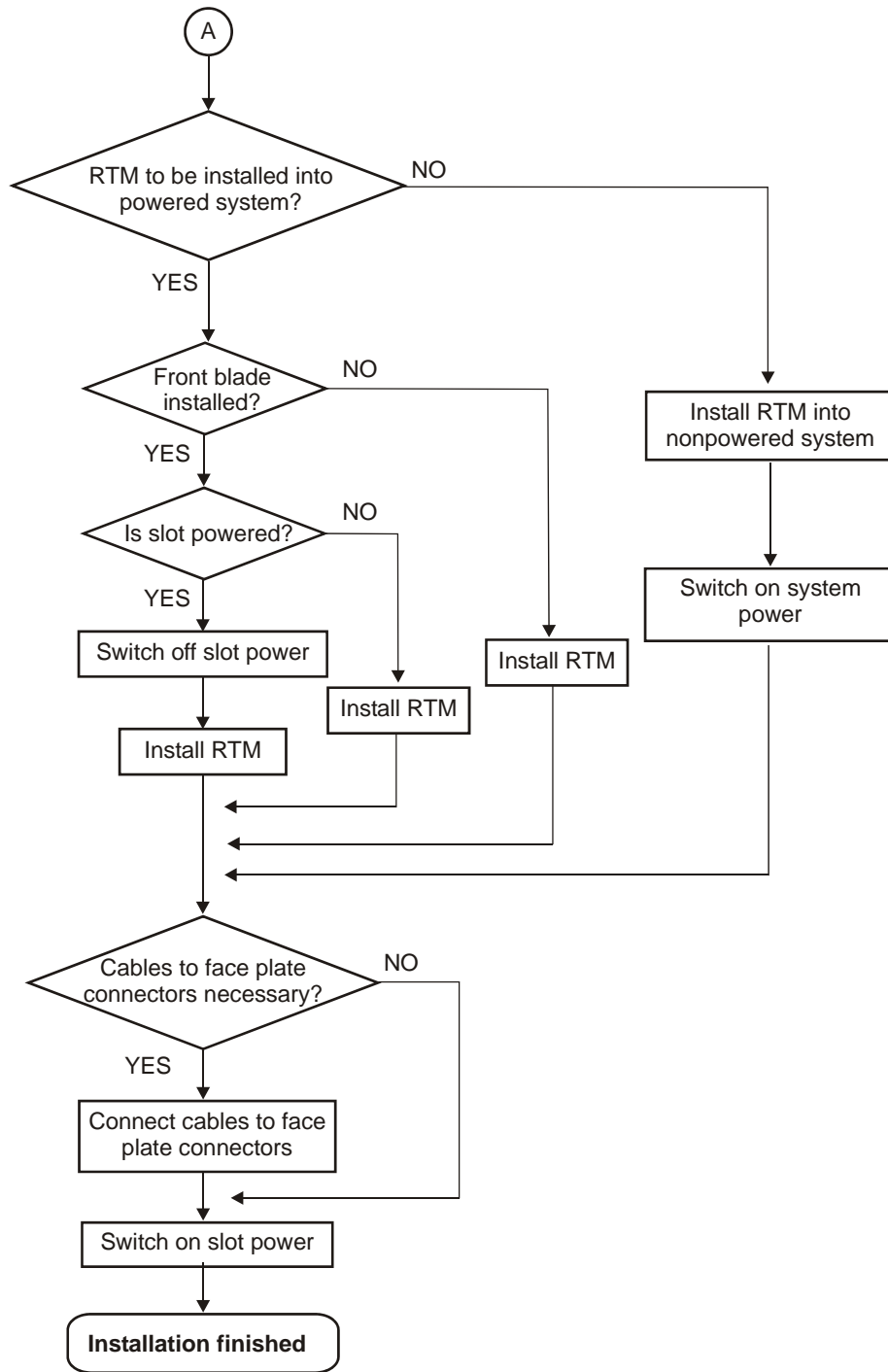


Figure 2-2 Action Plan - Part 2



## 2.2 Before You Start

This section provides the following information:

- Inspecting the contents of the delivered package
- Requirements

### 2.2.1 Package Inspection

#### NOTICE

##### Damage of Circuits

Electrostatic discharge and incorrect RTM installation and removal can damage circuits or shorten their life.

Before touching the RTM or electronic components, make sure that you are working in an ESD-safe environment.

The ACC/ARTM-7221/SCSI comes delivered as accessory kit consisting of this Installation Guide and the RTM.

### 2.2.2 Requirements

Before installing the RTM, make sure the requirements described in this section are met.

#### 2.2.2.1 Environmental Requirements

The environmental conditions must be tested and proven in the used system configuration. The conditions refer to the surrounding of the board within the user environment.



- Operating temperatures refer to the temperature of the air circulating around the ARTM and not to the actual component temperature.
- To ensure that the operating conditions are met, forced air cooling is required within the chassis environment.
- The environmental values given in the table below only apply to the ARTM without any hard disk. If installing hard disks, their environmental requirements must also be taken into account. If you use the ARTM together with a hard disk, also check the environmental requirements of the hard disk and make sure that the most restrictive requirements are met.

