AdvancedTCA Shelf, 14-slot

User's Manual

Product Number:

11596-006

Rev.	Date updated	Change
D1.0	July 3, 2006	Draft Release

Contents

1 Safety

The intended audience of this User's Manual is system integrators and hardware/software engineers.

1.1 Safety Symbols used in this document

	Hazardous voltage!
	This is the electrical hazard symbol. It indicates that there are dangerous voltages inside the Shelf.

	Caution!
	This is the user caution symbol. It indicates a condition where damage of the equipment or injury of the service personnel could occur. To reduce the risk of damage or injury, follow all steps or procedures as instructed.

	Danger of electrostatic discharge!
	The Shelf contains static sensitive devices. To prevent static damage you must wear an ESD wrist strap.

1.2 General Safety Precautions

	Warning!
	Voltages over 60 VDC can be present in this equipment. As defined in the PICMG 3.0 Specification, this equipment is intended to be accessed, to be installed and maintained by qualified and trained service personnel only.

- Service personnel must know the necessary electrical safety, wiring and connection practices for installing this equipment in a telecommunication environment.
- Install this equipment only in compliance with local and national electrical codes.
- For additional information about this equipment, see the PICMG 3.0 Specification (*www.picmg.com*).

1.3 References and Architecture Specifications

- Pigeon Point Systems IPM Sentry Shelf-External Interface Reference (*www.pigeonpoint.com*)
- PICMG® 3.0 AdvancedTCA® Base Specification (*www.picmg.com*)
- PICMG® Engineering Change Notice ECN 3.0-2.0-00

1.4 Product definition

The Schroff 11596-006 is a 13U / 14 Slot AdvancedTCA Shelf and designed to work with two redundant Schroff ShMM-ACB-IV Shelf Managers. At least one Shelf Manager is needed for a working System.

The Shelf Managers are not included with the Shelf.

1.5 Terms and Acronyms

Table 1: Terms and Acronyms

Term	Definition
ATCA	Advanced Telecom Computing Architecture
Backplane	Passive circuit board providing the connectors for the front boards. Power distribution, management and auxiliary signal connections are supported
CDM	Chassis Data Module
Chassis	Enclosure containing subrack, Backplane, boards, cooling devices, PEMs, same as Shelf
CMM	Chassis Management Module, same as Shelf Manager
ECN	Engineering Change Notice
ESD	Electrostatic Discharge
ETSI	European Telecommunications Standards Institute
FRU	Field Replaceable Unit
IPMB	Intelligent Platform Management Bus
IPMC	Intelligent Platform Management Controller
IPMI	Intelligent Platform Management Interface
PCB	Printed Circuit Board
PEM	Power Entry Module
RTC	Real Time Clock
RTM	Rear Transition Module
Shelf	See Chassis
VRTN	Voltage Return

2 Hardware Platform

The Schroff 13U / 14 Slot AdvancedTCA Shelf implements the following features:

- Compliant to PICMG 3.0 Revision 2.0

- 14 slot ATCA Backplane with Dual Star Fabric Interface, Dual Star Base Interface and bused IPMB interface, supporting twelve 8U node board slots and two 8U hub slots

- Mounting brackets for 19" cabinets

- ESD Wrist Strap Terminal at the front

- 2 Dedicated Shelf Manager slots accepting Schroff ShMM-ACB-IV Shelf Managers

- Cooling for 200 W per Front Board

- 3 Hot Swap Fan Trays, front pluggable

- Air filter with air filter presence signaling

- Front pluggable Shelf Alarm Panel (SAP): Provides Alarm Status LEDs, serial interfaces for the Shelf Managers and Telco Alarm interface

- Dual front pluggable redundant Power Entry Modules (PEM).

2.1 Shelf FrontView

Figure 1: Shelf Front View
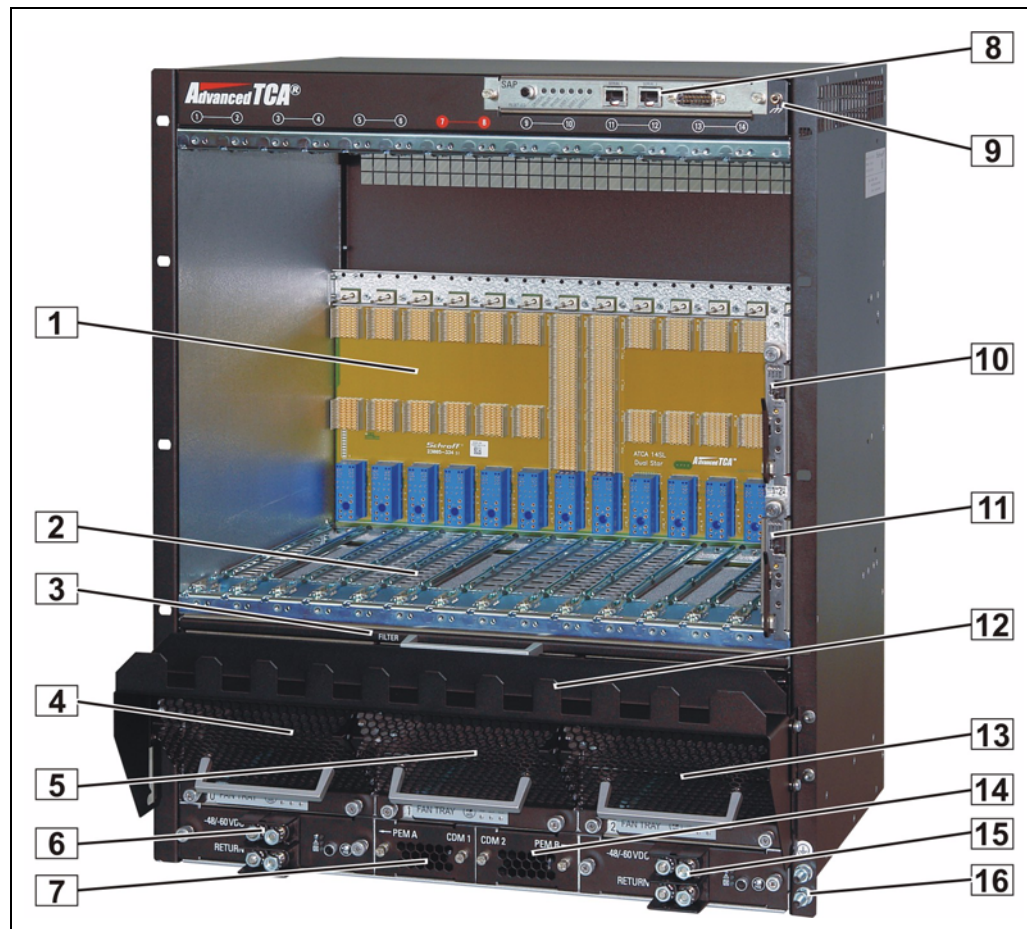
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1	ATCA 14-Slot Backplane	9	ESD Wrist Strap Terminal
2	Front Card Cage	10	Primary Shelf Manger (upper)
3	Air Filter	11	Secondary Shelf Manager (lower)
4	Fan Tray #0	12	Front Cable Tray
5	Fan Tray #1	13	Fan Tray #2
6	PEM A	14	CDM2
7	CDM1	15	PEM B
8	Shelf Alarm Panel (SAP)	16	Shelf Ground Terminal (M6 bolt)

2.2 ESD Wrist Strap Terminals

⚠	**Danger of electrostatic discharge!**
	Static electricity can harm delicate components inside the Shelf. You must wear an ESD wrist strap before exchanging any part or electric component!

The ESD Wrist Strap Terminal (4 mm banana jack) is located at the upper front side of the Shelf.

Figure 2: ESD Wrist Strap Terminals

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1   Front ESD Wrist Strap Terminal

3 ATCA Backplane

The 14-slot ATCA monolithic Backplane provides:

- 12 ATCA Node slots
- Two ATCA Hub slots
- Two CDM slots
- Two Dedicated Shelf Manager slots
- Two Power Entry Module (PEM) slots
- 3 Fan Tray slots

3.1 Logical to Physical Slot Mapping

The physical slots are sequentially numbered from left to right. The logical slots are mapped to the physical slots according to Table 2.

Table 2: 14-Slot ATCA Backplane physical to logical slot mapping

	Node	Node	Node	Node	Node	Node	Hub Slot	Hub Slot	Node	Node	Node	Node	Node	Node
Physical slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Logical slot	13	11	9	7	5	3	1	2	4	6	8	10	12	14
HW-Address (Hex)	4D	4B	49	47	45	43	41	42	44	46	48	4A	4CA	4E
IPMB-Address (Hex)	9A	96	92	8E	8A	86	82	84	88	8C	90	94	98	9C
Update Channel	●—●		●—●		●—●		●—●		●—●		●—●		●—●	
Power Domain	1	2	1	2	1	2	2	3	3	4	3	4	3	4

3.2 Base Interface

Logical slots 1 and 2 are the hub slots for the Dual Star Base Interface. Base Interface Channel 1 (ShMC) of logical slot 1 and 2 is cross connected to both Dedicated Shelf Manager slots on the ATCA Backplane. See section *Chapter 3.11, "Shelf Manager Cross Connect"* for details.

3.3 Fabric Interface

The Fabric Interface in the ATCA Backplane is wired as Dual Star, supporting four ports per channel.

See PICMG® 3.0 AdvancedTCA® Base Specification for details.

3.4 Synchronization Clocks

Synchronization clocks are bused between all 14 ATCA slots and terminated at both ends.

3.5 Update Channel Interface

The Update Channels are wired between two redundant ATCA Backplane slots. (See Table 2 in this Chapter)

The Update Channel can be used to pass data or routing information between two redundant ATCA Boards.

The Update Channel assignment is printed on the frontside of the Shelf.

3.6 ATCA Backplane, Power Domains

The ATCA Backplane is divided into four Power domains. This topology is used for safety reasons to keep the max. current per fuse less the 30 A. Slots connected by update ports, are on separate power domains as well as the hub slots, the Shelf Manager slots and the Fan Trays. (See *Table 2* in this Chapter and *Figure 21*)

3.7 Dedicated Shelf Manager Slots

The front accessible Shelf Manager slots accept Schroff ShMM-ACB-IV Shelf Managers and are wired to:
*   IPMB_A and IPMB_B (I²C-bus)
*   Base Interface Channel 1 (ShMC) of the Base Interface Hub slots, support-ing Shelf Manager Cross Connect (10/100 Base T Ethernet)
*   Fan Tray connectors
*   PEM_A and PEM_B connector

The Dedicated Shelf Manager slots also have interconnected signals that allow the Shelf Managers to run in a redundant configuration.

3.8 Intelligent Platform Management Bus (IPMB)

The IPMB_A and IPMB_B are routed to the ATCA slots in a bused configuration. The IPMBs at each slot are wired redundantly. Every ATCA board is connected to an IPMB_A and IPMB_B and routed to both Dedicated Shelf Manager slots on the ATCA Backplane.

Figure 3: Bused IPMB
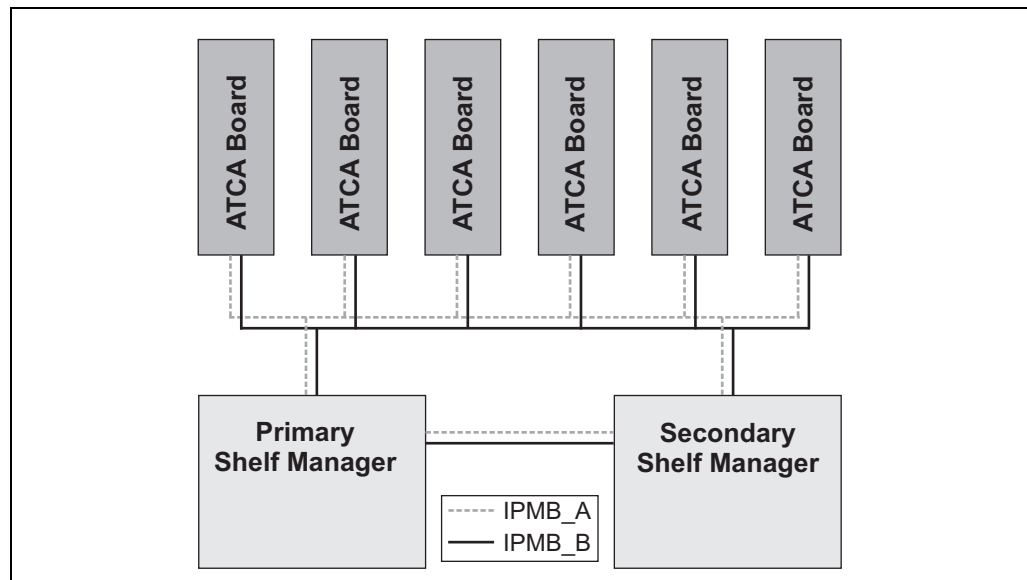
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3.9 Non-ATCA Connectors on the ATCA Backplane

Figure 4: ATCA Backplane front connectors
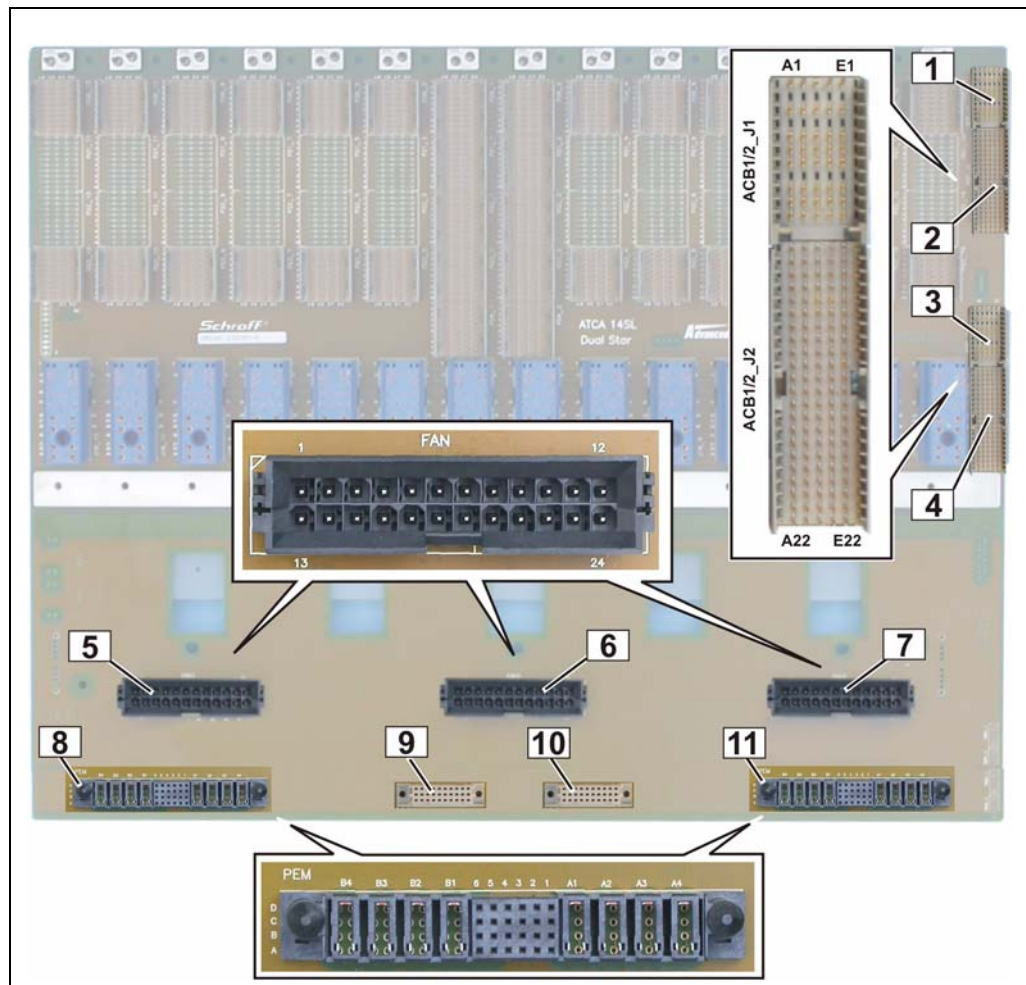
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Table 3: ATCA Backplane front connectors

#	Name	Type	Designation
1	ACB1_J1	HardMetric C11	Backplane Connector (J1) primary Shelf Manager (upper)
2	ACB1_J2	HardMetric AB22	Backplane Connector (J2) primary Shelf Manager (upper)
3	ACB2_J1	HardMetric C11	Backplane Connector (J1) secondary Shelf Manager (lower)
4	ACB2_J2	HardMetric AB22	Backplane Connector (J2) secondary Shelf Manager (lower)
5	FAN1	Molex Series	Backplane Connector Fan Tray #0
6	FAN2	Molex Series	Backplane Connector Fan Tray #1
7	FAN3	Molex Series	Backplane Connector Fan Tray #2
8	PEM1		Backplane Connector PEM A
9	CDM1		Backplane Connector CDM1
10	CDM2		Backplane Connector CDM2
11	PEM2		Backplane Connector PEM B

3.9.1 Fan Tray Backplane Connectors

For pin assignment see *Table 15*.

3.9.2 Shelf Manager Backplane Connectors

For pin assignment see *Table 27* and *Table 28*.

3.9.3 PEM Backplane Connectors:

For pin assignment see *Chapter 8.7, "PEM Connectors"*.

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3.10 Chassis Data Modules (CDM)

The Chassis Data Module (CDM) (1) is a carrier board for the FRU SEEPROM (24LC256). Both CDMs are pluggable modules and located on the lower front side of the ATCA Shelf.

Figure 5: Chassis Data Modules (CDM)
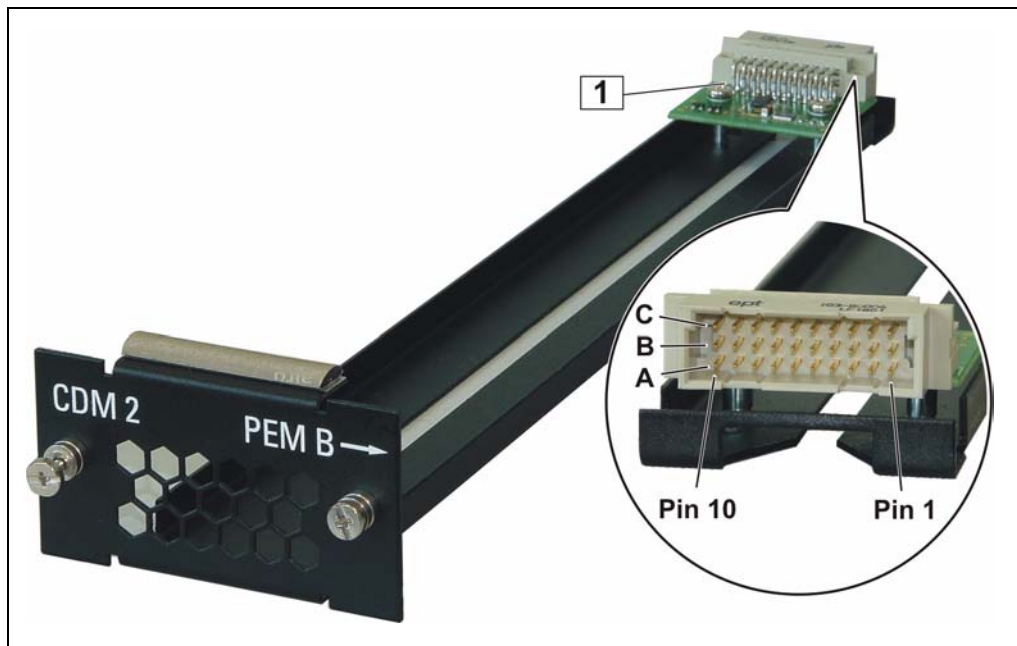
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1   CDM 2

Table 4: CDM Backplane Connector Pin assignment

Pin	A	B	C
1		GND	SCL
2		GND	SDA
3		GND	I2C_PWR_A
4		GND	I2C_PWR_B
5			A0 (GND)
6			A1
7			A2 (GND)

Table 5: Chassis Data Module I²C addresses

CDM	Channel	I²C-bus address
CDM 1, SEEPROM	Channel 1	0xa4 / 52
CDM 2, SEEPROM	Channel 2	0xa4 / 52

3.11 Shelf Manager Cross Connect

The ATCA Backplane provides cross connect traces between the Base Hubs and the Shelf Managers according to PICMG Engineering Change Notice ECN 3.0-2.0-001. This ECN adds an option for dual 10/100 Base-T links from each Base Hub to both Dedicated Shelf Manager slots.

Figure 6: Shelf Manager Cross Connect
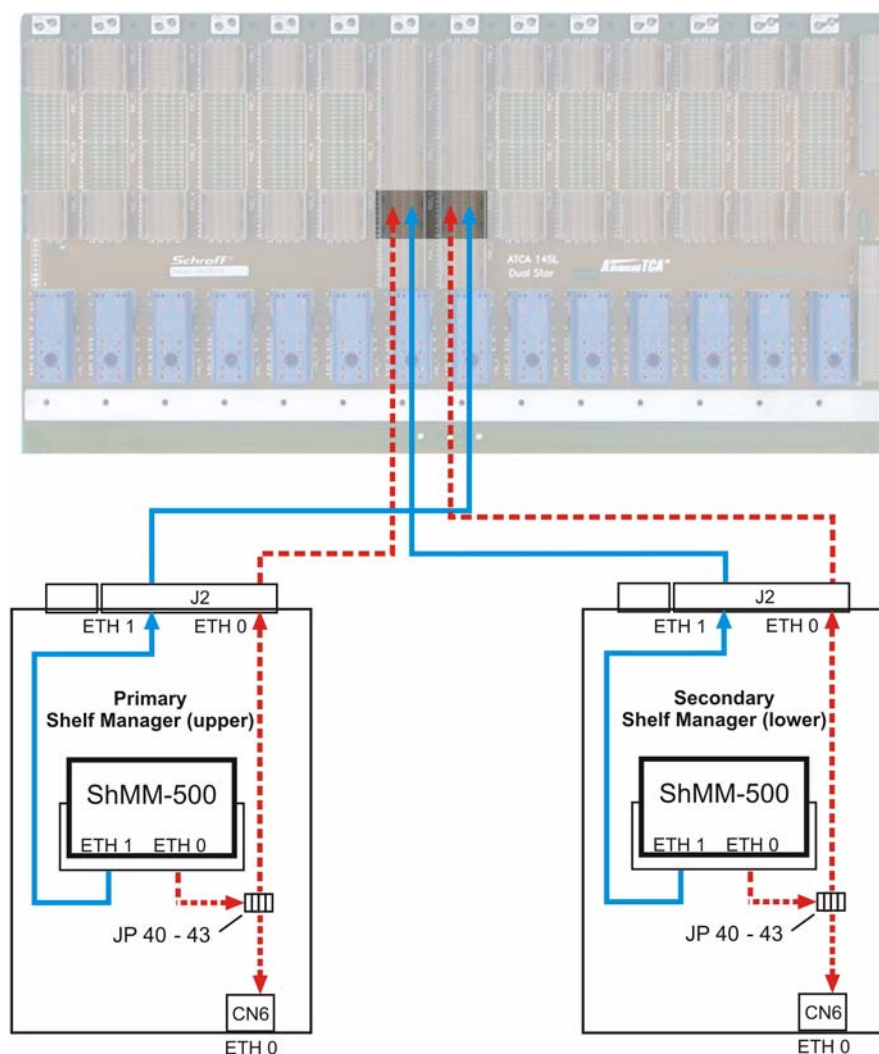
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Table 6: Connector (P23) pin assignments for Shelf Manager Cross Connect

Row	Designation	ab		cd		ef		gh	
5	Shelf Manager Port with Shelf Manager Cross Connects	Tx1+	Tx1-	Rx1+	Rx1-	Tx2+	Tx2-	Rx2+	Rx2-
		Shelf Manager Cross Connect 1				Shelf Manager Cross Connect 2			

4 Air Filter

Figure 7: Air Filter
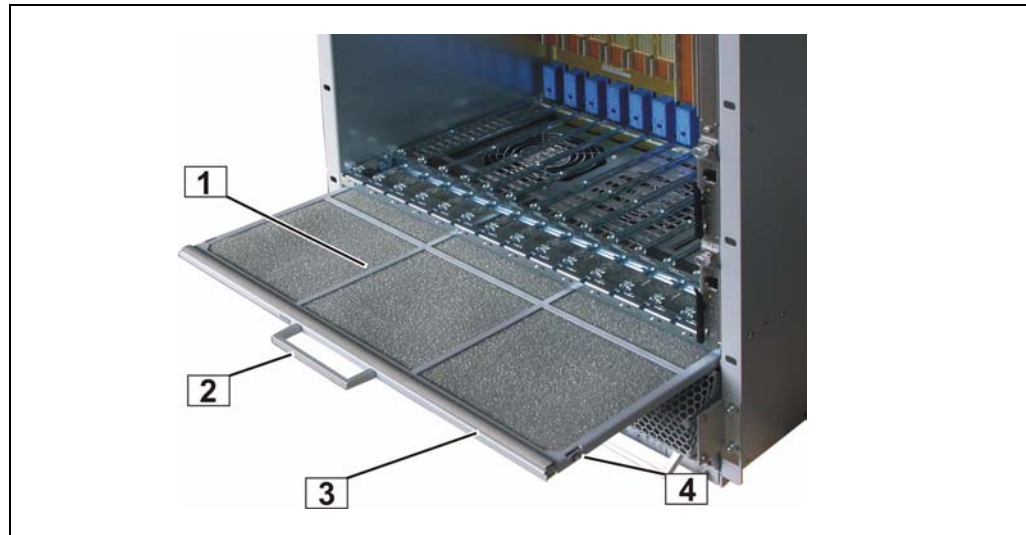
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1	Filter Element	3	Filter Tray
2	Handle	4	Spring mounted ball lock

4.1 Introduction

The ATCA Shelf provides a front replaceable air filter.