## NOTICE

### RTM damage

**High humidity and condensation on the RTM surface causes short circuits.**

**Do not operate the RTM outside the specified environmental limits. Make sure the RTM is completely dry and there is no moisture on any surface before applying power.**

**Do not operate the RTM below 0°C.**

Table 2-1 Environmental Requirements

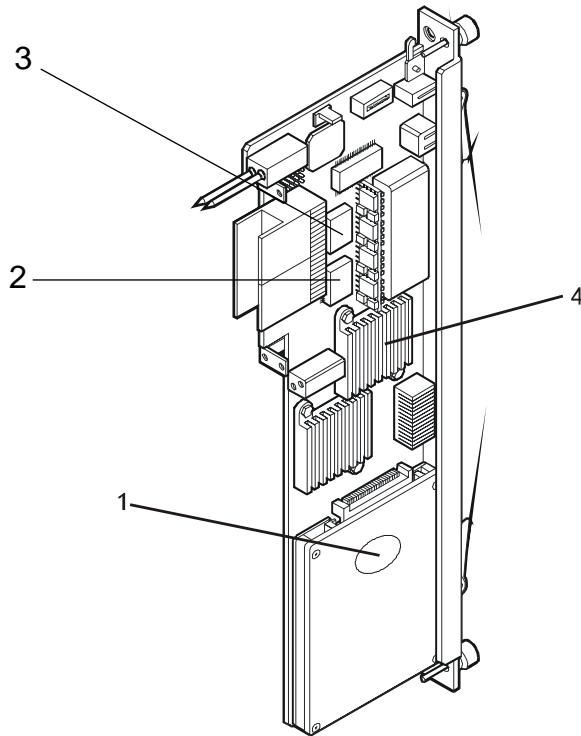
Requirement	Operating	Non-Operating
Temperature	+5°C to +40°C (normal operation) according to NEBS Standard GR-63-CORE -5°C to +55°C (exceptional operation) according to NEBS Standard GR-63-CORE All values may be further limited by installed accessories with more restrictive environmental requirements.	-40°C to +70°C (may be further limited by installed accessories)
Temp. Change	+/- 0.25°C/min according to NEBS Standard GR-63-CORE	+/- 0.25°C/min
Rel. Humidity	5% to 95% non-condensing according to Emerson-internal environmental requirements	5% to 95% non-condensing according to Emerson-internal environmental requirements
Altitude	Up to +3,000 m	Up to +12,000 m
Vibration 5-20 Hz 20-250 Hz	0.5 mm amplitude 1g	1 mm amplitude 2.0 g
Shock	5 g/11 ms halfsine according to Emerson-internal environmental requirements	15 g/11 ms half sine according to Emerson-internal environmental requirements
Free Fall		1,200 mm/all edges and corners

In order to ensure proper RTM operation, you have to make sure that the temperatures at the following locations are not exceeded. If not stated otherwise, the temperatures should be measured exactly at the given locations.

Location	Component	Temperature Limit
1	Installed hard disk	60°C
2	TX1322 TLV-1 transformer	80° C
3	TX1322 TLV-1 transformer	80°C
4	Controller	85°C



Figure 2-3 Critical Temperature Spots



### 2.2.2.2 Power Requirements

The RTM draws approximately 25W from the front blade which it is attached to.

### 2.2.2.3 Backplane Requirements

For installing the RTM, you need a system without a zone 3 midplane.

## 2.3 On-Board Connectors

The RTM provides the following on-board connectors:

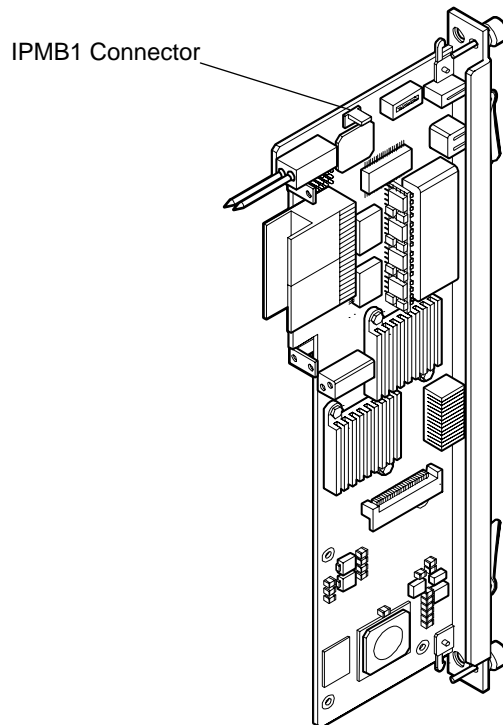
- IPMB1
- SAS

Before installing the RTM, you may want to connect devices to these connectors.

### 2.3.1 IPMB1

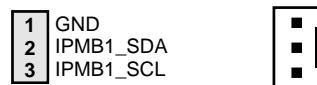
The RTM provides an on-board IPMB1 connector which enables you to attach a device such as a fan to the IPMB1 interface of the ATCA-7221. The following figure shows the location of the IPMB1 connector.

Figure 2-4 Location of IPMB1 Connector



The following figure shows the pinout of the IPMB1 connector.