The filter meets the requirements of the Telcordia Technologies Generic Requirements GR-78-CORE specification.

4.2 Air Filter Replacement

The air filter can be removed by pulling the air filter's handle. To re-install, push the air filter into the guide rails at each side of the shelf until the spring mounted ball lock engage.

When installing the air filter, the filter element must be in top position

4.3 Air Filter Presence Sensor

The air filter presence is detected by a reed switch located on the Backplane. The reed switch is activated by a magnet at the rear side of the air filter metal frame.

5 Shelf Ground Connection

⚡	**Hazardous voltage!**
	Before powering-up the Shelf, make sure that the Shelf Ground terminals are connected to Protective Earth (PE) of the building.

The ATCA Shelf provides a Shelf ground terminal at the right mounting bracket. The Shelf ground terminal provides two M6 studs to connect a double-lug Shelf ground terminal cable. These studs are 6mm studs with 15.88 mm spacing between stud centers.

Figure 8: Shelf Ground Terminal
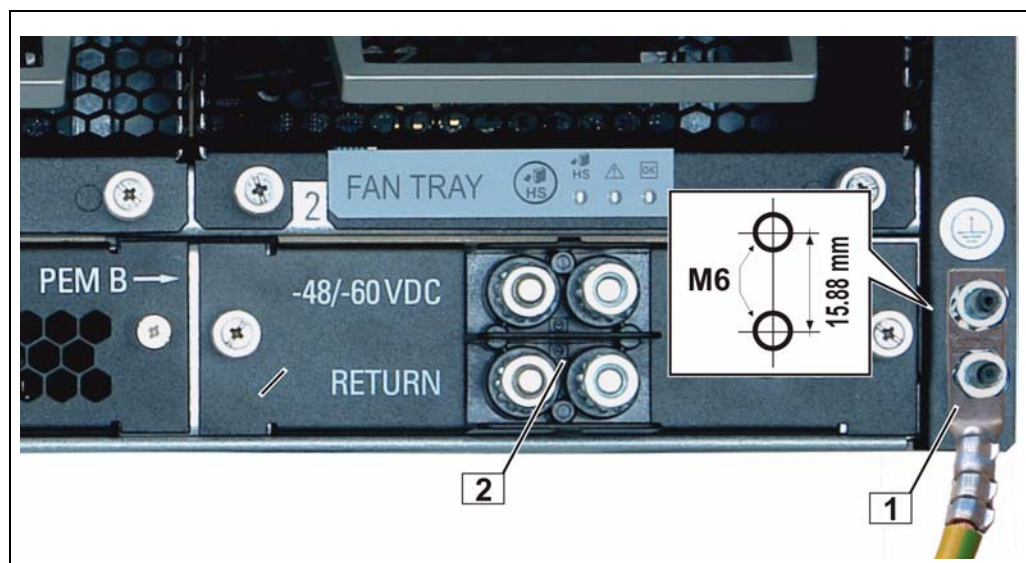
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1   Shelf Ground Terminal   2   Power Block

⚠	**Caution!**
	The thread for the Ground Terminal studs is M6 (6 mm), the thread for the Power Blocks is 1/4" - 20 UNC. Do not mistake the resp. nuts!

5.1 Specification for the Shelf Ground connection cable

Required wire size: AWG6

Required terminals: Use only double lug terminals with 45° angle tongue.

Example for terminal:

PANDUIT part no. **LCD6-14AH-L**, or **Thomas&Betts** part no. **54205UF**

See catalogs at www.panduit.com and www.tnb.com.

6 Shelf Alarm Panel

6.1 Shelf Alarm Panel (SAP)

The Shelf Alarm Panel (SAP) is located at the front of the Shelf. It provides:

- 3 Shelf Alarm LEDs (MINOR, MAJOR, CRITICAL)
- 3 User-definable LEDs (USER1, USER2, USER3)
- The Alarm Cutoff push button (ALARM SILENCE)
- 2 serial console interfaces for both Shelf Managers (RJ45 connectors)
- The Telco Alarm connector (DB15-male)

The I²C-bus devices on the SAP are connected to the Master-Only I²C-bus of both Shelf Managers. Only the active Shelf Manager has access to the SAP.

Figure 9: Shelf Alarm Panel (SAP)
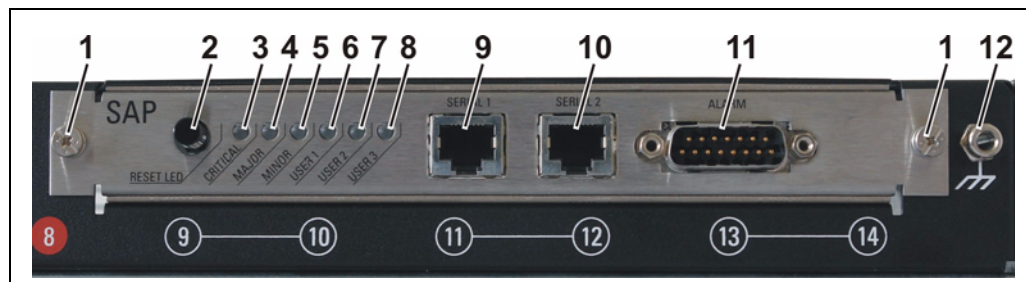
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1	Fixing screw	7	User definable LED 2 (amber)
2	Alarm Cutoff push button (ALARM SILENCE)	8	User definable LED 3 (amber)
3	LED Critical Alarm (red)	9	Serial Console Interface primary Shelf Manager (upper)
4	LED Major Alarm (red)	10	Serial Console Interface secondary Shelf Manager (lower)
5	LED Minor Alarm (amber)	11	Telco Alarm Interface (DB15-male)
6	User definable LED 1 (amber)	12	ESD Wrist Strap Terminal

6.2 Connection between Shelf Manager and SAP

Figure 10: Connection between Shelf Manager and SAP
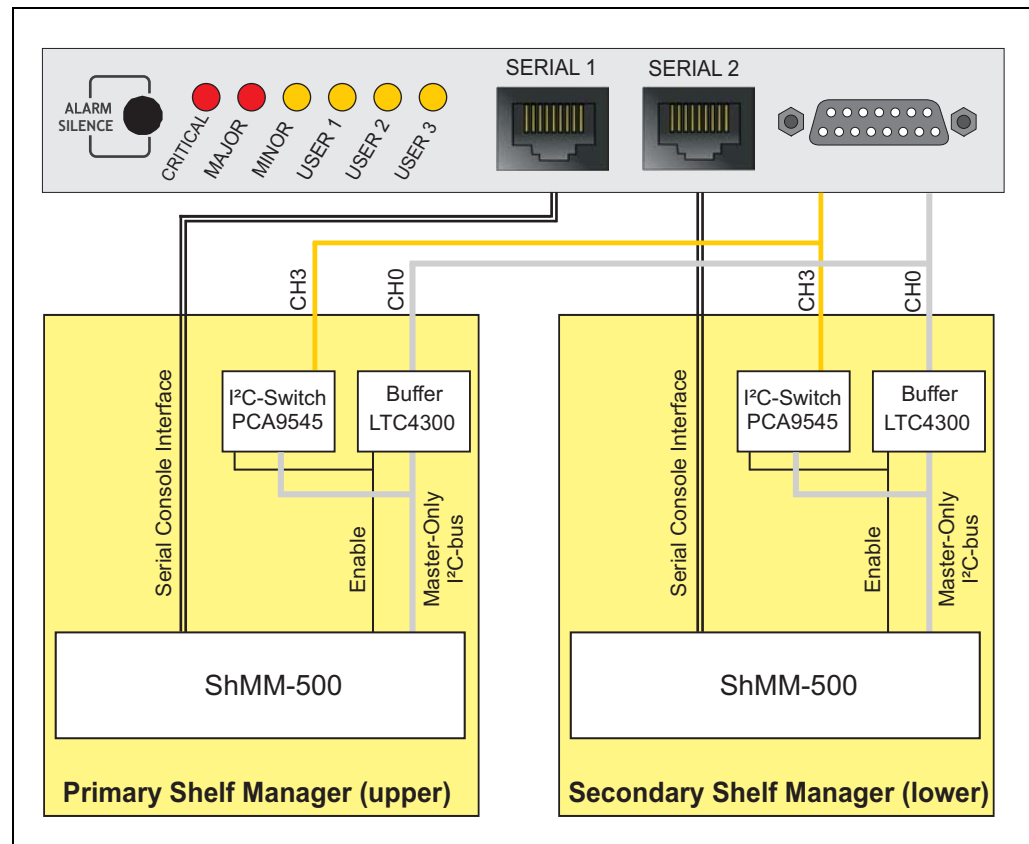
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6.3 SAP Block Diagram

Figure 11: SAP Block Diagram
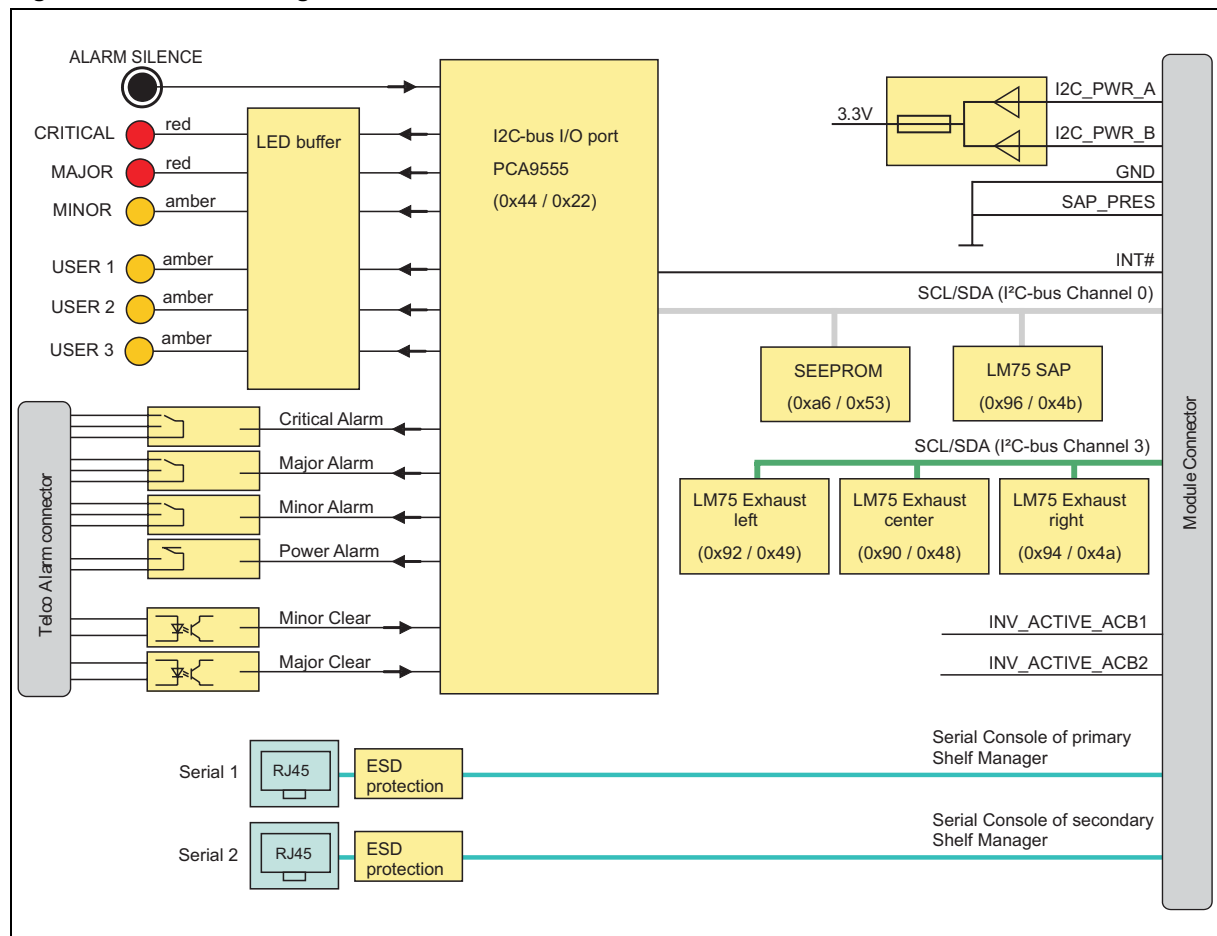
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6.4 RS-232 Serial Console Interfaces on SAP

Figure 12: RS-232 Serial Console Interfaces on SAP
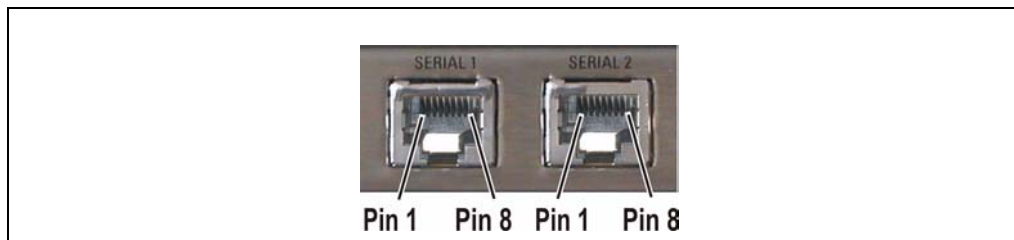
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The SAP provides a RS-232 serial console connector (SERIAL 1) for the primary (upper) and a RS-232 serial console connector (SERIAL 2) for the secondary (lower) Shelf Manager. The connectors are 8-pin RJ45 modular receptacles.

A full set of RS-232 signals, including modem control, is provided. The serial interface is implemented on the ShMM-500.

The serial console default configuration is:
- *115200 baud*
- *no parity*
- *8 data bits*
- *1 stop bit*

Table 7: RS-232 Serial Console Interface Pin assignment

RJ45 Pin	RS-232 Signal	ShMM-500 Signal	Type	Description
1	RTS	RTS	Out	Request To Send
2	DTR	DTR	Out	Data Terminal Ready
3	TxD	TXD0	Out	Transmit Data
4	GND	GND	---	Logic Ground
5	GND	GND	---	Logic Ground
6	RxD	RXD0	In	Receive Data
7	DSR	DSR	In	Data Set Ready
8	CTS	CTS	In	Clear To Send

6.5 SAP Telco Alarms

6.5.1 Telco Alarm Interface

The SAP provides a Telco Alarm interface on the DB15-male connector. The Telco Alarm interface relay circuits are capable of carrying 60 VDC or 1 A with a max. rating of 30 VA. The SAP accepts timed pulse inputs for clearing Minor and Major alarm states.

There is no reset for the Critical state.

Reset is accomplished by asserting a voltage differential from 3.3 V to 48 V for between 200 and 300 ms. The acceptance voltage range is from 0 to 48 VDC continuous (handles up to 60 VDC at a 50% duty cycle). The current drawn by a reset input does not exceed 12 mA.

6.5.2 Telco Alarm LEDs

The SAP provides the Telco Alarm LEDs. These LEDs indicate presence of Critical, Major and Minor alarms as follows:

Table 8: Telco Alarm LEDs

State	Description
Off	No Alarm triggered
On	Alarm triggered
Blinking	Alarm Cutoff (ACO) is activated

6.5.3 Telco Alarm Cutoff Push Button (ALARM SILENCE)

The Telco Alarm Cutoff push button (ALARM SILENCE) on the SAP activates the Alarm Cutoff (ACO) state. When ACO is activated, the active Alarm LEDs blinks and all of the alarm relays are deactivated.

*The **ALARM SILENCE** push button only activates the Alarm Cutoff (ACO) state, but does not clear the alarm completely.*

6.5.4 Telco Alarm Connector (DB15-male)

Figure 13: Telco Alarm Connector (DB15-male)
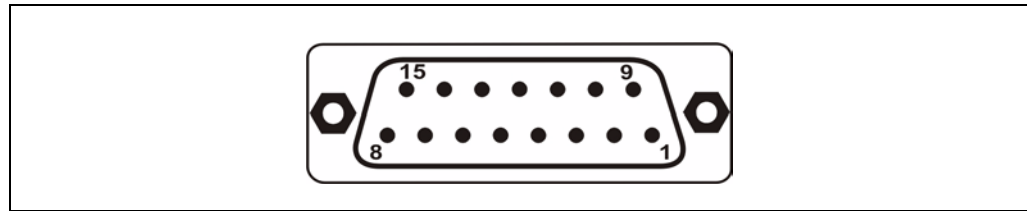
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Table 9: Telco Alarm Connector (CN2) Pin Assignment

CN2 Pin	Name	Description
1	AMIR+	MinorReset+
2	AMIR-	MinorReset-
3	AMAR+	MajorReset+
4	AMAR-	MajorReset-
5	ACNO	CriticalAlarm - NO
6	ACNC	CriticalAlarm - NC
7	ACCOM	CriticalAlarm - COM
8	AMINO	MinorAlarm – NO
9	AMINC	MinorAlarm – NC
10	AMINCOM	MinorAlarm – COM
11	AMANO	MajorAlarm – NO
12	AMANC	MajorAlarm – NC
13	AMACOM	MajorAlarm – COM
14	APRCO	PwrAlarm – NO
15	APRCOM	PwrAlarm - COM
Shield	Shelf-GND	Shelf Ground

6.6 User definable LEDs

The LEDs USER (1, 2, 3) are user definable and connected to the I²C-bus I/O port of the PCA 9555 on the SAP.

6.7 SAP Sensors and Connectors

Figure 14: SAP Sensors and Connectors
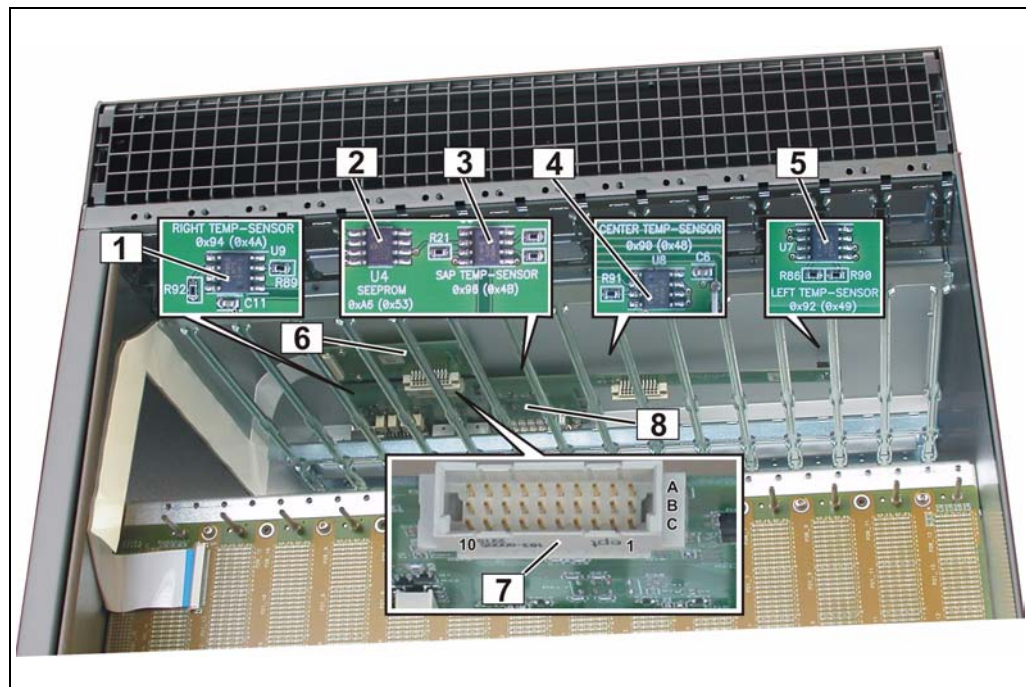
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1	Exhaust Temp. Sensor (right)	5	Exhaust Temp. Sensor (left)
2	SAP SEEPROM	6	Adapter Board
3	SAP Temp. Sensor	7	Connector SAP - Adapter Board
4	Exhaust Temp. Sensor (center)	8	SAP PCB

6.7.1 SAP SEEPROM

The SAP SEEPROM is connected to the Master-Only I²C-bus Channel 0 and is a Microchip 24LC256 device.

6.7.2 SAP Temperature Sensors

Three LM75 temperature sensors for measuring the exhaust temperatures and one sensor for the board temperature are located on the SAP PCB. The exhaust temperature sensors are connected to the Master-Only I²C-bus Channel 3, the board temperature sensor is connected to the Master-Only I²C-bus Channel 0.

6.7.3 SAP I²C Addresses

Table 10: SAP I²C Addresses

LM75 (Board)	SEEPROM	LM75 (Left)	LM75 (Center)	LM75 (Right)	PCA9555
0x96/0x4b	0xa6/0x53	0x92/0x49	0x90/0x48	0x94/0x4a	0x44/0x22

6.7.4 Connector SAP - Adapter Board

Table 11: Connector SAP - Adapter Board Pin Assignment

Pin	A	B	C
1	TXD0_ACB2	RXD1_ACB2	RXD1_ACB1
2	TXD1_ACB1	CD_ACB2	RXD0_ACB2
3	TXD1_ACB2	GND	CTS_ACB2
4	RTS_ACB2	DSR_ACB1	DTR_ACB2
5	GND	CTS_ACB1	CD_ACB1
6	SCL_CH0	RTS_ACB1	DSR_ACB2
7	SDA_CH0	DTR_ACB1	INT#
8	TXD0_ACB1	INV_ACTIVE_ACB1	SCL_CH3
9	RXD0_ACB1	INV_ACTIVE_ACB2	SDA_CH3
10	I2C_PWR_A	GND	I2C_PWR_B

6.8 SAP PCA9555 Function

The PCA9555 device:

- controls the status of the LEDs at the Shelf Alarm Display
- reads the status of the Telco Alarm push button (ALARM SILENCE)
- controls the Telco Alarm relays

Table 12: SAP PCA9555 Device Function

PCA9555 I/O pins	Function	State
0.0	Power Alarm to telco relays output	1 = relays powered
0.1	Minor Alarm to telco relays output	1 = relays powered
0.2	Major Alarm to telco relays output	1 = relays powered
0.3	Critical Alarm to telco relays output	1 = relays powered
0.4	N/C	Pulled High
0.5	Minor alarm LED (yellow) output	1 = On
0.6	Major alarm LED (amber) output	1 = On
0.7	Critical alarm LED (red) output	1 = On
1.0	Alarm cutoff push button input	0 = button pushed
1.1	Minor Clear input	0 = voltage applied to input pins
1.2	Major Clear input	0 = voltage applied to input pins
1.3	N/C	Pulled High
1.4	N/C	Pulled High
1.5	LED USER3 output	1 = On
1.6	LED USER2 output	1 = On
1.7	LED USER1 output	1 = On

6.9 SAP Console Cable for the Shelf Manger Serial Interface

Figure 15: RJ45 to DB9 Serial Console Cable
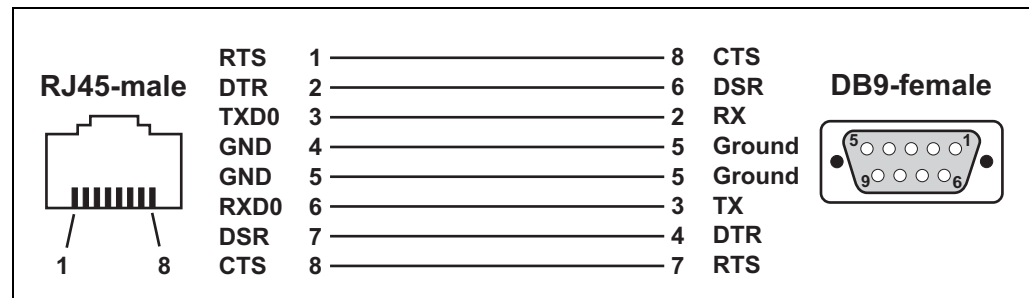
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The connectors are shown with the cables pointing away.

The serial console default configuration is:
- *115200 baud*
- *no parity*
- *8 data bits*
- *1 stop bit*

The serial console cable is not included with the Shelf.

7 Fan Trays

7.1 Introduction

The 14 Slot ATCA Shelf contains three interchangeable Fan Trays. The Fan Trays are plugged-in at the front bottom of the Shelf and can be removed after lifting the front cable tray.

Each Fan Tray contains two fans for cooling the front boards and the RTM section of the Shelf. The cooling of the RTM section is provided by guiding air through cutouts in the ATCA Backplane.