Figure 2-5 IPMB1 Connector Pinout

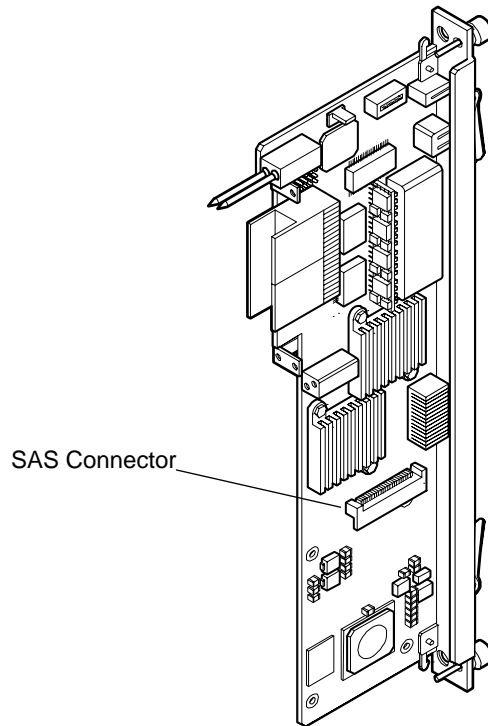


### 2.3.2 Serial Attached SCSI

The Serial Attached SCSI (SAS) connector allows to install an on-board 2.5" SAS hard disk which is available as accessory kit called ACC/ATCA-7221/HDD/SAS for the RTM. For further information refer to the *ACC/ATCA-7221/HDD/SAS Installation Guide* which can be downloaded from the Emerson literature catalog.

The following figure shows the location of the SAS connector.

Figure 2-6 Location of SAS Connector



The SAS hard-disk activity is shown via the HDD LED at the RTM face plate.

The following connector pinout gives information on which signal is assigned to which pin.

Table 2-2 SAS Connector Pinout

Segment	Pin	Name
Primary Signal	S1	GROUND
Primary Signal	S2	RP+
Primary Signal	S3	RP
Primary Signal	S4	GROUND
Primary Signal	S5	TP
Primary Signal	S6	TP+
Primary Signal	S7	GROUND
Secondary Signal	S8	GROUND
Secondary Signal	S9	RS+
Secondary Signal	S10	RS
Secondary Signal	S11	GROUND

Table 2-2 SAS Connector Pinout (continued)

Segment	Pin	Name
Secondary Signal	S12	TS
Secondary Signal	S13	TS+
Secondary Signal	S14	GROUND
Power	P1	V3P3
Power	P2	V3P3
Power	P3	V3P3, precharge
Power	P4	GROUND
Power	P5	GROUND
Power	P6	GROUND
Power	P7	VP5, precharge
Power	P8	VP5
Power	P9	VP5
Power	P10	GROUND
Power	P11	READY LED
Power	P12	GROUND
Power	P13	VP12, precharge
Power	P14	VP12
Power	P15	VP12

## 2.4 Module Installation

The ARTM can be installed into a powered or nonpowered system and must be installed into a AdvancedTCA system without a zone 3 midplane.

### NOTICE

#### RTM Damage

Installing the RTM with other blades than the PENT/ATCA-7221 damages the RTM.  
Only install the RTM with the Emerson PENT/ATCA-7221 blade.

## 2.4.1 Nonpowered System

### **NOTICE**

#### **Damage of Circuits**

**Electrostatic discharge and incorrect RTM installation and removal can damage circuits or shorten their life.**

**Before touching the RTM or electronic components, make sure that you are working in an ESD-safe environment.**

#### **Installation Procedure**

1. Locate the slot the ARTM is to be installed into at the shelf's rear which must be the same as that of the front blade

### **NOTICE**

#### **RTM Malfunctioning**

**Incorrect RTM installation and removal can result in RTM malfunctioning.**

**When plugging the RTM in or removing it, do not press on the face plate but use the handles.**

2. Ensure that the top and bottom handles are in outward position
3. Insert the ARTM into the shelf by placing the top and bottom edges in the card guides of the slot
4. Slide the ARTM into the slot
5. Hook the lower and the upper handle into the shelf rail recesses
6. Fully insert the ARTM and lock it to the shelf by pressing the two components of the lower and upper handles together and turning the handles towards the face plate
7. Tighten the two face plate screws
8. Plug interface cables into the face plate connectors, if applicable
9. Turn on system power

## Removal Procedure

1. Remove interface cables from the face plate connectors, if applicable
2. Loosen the two face plate screws
3. Open the lower and the upper handle by pressing the two handle components together and turning the handles outward

### NOTICE

#### RTM Malfunctioning

**Incorrect RTM installation and removal can result in RTM malfunctioning. When plugging the RTM in or removing it, do not press on the face plate but use the handles.**

4. Remove the ARTM from the slot
5. Turn on the system power

## 2.4.2 Powered System

You can install the ARTM into a powered system if the front blade is already installed or if it is not already installed. If the front blade is already installed, its payload has to be powered down first.

### NOTICE

#### Damage of Circuits

**Electrostatic discharge and incorrect RTM installation and removal can damage circuits or shorten their life.**

**Before touching the RTM or electronic components, make sure that you are working in an ESD-safe environment.**

## Installation Procedure with Installed Front Blade

1. Locate the slot the ARTM is to be installed into the shelf's rear which must be the same as that of the front blade
2. Open the lower handle of the front blade in order to power down its payload  
The blue LED on the front blade starts to flash. This indicates that the front blade is informing the shelf manager about its desire to power down its payload.
3. Wait until the blue LED on the front blade is ON

This indicates that the front board's payload is powered down.