The fan speeds are monitored by a tachometer signal sent from the Fan Trays to the Shelf Manager. The Shelf Manager regulates the fan speed with a DC voltage. (1.5 V = min. speed, 10 V = max. speed)

The display module at the Fan Tray provides:

- A blue Hot Swap LED
- A red Fan Tray Alarm LED
- A green Fan Tray OK LED
- A Hot Swap push button

Figure 16: Fan Tray, Front and Rear View

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1	Hot Swap push button	5	Extraction handle
2	Hot Swap LED (blue)	6	Fixing screws
3	Fan Tray Alarm LED (red)	7	Backplane connector
4	Fan Tray OK LED (green)	8	Guiding Pin

Figure 17: Fan Tray Numbering

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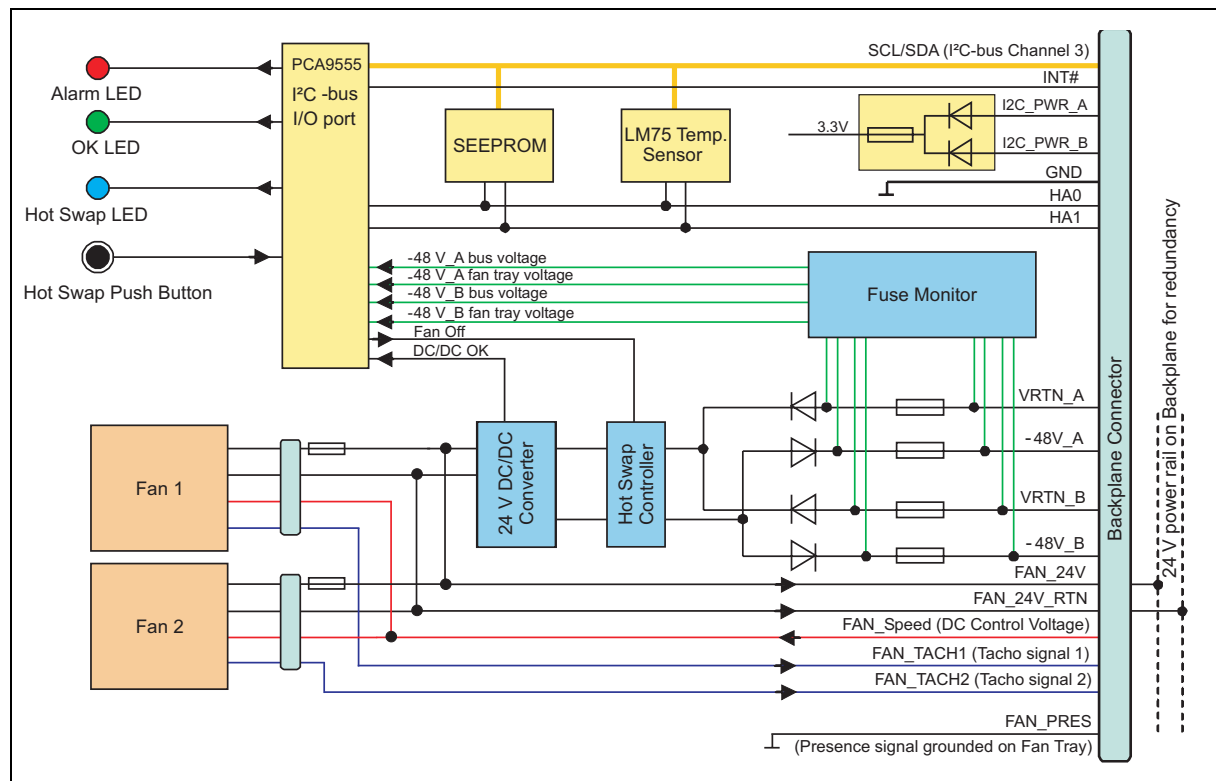| 00 | Fan Tray #0 (left) | 2 | Fan #2 |
01	Fan Tray #1 (center)	3	Fan #3
02	Fan Tray #2 (right)	4	Fan #4
0	Fan #0	5	Fan #5
1	Fan #1		

7.2 Fan Tray Block Diagram

Figure 18: Fan Tray Block Diagram

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7.3 Fan Tray Signals

The Fan Tray provides signals for:

- Supply Voltage monitoring
- Switching off the fans
- Status of the 24 V DC/DC converter

These signals are controlled by the PCA9555 I²C device on the Fan Tray PCB. The Shelf Manager has access to these signals via the Master-Only I²C-bus.

Table 13: Fan Tray Signals

Signal	description
-48V_A bus voltage	Indicates the presence of the –48V_A / VRTN_A at the Horizontal Board Connector
-48V_A fan tray voltage	Indicates the presence of the –48V_A / VRTN_A after the fan tray's mains fuse
-48V_B bus voltage	Indicates the presence of the –48V_B / VRTN_B at the Horizontal Board Connector
-48V_B fan tray voltage	Indicates the presence of the –48V_B / VRTN_B after the fan tray's mains fuse
DC/DC OK	Indicates the proper functioning of the DC/DC converter which generates the 24 V voltage supply for the fans and the optical-isolation devices on the Shelf Manager
Fan Off	Turns off the fans

7.4 Fan Tray Temperature Sensor

The temperature sensors (LM75) in the Fan Trays measure the intake temperatures of the Shelf. The temperature sensors are connected to Channel 3 of the Master-Only I²C-bus.

I²C-bus addresses see *Table 16*.

7.5 Fan Tray control board SEEPROM

The SEEPROM (Microchip 24LC256) on the Fan Tray control board stores the FRU data and is connected to Channel 3 of the Master-Only I²C-bus.

I²C-bus addresses see *Table 16*.

7.6 Fan Tray Connectors and Indicators

Table 14: LEDs on Fan Tray control panel

Color	Description
blue	Hot Swap LED
red	Alarm LED
green	Fan Tray OK LED

Figure 19: Fan Tray Backplane connector
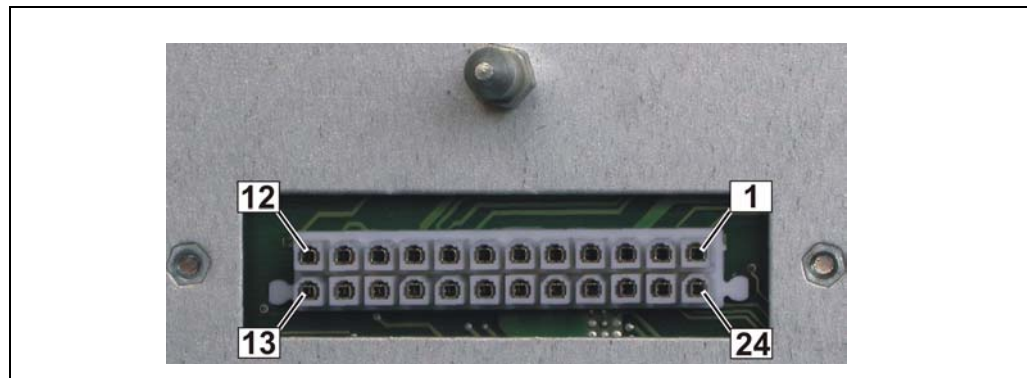
12705876

Table 15: Fan Tray Backplane connector pin assignment

Pin #	Signal	Pin #	Signal
1	INT#	13	FAN_PRES
2	HA1	14	HA0
3	GND	15	SCL_CH3
4	I2C_PWR_A	16	SDA_CH3
5	I2C_PWR_B	17	
6	-48V_A	18	-48V_B
7	VRTN_A	19	VRTN_B
8		20	
9	FAN_24V	21	FAN_24V_RTN
10		22	FAN_Speed
11	FAN_TACH2	23	
12		24	FAN_TACH1

For explanation of these signals see *Figure 18*.

7.7 Fan Tray I²C Addresses

Geographic address pins (HA0, HA1) at the Fan Tray Backplane connector determine the I²C addresses of the devices.

Table 16: Fan Tray I²C addresses

Fan Tray Location (front view)	SEEPROM	LM75	PCA9555
#0 (Left)	0xa8/0x54	0x98/0x4c	0x48/0x24
#1 (Center)	0xaa/0x55	0x9a/0x4d	0x4a/0x25
#2 (Right)	0xac/0x56	0x9c/0x4e	0x4c/0x26

The addresses are shown in 8 bit/7 bit format.

7.8 Fan Tray I/O Device

The Fan Tray I/O device (PCA9555):
- controls the status of the LEDs
- reads the status of the Hot Swap push button
- reads the status of the DC/DC converter for the 24 VDC fan power supply
- can enable the Hot Swap controller to switch off the fans

Table 17: Fan Tray PCA9555 pin assignment

PCA9555 I/O pins	Function	State
0.0	-48A bus voltage	0 = Voltage OK
0.1	-48A fan tray voltage	0 = Voltage OK
0.2	-48B bus voltage	0 = Voltage OK
0.3	-48B fan tray voltage	0 = Voltage OK
0.4	DC/DC OK	0 = Voltage OK
0.5	Fan Off	0 = Fans switched off
0.6	N/C	Pulled high
0.7	N/C	Pulled high
1.0	N/C	Pulled high
1.1	N/C	Pulled high
1.2	N/C	Pulled high
1.3	Green LED (OK)	1 = On
1.4	Hot swap push button switch	1 = not pushed, 0 = pushed
1.5	Red LED (Alarm)	1 = On
1.6	N/C	Pulled high
1.7	Blue LED (Hot swap)	1 = On

Configuration registers 6 and 7 in the PCA9555 control the direction of the I/O pins. Normally a 0xdf is written to register 6 and a 0x17 is written to register 7. This will make all pins to inputs except for 0.5, 1.7, 1.6, 1.5 and 1.3.

Configuration registers 4 and 5 in the PCA9555 control the inversion of the I/O pins. Normally a 0x00 is written to register 4 and 5. This will make the polarity of all of the pins the same as the bits in the registers.

8 Power Entry Module (PEM)

	Hazardous voltage!
⚡	*Before working ensure that the power is removed from the power connection cables. When the system is powered on, do NOT touch the power terminals.*

	Warning!
⚠	*Although there are fuses in the power entry circuit of the Shelf, the power lines have to be protected on rack level with 80 A breakers.*

ℹ	*The Shelf can be powered using a regular telecommunication power supply of -48/-60 VDC with a VDC return. The specified voltage range is from -40.5 VDC to -72 VDC.The Shelf supports redundant power supplies but the two supplies should be independently powered.*

8.1 Introduction

Two pluggable redundant Power Entry Modules (PEMs) are located at the front bottom side of the Shelf. Each PEM provides power terminals for a 80 A power feed. Each power feed to the PEM consists of a –48 VDC cable and its corresponding return cable. Inside the PEM, the main feed is divided into four separate fused power feeds. Each power feed supplies power to a separate part of the ATCA Backplane. This topology is used for safety reasons to keep the max. current per fuse less the 30 A. The segmentation is shown in *Chapter 8.3, "PEM Power Feeds"*

The power filtering consisting of a discrete line-filter for each power feed.

The PEM provides:

- A PCA9555 I/O device for voltage monitoring and Hot Swap functionality
- A LM75 temperature sensor
- A 24LC256 FRU SEEPROM

These devices are connected to the I²C-bus.

To detect a missing or low supply voltage as well as a blown fuse, the input voltages at the power terminals and after the fuses are monitored by the PCA9555 chip through optical-isolation devices.

To indicate the presence of the PEM, a PEM presence signal is grounded by the PEM.

A Blue Hot Swap LED and a Hot Swap Push Button provide Hot Swap functionality. A red (power failure) and a green (OK) LED provide status indication.