4. Ensure that the top and the bottom handles of the ARTM are in outward position
5. Insert the ARTM into the shelf by placing the top and bottom edges in the card guides of the slot

### **NOTICE**

#### **RTM Malfunctioning**

**Incorrect RTM installation and removal can result in RTM malfunctioning.**

**When plugging the RTM in or removing it, do not press on the face plate but use the handles.**

6. Slide the ARTM into the slot
7. Hook the lower and the upper handle into the shelf rail recesses
8. Fully insert the ARTM and lock it to the shelf by pressing the two components of the lower and the upper handles together and turning the handles towards the face plate  
The ARTM's blue hot swap LED is switched ON. This indicates that the ARTM's MMC is powered up.
9. Close the lower handle of the front blade in order to power up the payload of both the front blade and the ARTM  
The blue LEDs of both the front blade and the ARTM start to flash. This indicates that the front blade is informing the shelf manager about its desire to power up the payload of both the front blade and the ARTM.
10. Tighten both face plate screws on the ARTM
11. Wait until the blue LEDs of both the front blade and the ARTM are OFF  
A switched OFF blue LED indicates that the payload of the respective blade or ARTM has been powered up and is active.
12. Plug interface cable into face plate connectors, if applicable

#### **Installation Procedure without Installed Front Blade**

1. Ensure that the top and bottom handles of the RTM are in outward position
2. Insert the ARTM into the shelf by placing the top and the bottom edges in the card guides of the slot
3. Slide the ARTM into the slot
4. Hook the lower and the upper handle into the shelf rail recesses

5. Fully insert the ARTM and lock it to the shelf by pressing the two components of the lower and upper handles and turning the handles towards the face plate
6. Fasten both screws on the ARTM
7. Insert the front blade from the system's front into the same slot as the ARTM  
As soon as the front blade is connected to the backplane, the blue hot swap LEDs of both the front blade and the ARTM are illuminated permanently. This indicates that the IPMC of the front blade and the MMC of the ARTM are powered up.
8. Close the handles of the front blade  
The blue LEDs on both the front blade and the ARTM start flashing. This indicates that the front blade is informing the shelf manager about its desire to power up the payload of both the front blade and the ARTM.
9. Tighten the two face plate screws on the front blade
10. Wait until the blue LEDs on both the front blade and the ARTM are OFF  
Switched off blue LEDs indicate that the payload of the respective blade or ARTM has become active.
11. Plug interface cable into face plate connectors, if applicable

### Removal Procedure

#### **NOTICE**

##### **Damage of ARTM and Front Blade**

**Removing the ARTM from the system while the payload of the front blade is powered up may damage the front blade and ARTM.**

**Whenever removing the ARTM from the system, you have to power down the payload of the front blade first.**

1. Open the lower handle of either the ARTM or the front blade  
The blue LEDs on both the front blade and the ARTM start flashing. This indicates that the front blade is informing the shelf manager about its desire to power down the payload of both the front blade and the ARTM.

#### **NOTICE**

##### **Data loss**

**Removing the RTM with the system power on and the blue LED on the front blade still flashing causes data loss.**

**Before removing the RTM from a powered system, power down the slot by opening the lower handle of the front blade and wait until the blue LED is permanently ON.**



2. Wait until the blue LEDs on both the front blade and the ARTM are permanently ON  
A permanently switched ON LED indicates that the payload of respective blade or ARTM has been powered down. .
3. Loosen the two ARTM face plate screws
4. Open the lower and the upper handle by pressing the two handle components together and turning the handles outwards
5. Remove interface cables from face plate connectors, if applicable

### **NOTICE**

#### **RTM Malfunctioning**

**Incorrect RTM installation and removal can result in RTM malfunctioning.**

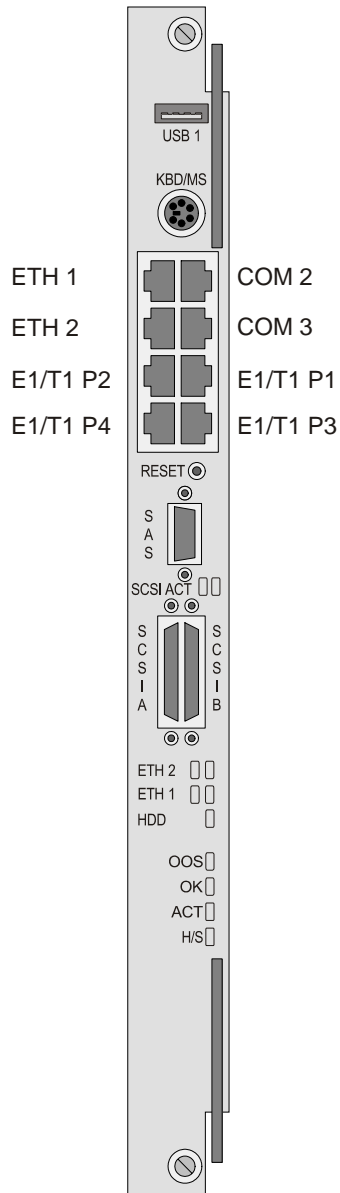
**When plugging the RTM in or removing it, do not press on the face plate but use the handles.**

6. Remove the ARTM from the slot

## 2.5 Face Plate Controls, Indicators and Connectors

The following figure shows the face plate of the RTM.