8.2 PEM Components

Figure 20: PEM components
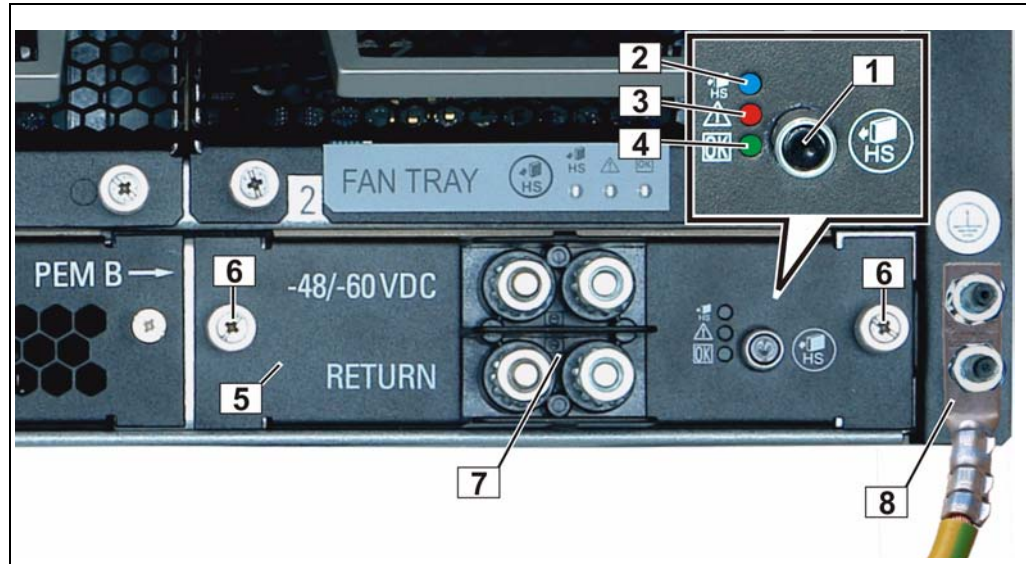
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1	Hot Swap push button	5	Power Entry Module (PEM)
2	Hot Swap LED (blue)	6	PEM fixing screws
3	PEM Alarm LED (red)	7	Double Stud Power Block
4	PEM OK LED (green)	8	Shelf Ground Connection

8.3 PEM Power Feeds

The ATCA Backplane is divided into four Power domains. Each of the four power feeds supplies power to a separate part of the ATCA Backplane. The hub slot on physical slot 7 is on the same power domain as the primary Shelf Manager (upper). The hub slot and physical slot 8 is on the same power domain as the secondary Shelf Manager (lower).

Figure 21: Power distribution of the four Power Feeds within the Shelf
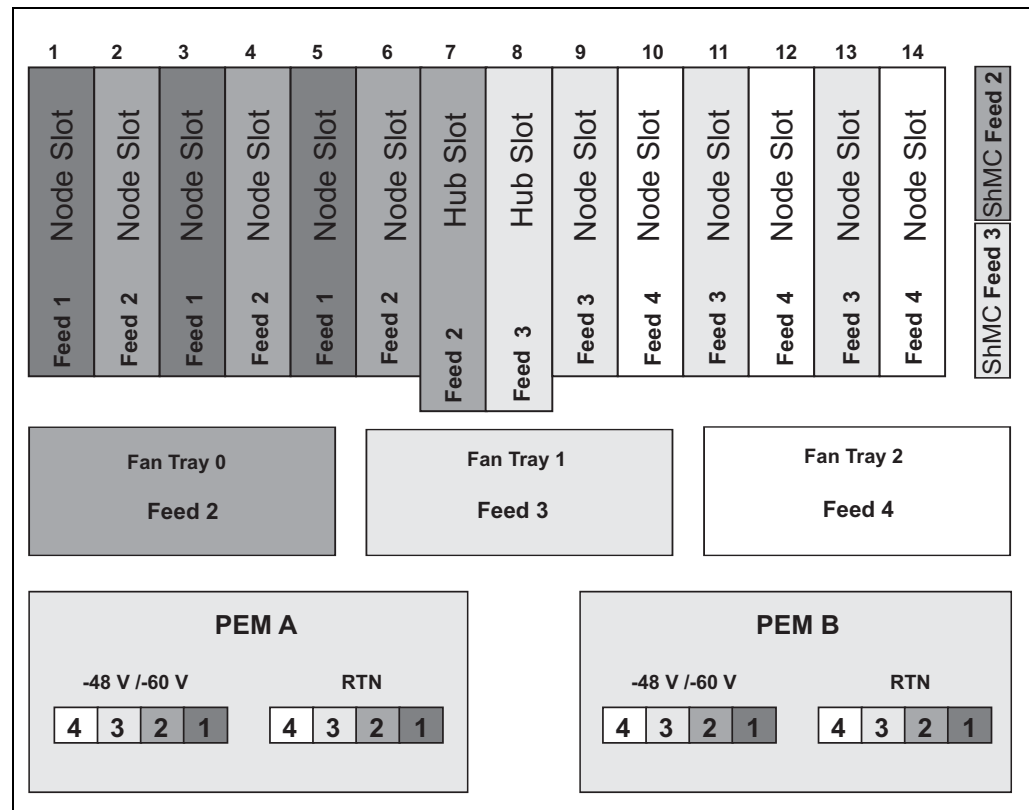
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8.4 PEM Block Diagram

Figure 22: PEM Block Diagram
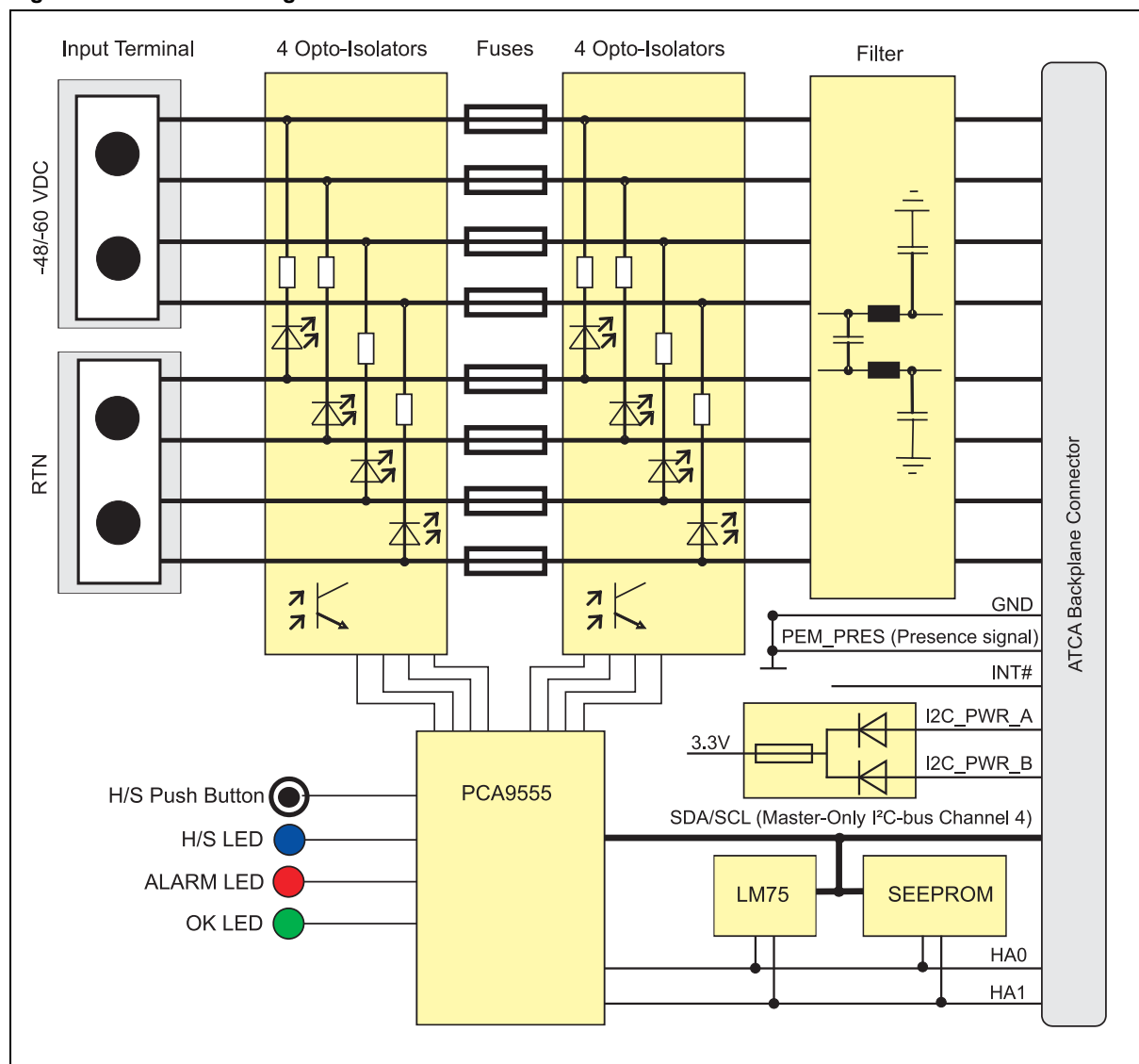
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8.5 PEM I²C-bus addresses

Geographic address pins (HA0, HA1) on the PEM Backplane connector determine the I²C addresses of the devices. The I²C devices on the PEMs are connected to Channel 4 of the Master-Only I²C-bus of the Shelf Managers.

Table 18: PEM I²C-bus addresses

PEM Location	SEEPROM	LM75	PCA9555
PEM A (Right, view from rear)	0xa8/54	0x98/4c	0x48/24
PEM B (Left, view from rear)	0xaa/55	0x9a/4d	0x4a/25

8.6 PEM I/O Device

The PEM I/O device (PCA9555):

• controls the status of the LEDs
• reads the status of the Hot Swap push button
• reads the status of the -48 VDC inputs

Table 19: PEM PCA 9555 pin assignment

| PCA9555 I/O pin	Function	State
0.0	Power feed 2 at power block present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.1	Power feed 2 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.2	Power feed 1 at power block present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.3	Power feed 1 after the fuse pre-sentt	-48 V present = 0 -48 V absent = 1 (3.3V)
0.4	N/C	Pulled High
0.5	N/C	Pulled High
0.6	Power feed 4 at power block present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.7	Power feed 4 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
1.0	Power feed 3 at power block present	-48 V present = 0 -48 V absent = 1 (3.3V)
1.1	Power feed 3 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
1.2	N/C	Pulled High
1.3	Green LED	1=on
1.4	Push-button switch	1=not pushed, 0=pushed
1.5	Red LED	1=on
1.6	N/C	Pulled High
1.7	Blue LED	1=on

8.7 PEM Connectors

Figure 23: PEM Backplane Connector
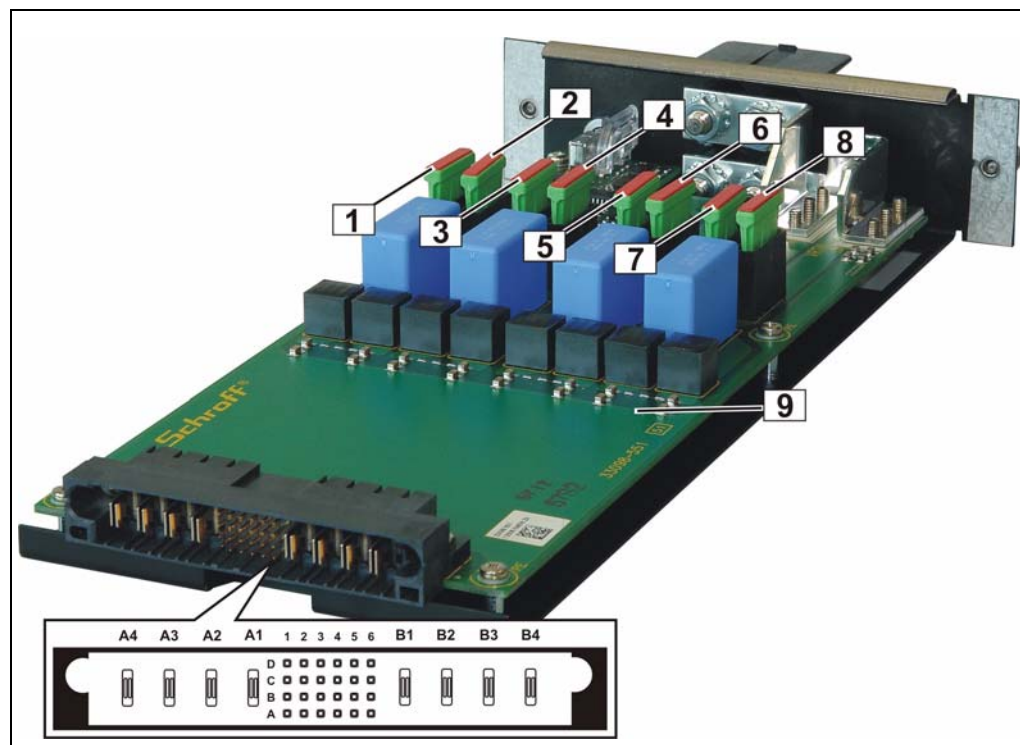
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1	30 A Fuse -48V_1 (F102)	6	30 A Fuse VRTN_3 (F301)
2	30 A Fuse VRTN_1 (F101)	7	30 A Fuse VRTN_4 (F401)
3	30 A Fuse -48V_2 (F202)	8	30 A Fuse -48V_4 (F402)
4	30 A Fuse VRTN_2 (F201)	9	PEM
5	30 A Fuse -48V_3 (F302)		

The fuses are rated 30A, 80 V.

Table 20: PEM Backplane connector power contacts

A4	A3	A2	A1	B1	B2	B3	B4
-48 V_1	VRTN_1	-48 V_2	VRTN_2	-48 V_3	VRTN_3	-48 V_4	VRTN_4

Table 21: PEM Backplane connector signal contacts

Pin #	1	2	3	4	5	6
D		INT#	PEM_PRES			
C		HA0	HA1			
B		SCL_CH4	GND			
A		SDA_CH4	I2C_PWR_A	I2C_PWR_B		

8.8 Specification for the power connection cables

Each power feed to the PEM consists of a –48 VDC cable and its corresponding return cable. A dual stud connection is available for each cable. These studs are ¼ in. studs with 5/8 in. (15.88 mm) spacing between stud centers.

⚠	**Caution!**
	The thread for the Ground Terminal studs is M6 (6 mm), the thread for the Power Block studs is 1/4" - 20 UNC. Do not mistake the resp. nuts!

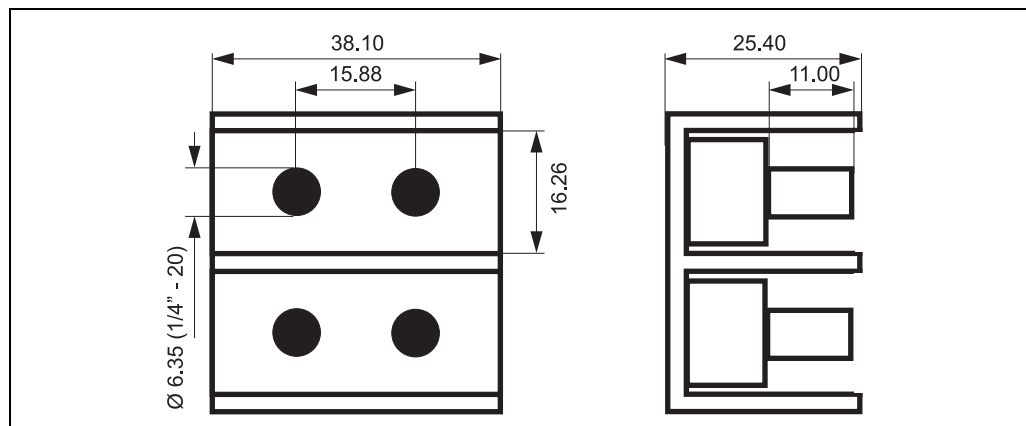**Required wire size:**

Diameter 16 mm² resp. AWG6

max. length 2.5 to 3.0 m

suitable for 80 A at 50° C ambient temperature.

Required terminals:

Use only double lug terminals

Figure 24: PEM Power Blocks

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9 Master-Only I²C Bus

The master-only I²C bus is used internally on the ShMM-500 for the RTC and SEEPROM devices. The ShMM-ACB-IV also has a number of onboard I²C devices connected to the master-only I²C bus. These devices read the slot's hardware address, communicate with the System Management controllers ADM1024/1026 and monitor the presence signals of the PEMs and Fan Trays.

The master-only I²C bus is fed to a 4-channel switch (PCA9545) and then routed through the ATCA Backplane connector (J2) to:

- the Shelf FRU SEEPROMs on CDMs (Channel 1 and 2)
- the intake temperature sensors on the Fan Trays (Channel 3)
- the exhaust temperature sensors on the SAP (Channel 3)
- the PEMs (Channel 4)

The master only I²C-bus is also buffered by a LTC4300 device and then routed to the SAP. The 'Active' signal of the ShMM-500 is used to enable the I²C switch and the LTC4300 buffer, so that only the active Shelf Manager has access to the Shelf I²C-bus devices.

Figure 25: Distribution of the Master-Only I²C-bus
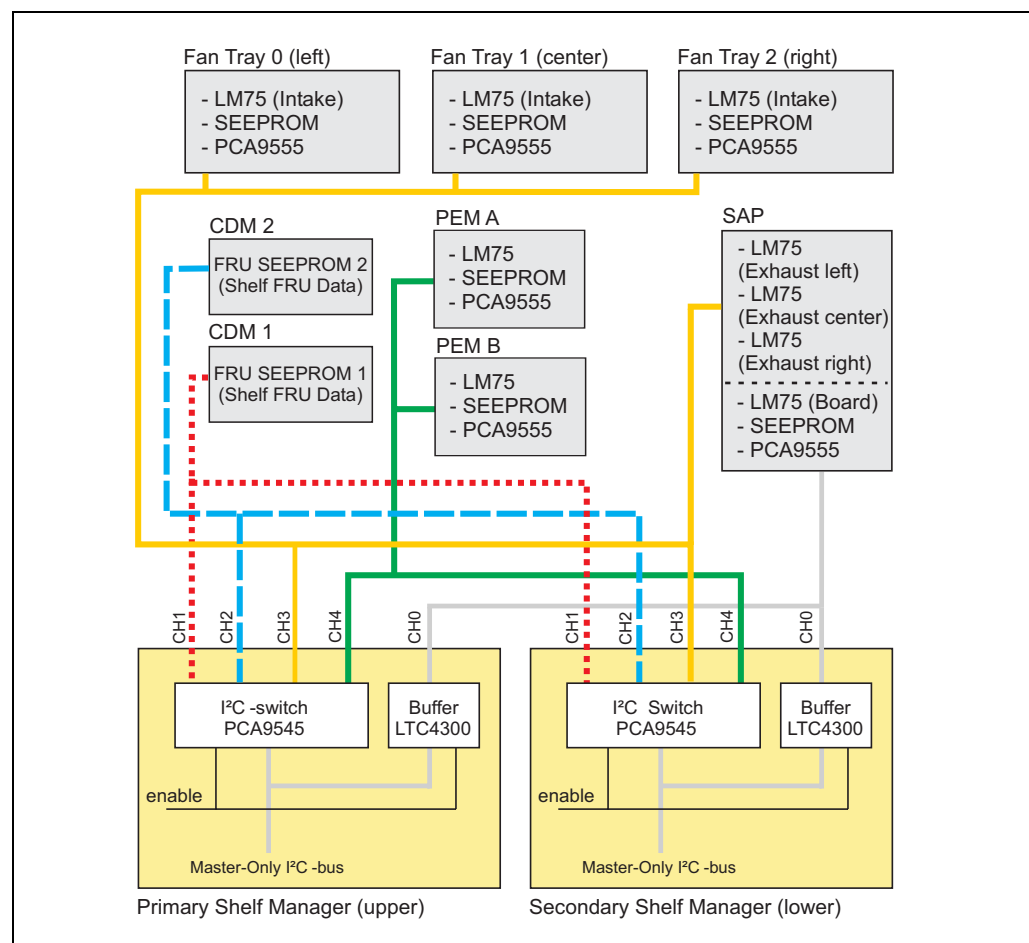
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Table 22: I²C-bus addresses of the Shelf

I²C addr.	ShMM	ACB-IV	SAP CH 0	CH 1	CH 2	CH 3	CH 4
0x44 / 22			PCA9555 Telco Alarms				
0x46 / 23		PCA9554 HW-Addr					
0x48 / 24						PCA9555 Fan Tray 0 (left)	PCA9555 PEM A
0x4a / 25						PCA9555 Fan Tray 1 (center)	PCA9555 PEM B
0x4c / 26						PCA9555 Fan Tray 2 (right)	
0x58 / 2C		ADM1024					
0x5c / 2E		ADM1026					
0x90 / 48						LM75 exhaust temp. center	
0x92 / 49						LM75 exhaust temp. left	
0x94 / 4a						LM75 exhaust temp. right	
0x96 / 4b			LM75 SAP temperature				
0x98 / 4c						LM75 intake temp. (left)	LM75 PEM A
0x9a / 4d						LM75 intake temp. (center)	LM75 PEM B
0x9c / 4e						LM75 intake temp. (right)	
0xa0 / 50	SEEPROM						
0xa4 / 52				SEEPROM CDM 1	SEEPROM CDM 2		
0xa6 / 53			SEEPROM SAP				
0xa8 / 54						SEEPROM Fan Tray 0 (left)	SEEPROM PEM A
0xaa / 55						SEEPROM Fan Tray 1 (center)	SEEPROM PEM B
0xac / 56						SEEPROM Fan Tray 2 (right)	
0xe0 / 70		PCA9545 I²C-bus switch					
0xe8 / 74		PCA9539 radial IPMB enable					
0xea / 75		PCA9539 radial IPMB enable					
0xee / 77		PCA9539 radial IPMB enable + GPIO					
0xd0 / 68	RTC DS1337						

10 Shelf Managers

10.1 Introduction

The **Shelf Management Mezzanine ATCA Carrier Board version IV** (**ShMM-ACB-IV**) provides a platform for the Pigeon Point Systems IPM Sentry **Shelf Management Mezzanine 500** (**ShMM-500**).
The ShMM-ACB-IV and the ShMM-500 together build the Shelf Manager for the Schroff 14 slot ATCA Shelf.
The Schroff 11596-006 ATCA Shelf is designed to work with two redundant Schroff ShMM-ACB-IV Shelf Managers. The Shelf Managers are located in the Dedicated Shelf Manager slots. At least one Shelf Manager is needed for a working System.

The Shelf Managers are not included with the Shelf.

The ShMM-ACB-IV also contains the Fan Controller for the three pluggable Fan Trays and provides individual Ethernet connections to both Base Hubs (ShMC cross connect), according to PICMG Engineering Change Notice ECN 3.0-2.0-001

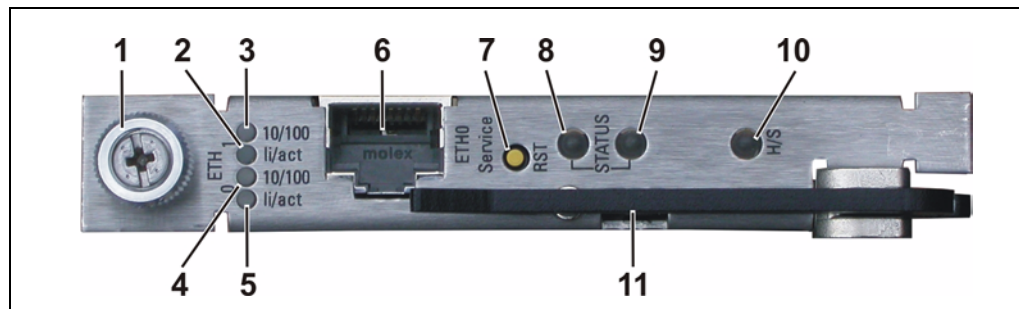**Figure 26: Schroff Shelf Management Mezzanine ATCA Carrier Board version IV**
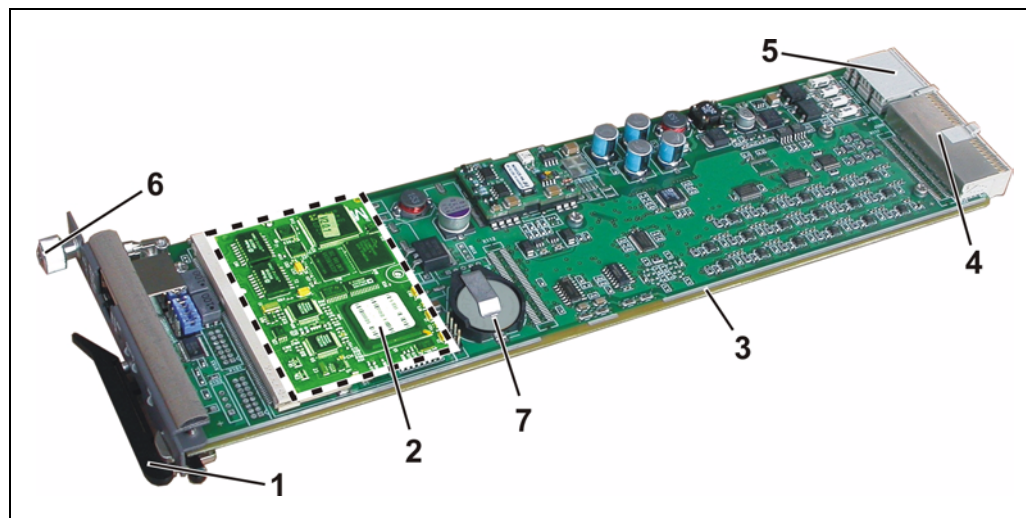
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1	Extraction handle	5	Backplane Connector (J1)
2	ShMM-500	6	Fixing screw
3	ShMM-ACB-IV	7	RTC Backup Batterie
4	Backplane Connector (J2)		

10.2 Front Panel Components

**Figure 27: Shelf Manager Front Panel Components**

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1	Fixing screw	7	RESET push button
2	ETH 1 Link/Activity LED (green)	8	Shelf Manager Status LED (red)
3	ETH 1 Speed LED (yellow)	9	Shelf Manager Status LED (green)
4	ETH 0 Speed LED (yellow)	10	Hot Swap LED (blue)
5	ETH 0 Link/Activity LED (green)	11	Extraction handle with Hot Swap switch
6	ETH 0 Ethernet Service Connector		

10.3 Bused IPMB Interface

The ShMM-500 provides two IPMBs. The IPMB_A and IPMB_B from the ShMM-500 are routed directly through the Shmm-ACB-IV PCB to the Backplane connector (J2). The ATCA Backplane buses the two IPMBs to the ATCA boards.