Figure 2-7 Face Plate



### 2.5.1 Connectors

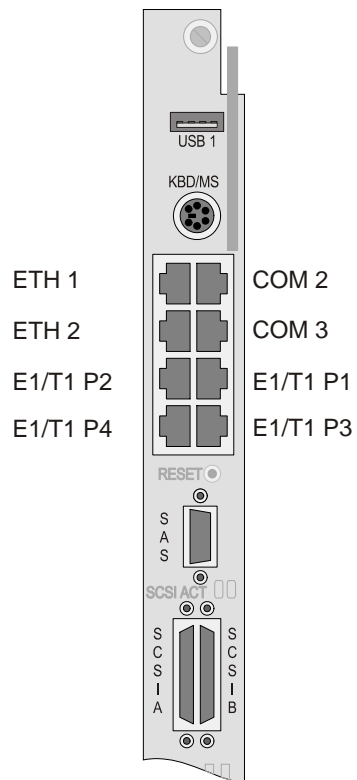
The face plate of the RTM provides the following connectors:

- One USB 2.0
- Keyboard/mouse

- Two Ethernet interfaces
- Two serial (RJ-45)
- Four E1/T1

- One SAS interface
- Two SCSI interfaces

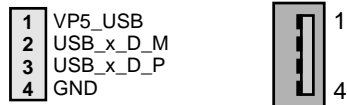
Figure 2-8 Face Plate Connectors



### 2.5.1.1 USB

Two USB 2.0 devices can be connected via the USB connectors USB 1 and USB 2. The following connector pinout gives information on which signal is assigned to which pin. The "x" stands for the number of the interface.

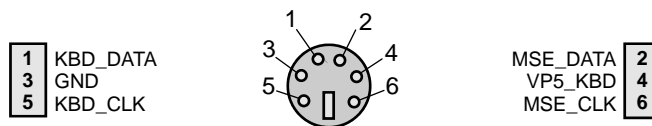
Figure 2-9 USB Connector Pinout



### 2.5.1.2 Keyboard/Mouse

One PS/2 keyboard or one PS/2 mouse can directly be connected to the RTM. If you use a splitter cable, you can connect a PS/2 keyboard and mouse simultaneously. The following connector pinout gives information on which signal is assigned to which pin.

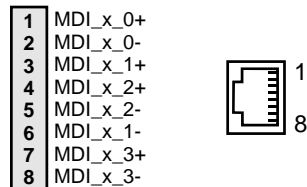
Figure 2-10 Keyboard/Mouse Connector Pinout



### 2.5.1.3 Ethernet

Two Ethernet devices can be connected to the RTM via the two RJ-45 connectors on the face plate. The following connector pinout gives information on which signal is assigned to which pin. The "x" stands for the number of the interface.

Figure 2-11 Ethernet Connector Pinout



### 2.5.1.4 Serial

#### NOTICE

##### RTM and telephone damage

##### E1/T1 interfaces on face plate


On the face plate, RJ-45 connectors are used for different interfaces. Mismatching the interfaces, i.e. connecting a telephone or an E1/T1 network to the serial interfaces labeled as COM or connecting a serial device to a RJ-45 connector labeled as E1/T1 may damage the telephone or the RTM.

Therefore, only connect E1/T1 networks to RJ-45 connectors labeled as E1/T1 ports and only connect serial devices to RJ-45 connectors labeled as COM.

Two serial devices can be connected to the RTM via the two RJ-45 connectors on the face plate. The following connector pinout gives information on which signal is assigned to which pin. The "x" stands for the number of the interface.

Figure 2-12 Serial Connector Pinout

1	RJ45_x_RI
2	RJ45_x_DCD
3	RJ45_x_DTR
4	GND
5	RJ45_x_RXD
6	RJ45_x_TXD
7	RJ45_x_CTS
8	RJ45_x_RTS



### 2.5.1.5 E1/T1

#### NOTICE

##### RTM and telephone damage

##### E1/T1 interfaces on face plate

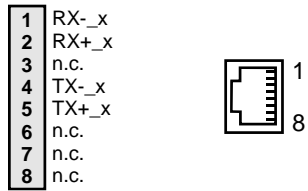
On the face plate, RJ-45 connectors are used for different interfaces. Mismatching the interfaces, i.e. connecting a telephone or an E1/T1 network to the serial interfaces labeled as COM or connecting a serial device to a RJ-45 connector labeled as E1/T1 may damage the telephone or the RTM.

Therefore, only connect E1/T1 networks to RJ-45 connectors labeled as E1/T1 ports and only connect serial devices to RJ-45 connectors labeled as COM.

The RTM face plate provides four E1/T1 interface connectors at its face plate. The respective signals derive from a PMC-8260/DS1 installed on the front blade. Depending on the PMC-8260/DS1 variant, up to four E1/T1 interfaces are available at the RTM's face plate.

The following connector pinout gives information on which signal is assigned to which pin. The "x" stands for the number of the interface.

Figure 2-13 E1/T1 Connector Pinout





### 2.5.1.6 SAS

The following connector pinout gives information on which signal is assigned to which pin.

Figure 2-14 SAS Connector Pinout

<b>G1</b>	GND		GND	<b>G1</b>
<b>S2</b>	Rx 2-		Rx 2+	<b>S1</b>
<b>G2</b>	GND		GND	<b>G2</b>
<b>S4</b>	Rx 3-		Rx 3+	<b>S3</b>
<b>G3</b>	GND		GND	<b>G3</b>
<b>S6</b>	n.c.		n.c.	<b>S5</b>
<b>G4</b>	GND		GND	<b>G4</b>
<b>S8</b>	n.c.		n.c.	<b>S7</b>
<b>G5</b>	GND		GND	<b>G5</b>
<b>S10</b>	n.c.		n.c.	<b>S9</b>
<b>G6</b>	GND		GND	<b>G6</b>
<b>S12</b>	n.c.		n.c.	<b>S11</b>
<b>G7</b>	GND		GND	<b>G7</b>
<b>S14</b>	Tx 3+		Tx 3-	<b>S13</b>
<b>G8</b>	GND		GND	<b>G8</b>
<b>S16</b>	Tx 2+		Tx 2-	<b>S15</b>
<b>G9</b>	GND		GND	<b>G9</b>

### 2.5.1.7 SCSI

The following connector pinout gives information on which signal is assigned to which pin.

Figure 2-15 SCSI Connector Pinout

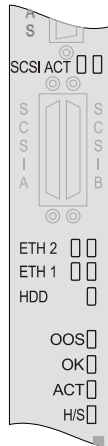
1	SCSIx_D12+	SCSIx_D12-	35
2	SCSIx_D13+	SCSIx_D13-	36
3	SCSIx_D14+	SCSIx_D14-	37
4	SCSIx_D15+	SCSIx_D15-	38
5	SCSIx_DP1+	SCSIx_DP1-	39
6	SCSIx_D0+	SCSIx_D0-	40
7	SCSIx_D1+	SCSIx_D1-	41
8	SCSIx_D2+	SCSIx_D2-	42
9	SCSIx_D3+	SCSIx_D3-	43
10	SCSIx_D4+	SCSIx_D4-	44
11	SCSIx_D5+	SCSIx_D5-	45
12	SCSIx_D6+	SCSIx_D6-	46
13	SCSIx_D7+	SCSIx_D7-	47
14	SCSIx_DP0+	SCSIx_DP0-	48
15	GND	GND	49
16	DIFFSENSE	GND	50
17	TERMPWR	TERMPWR	51
18	TERMPWR	TERMPWR	52
19	n.c.	n.c.	53
20	GND	GND	54
21	SCSIx_ATN+	SCSIx_ATN-	55
22	GND	GND	56
23	SCSIx_BSY+	SCSIx_BSY-	57
24	SCSIx_ACK+	SCSIx_ACK-	58
25	SCSIx_RST+	SCSIx_RST-	59
26	SCSIx_MSG+	SCSIx_MSG-	60
27	SCSIx_SEL+	SCSIx_SEL-	61
28	SCSIx_CD+	SCSIx_CD-	62
29	SCSIx_REQ+	SCSIx_REQ-	63
30	SCSIx_IO+	SCSIx_IO-	64
31	SCSIx_D8+	SCSIx_D8-	65
32	SCSIx_D9+	SCSIx_D9-	66
33	SCSIx_D10+	SCSIx_D10-	67
34	SCSIx_D11+	SCSIx_D11-	68



## 2.5.2 LEDs

The following figure shows the LEDs available at the RTMs front blade.

Figure 2-16 Face Plate LEDs



A detailed description of each LED is given in the following table.

Table 2-3 LED Description

LED	Description
SCSI ACT	<p>These LEDs indicate whether there is SCSI activity or not. Each LED represents one of the two SCSI channels on-board.</p> <p><b>Left LED</b>            OFF: No SCSI A activity            Green: SCSI A activity</p> <p><b>Right LED</b>            OFF: No SCSI B activity            Green: SCSI B activity</p>
ETH 1 and ETH 2	<p>These LEDs indicate the status of the Ethernet interfaces ETH 1 and ETH 2</p> <p><b>Left LEDs</b>            Indicates whether an Ethernet link is established or not            OFF: Ethernet link is not established            Yellow: Ethernet link is established</p> <p><b>Right LEDs</b>            Indicates whether there is Ethernet activity or not            OFF: No Ethernet activity            Green: Ethernet activity</p>
HDD	<p>Indicates whether there is SAS hard disk activity or not</p> <p>OFF: No SAS activity            Green: SAS activity</p>

Table 2-3 LED Description (continued)

LED	Description
OOS	Out-of-Service This LED is controlled by upper layer software, such as middleware or applications. It works in parallel to the OOS LED at the front blade's face plate.
OK	RTM Power Status Green: The RTM power has been enabled by the MMC. OFF: RTM power is disabled
ACT	This LED is controlled by upper layer software, such as middleware or applications. It works in parallel to the ACT LED at the front blade's face plate.
H/S	Indicates whether the RTM can be installed or removed <b>During RTM installation:</b> Permanently blue: RTM powers up Flashing blue: RTM communicates with shelf management controller OFF: RTM is active <b>During RTM removal:</b> Flashing blue: RTM notifies shelf management controller of desired deactivation. In this state the RTM must not be removed. Permanently blue: RTM is powered down and is ready to be extracted OFF: RTM is active and cannot be removed

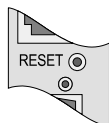
### 2.5.3 Reset Key

By pressing on the reset key, you reset the RTM and the front blade. The following figure shows the location of the reset key.



The RTM's MMC and the front blade's IPMC are not reset via this key.

Figure 2-17 Face Plate Reset Key



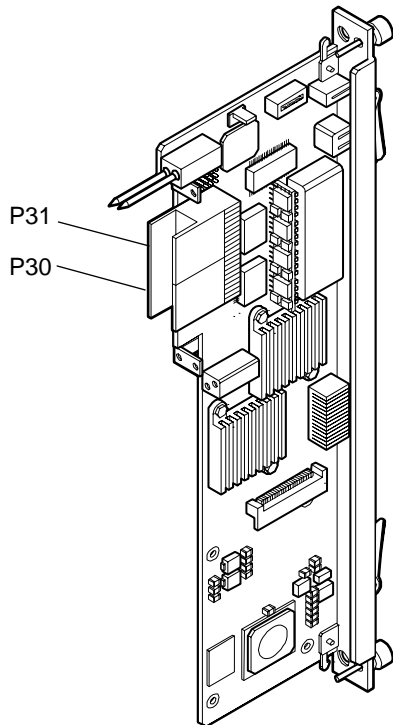
## 2.6 Zone 3 Connectors

The RTM provides two zone 3 connectors: P30 and P31. They provide interfaces to:

- Serial (RS-232)
- PCI Express
- USB
- Keyboard/Mouse
- IPMI
- Power
- PMC user I/O

The following figure shows the location of P30 and P31.

*Figure 2-18 Location of Zone 3 Connectors P30 and P31*



The following connector pinouts give information on which signal is assigned to which pin.

Figure 2-19 P30 Connector Pinout, Rows a-d

	a	b	a	b	c	d	e	f	g	h	c	d	
1	RS232_2_RXD	RS232_2_TXD									RS232_2_RTS	RS232_2_CTS	1
2	RS232_2_DCD	RS232_2_DTR									RS232_2_DSR	RS232_2_RI	2
3	RTM_GPO	n.c.									n.c.	n.c.	3
4	USB0_P	USB0_M									n.c.	n.c.	4
5	PCIE_2_TX_P	PCIE_2_TX_M									PCIE_2_RX_P	PCIE_2_RX_M	5
6	n.c.	n.c.									n.c.	n.c.	6
7	n.c.	n.c.									n.c.	n.c.	7
8	PCIE_0_TX_P	PCIE_0_TX_M									PCIE_0_RX_P	PCIE_0_RX_M	8
9	IPMB1_SCL	IPMB1_SDA									IPMI_V3P3	I2C_ALERT_N	9
10	VP12_RTM	VP12_RTM									V3P3_RTM	V3P3_RTM	10

Figure 2-20 P30 Connector Pinout, Rows e-h

	e	f	a	b	c	d	e	f	g	h	g	h	
1	RS232_3_RXD	RS232_3_TXD									RS232_3_RTS	RS232_3_CTS	1
2	RS232_3_DCD	RS232_3_DTR									RS232_3_DSR	RS232_3_RI	2
3	KBD_DAT	KBD_CLK									MSY_DAT	MSY_CLK	3
4	n.c.	n.c.									n.c.	n.c.	4
5	PCIE_3TX_P	PCIE_3_TX_M									PCIE_3_RX_P	PCIE_3_RX_M	5
6	n.c.	n.c.									n.c.	n.c.	6
7	n.c.	n.c.									n.c.	n.c.	7
8	PCIE_1_TX_P	PCIE_1_TX_M									PCIE_1_RX_P	PCIE_1_RX_M	8
9	BRD_PRES_N	RTM_PRES_N									RTM_RST_KEY_N	RTM_RST_N	9
10	VP5_RTM	n.c.									I2C_SCL	I2C_SDA	10

Figure 2-21 P31 Connector Pinout, Rows a-d

a		b		a	b	c	d	e	f	g	h	c	d	
1			n.c.									n.c.	n.c.	1
2	PMC1_IO_34		PMC1_IO_36									PMC1_IO_37	PMC1_IO_39	2
3	PMC1_IO_42		PMC1_IO_44									PMC1_IO_45	PMC1_IO_47	3
4	n.c.		n.c.									n.c.	n.c.	4
5	n.c.		n.c.									n.c.	n.c.	5
6	n.c.		n.c.									n.c.	n.c.	6
7	n.c.		n.c.									n.c.	n.c.	7
8	n.c.		n.c.									n.c.	n.c.	8
9	n.c.		n.c.									n.c.	n.c.	9
10	VP12_RTM		VP5_RTM									V3P3_RTM	n.c.	10

Figure 2-22 P31 Connector Pinout, Rows e-h

e		f		a	b	c	d	e	f	g	h	g	h	
1	n.c.		n.c.									PMC1_IO_33	PMC1_IO_35	1
2	PMC1_IO_38		PMC1_IO_40									PMC1_IO_41	PMC1_IO_43	2
3	PMC1_IO_46		PMC1_IO_48									n.c.	n.c.	3
4	n.c.		n.c.									n.c.	n.c.	4
5	n.c.		n.c.									n.c.	n.c.	5
6	n.c.		n.c.									n.c.	n.c.	6
7	n.c.		n.c.									n.c.	n.c.	7
8	n.c.		n.c.									n.c.	n.c.	8
9	n.c.		n.c.									n.c.	n.c.	9
10	n.c.		n.c.									n.c.	n.c.	10

## 2.7 Devices Connected to RTM's Mezzanine Management Controller

The RTM provides the a Mezzanine Management Controller (MMC) based on the Atmega64L controller which is fully compliant to the IPMI V 1.5 standard. The MMC is connected to the front blade's IPMC via IPMB1.

The MMC provides several status sensors that are accessible via IPMI. These sensors are listed in the following table.

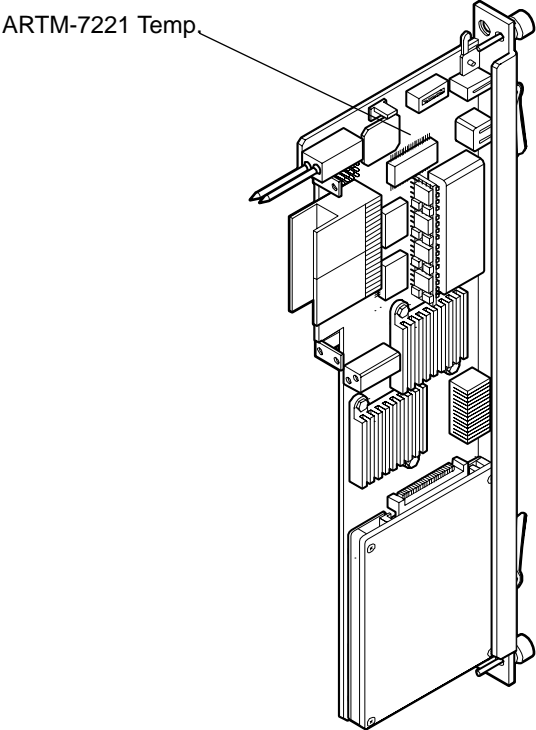
Table 2-4 Available IPMI Sensors

Sensor Name	Type of Measurement	What does it measure?	Sensor Type	Sensor Availability
RTM-7221 Temp.	Temperature	RTM temperature	Analog	Always
Voltage +1.8V	Voltage	+1.8V voltage level of RTM	Analog	While payload powered ON
Voltage +3.3V	Voltage	+3.3V voltage level of RTM	Analog	While Payload powered ON
Voltage +5VCC	Voltage	+5V voltage level of RTM	Analog	While Payload powered ON
Voltage +12V	Voltage	+12V voltage level of RTM	Analog	While Payload powered ON
Voltage +5V USB1	Voltage	+5V voltage level of USB interface 1	Analog	While Payload powered ON
Voltage +12V HDD	Voltage	12V voltage level of hard disk	Analog	While Payload powered ON
Volt +5V KB PWR	Voltage	+5V voltage level of keyboard/mouse interface	Analog	While Payload powered ON
RTM FW Revision	Firmware revision	Application firmware revision	Discrete	Always
RTM-7221 MMC	Reset type	Status and type of the last reset of the IPMC	Discrete	Always
BOOT FW Revision	Firmware revision	Boot loader firmware revision	Discrete	Always



The location of the temperature sensor is shown in the following figure.

Figure 2-23 Location of Temperature Sensor



For further details about these sensors as well as further IPMI-related information, refer to the *ACC/RTM-7221/SCSI: Control via IPMI Programmer's Guide* which can be downloaded from the Emerson literature catalog.





### A.1 Emerson Network Power - Embedded Computing Documents

The Emerson Network Power - Embedded Computing publications listed below are referenced in this manual. You can obtain electronic copies of Emerson Network Power - Embedded Computing publications by contacting your local Emerson sales office. For documentation of final released (GA) products, you can also visit the following website:

<http://www.emersonnetworkpowerembeddedcomputing.com> > Resource Center > Technical Documentation Search. This site provides the most up-to-date copies of Emerson Network Power - Embedded Computing product documentation.

**Note:** Check the Emerson literature catalog for any erratas that may be applicable to the RTM.

Company/ Organisation	www.	Document
Emerson		PENT/ATCA-7221 Reference Guide PENT/ATCA-7221: Control via IPMI Programmer's Guide ACC/ATCA-7221/HDD/SAS Installation Guide ACC/ARTM-7221/SCSI: Control via IPMI Programmer's Guide
PCI-SIG	<a href="http://pcisig.com/specifications">pcisig.com/specifications</a>	PCI Local Bus Specification Revision 2.2 PCI-X Addendum to the PCI Local Bus Specification 1.0
PICMG	<a href="http://picmg.org/specifications.stm">picmg.org/specifications.stm</a>	PICMG 3.0 Revision 1.0 Advanced TCA Base Specification PICMG 3.1 Revision 1.0 Specification Ethernet/Fiber Channel for AdvancedTCA Systems



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