The Active# signal of the ShMM-500 is used to switch on/off the pull-up resistors of the IPMBs.

Figure 28: Block diagram bused IPMB
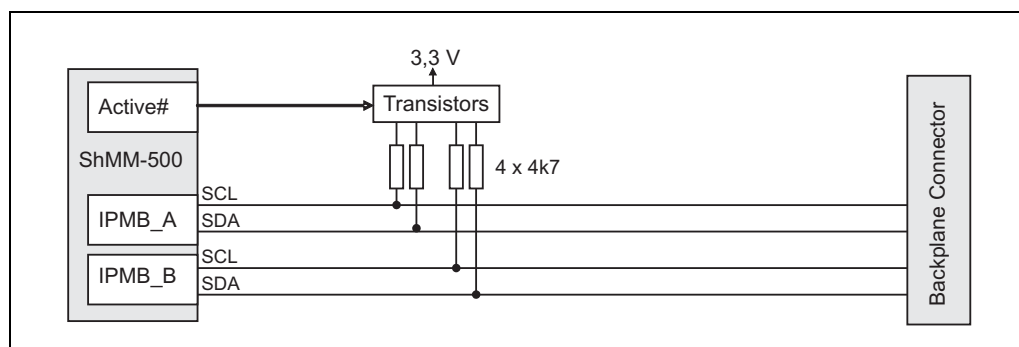
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10.4 Ethernet Channels

The Shelf Manager provides two 10/100 Ethernet interfaces. The first Ethernet channel (ETH0) is routed either to the RJ45 connector on the front panel or to the ATCA Backplane connector J2. The routing depends on the position of the jumpers JP40 - 43. The ATCA Backplane routes ETH0 from the connector J2 to the ShMC port on the corresponding Base Interface Hub board. The second Ethernet channel (ETH1) is routed to the other Base Interface Hub board (ShMC Cross Connect). Both Ethernet ports support 10 Mb (10BASE-T) and 100 Mb (100BASE-TX) connections.

The Shelf Manager provides two status LEDs for each Ethernet channel (ETH0 and ETH1). The LEDs are:

• Yellow: indicates 100 Mb speed when lit

• Green: indicates link when lit and activity when blinking

Table 23: Jumpers JP40 - JP43

Jumper	Name	Settings	Description
JP40	TX0P	1-2	Connect TX0P signal from the ShMM (CN1) to Ethernet connector on the front panel (CN6)
		2-3 (default)	Connect TX0P signal from the ShMM (CN1) to the Backplane signal connector (J2)
JP41	TX0N	1-2	Connect TX0P signal from the ShMM (CN1) to Ethernet connector on the front panel (CN6)
		2-3 (default)	Connect TX0N signal from the ShMM (CN1) to the Backplane signal connector (J2)
JP42	RX0P	1-2	Connect TX0P signal from the ShMM (CN1) to Ethernet connector on the front panel (CN6)
		2-3 (default)	Connect RX0P signal from the ShMM (CN1) to the Backplane signal connector (J2)
JP43	RX0N	1-2	Connect TX0P signal from the ShMM (CN1) to Ethernet connector on the front panel (CN6)
		2-3 (default)	Connect RX0N signal from the ShMM (CN1) to the Backplane signal connector (J2)

Figure 29: Jumpers JP40 - JP43 shown in default position 2-3

ShMM-ACB-IV
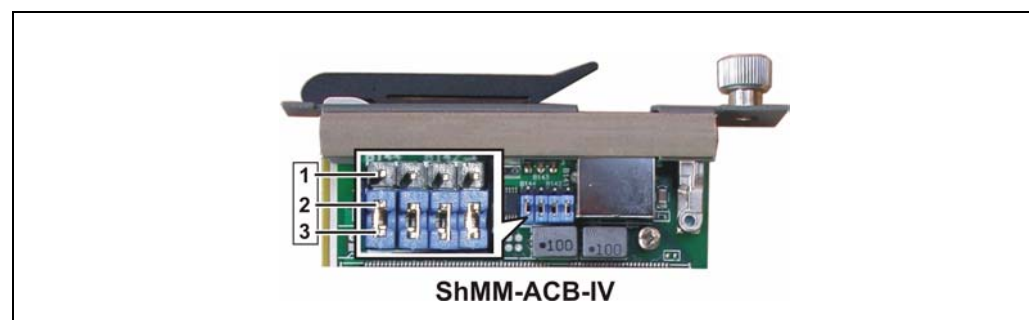
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Figure 30: Shelf Manager Ethernet Cross Connect
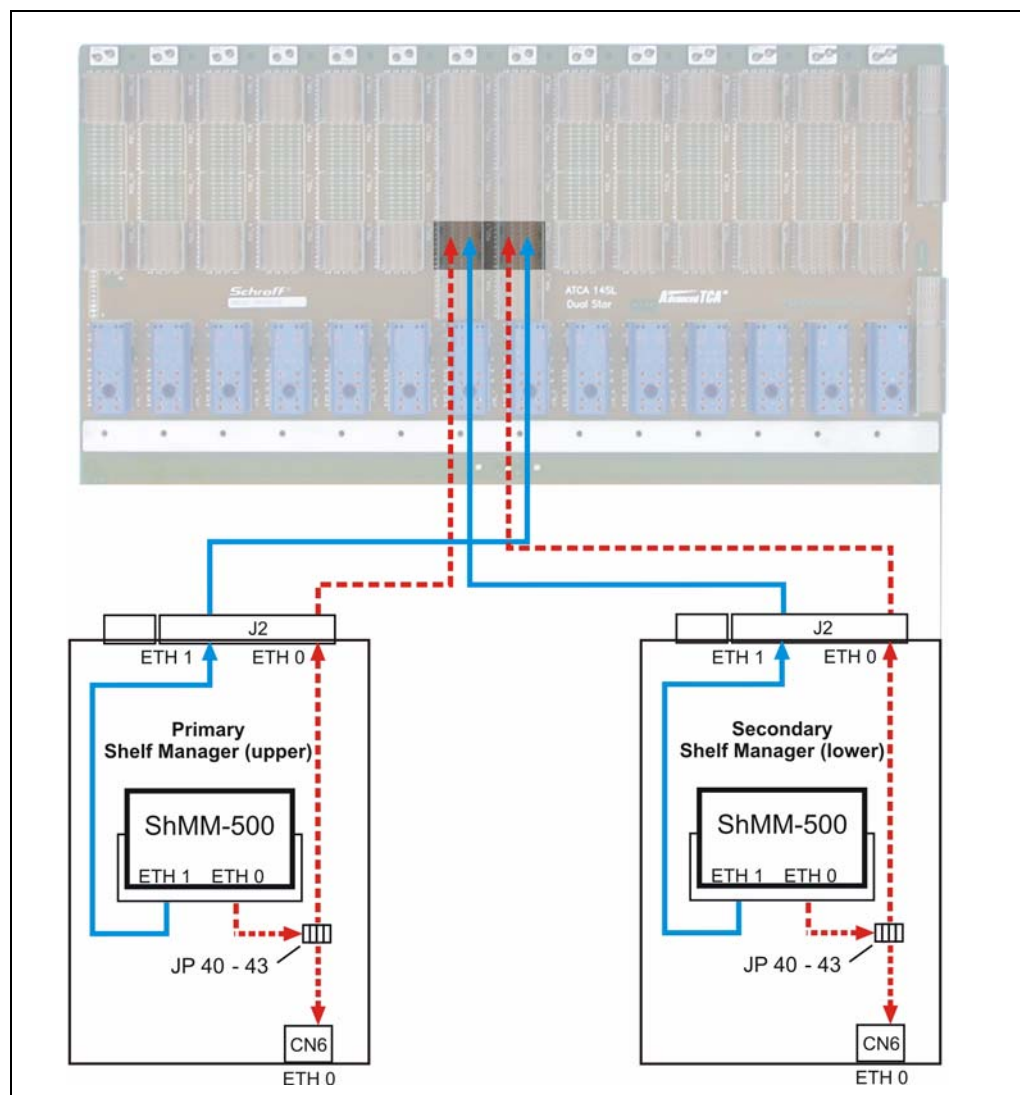
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Table 24: Connector (P23) pin assignment for Shelf Manager Cross Connect

Row	Designation	ab		cd		ef		gh	
5	Shelf Manager Port with Shelf Manager Cross Connects	Tx1+	Tx1-	Rx1+	Rx1-	Tx2+	Tx2-	Rx2+	Rx2-
		Shelf Manager Cross Connect 1				Shelf Manager Cross Connect 2			

10.5 Shelf Manager RS-232 Console Serial Interface

A serial interface is implemented on the ShMM-500.The Shelf Manager provides an RS-232 console interface that provides a full set of RS-232 signals, including modem control. These signals are routed through the ShMM-ACB-IV backplane connector to a RJ45 connector on the front panel of the Shelf Alarm Panel (SAP).

i *The serial console default configuration is:*
- *115200 baud*
- *no parity*
- *8 data bits*
- *1 stop bit*

10.6 Front Panel RESET push button

The ShMM-ACB-IV provides a RESET push button on the front panel. It is connected to the ShMM-500's /MR signal on ShMM-500 connector (CN1) pin 61.

i *Pushing the RESET button will reset the Shelf Manager*

10.7 Input Voltage and Fuse Monitoring

To detect a missing supply voltage as well as a blown fuse, the
ShMM-ACB-IV provides voltage monitoring and control functions.
The -48 VDC input voltages at the Backplane connector and behind the fuses
are connected to the ADM1026 chip through optical-isolation devices.

Figure 31: Input Voltage and Fuse Monitoring
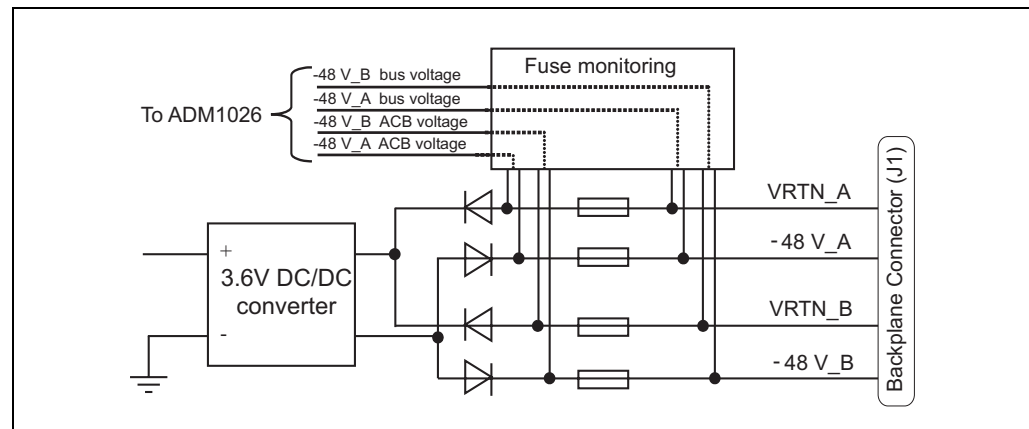
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Signal	description
-48 V_A bus voltage	Indicates the presence of the –48 V_A / VRTN_A at the backplane connector (J1). This signal is connected to pin 46 of the ADM1026
-48 V_A ACB voltage	Indicates the presence of the –48 V_A / VRTN_A behind the ACB-IV's mains fuse. This signal is connected to pin 44 of the ADM1026
-48 V_B bus voltage	Indicates the presence of the –48 V_B / VRTN_B at the backplane connector (J1). This signal is connected to pin 45 of the ADM1026
-48 V_B ACB voltage	Indicates the presence of the –48 V_B / VRTN_B behind the ACB-IV's mains fuse. This signal is connected to pin 43 of the ADM1026

10.8 Hardware Address

The ShMM-ACB-IV reads the hardware address and parity bit from the
backplane connector of the Dedicated Shelf Manager slot. Geographic address
pins (HA[0], HA7) at the Backplane connector determine bit 0 and bit 7, bit 1...6
are hardware-coded on the Shelf Manager PCB.

	HW-Addr.	IPMB-Addr.
Primary Shelf Manager	0x08	0x10
Secondary Shelf Manager	0x09	0x12

10.9 Redundancy Control

The Shelf Manager supports redundant operation with automatic switchover using redundant Shelf Managers. In a configuration where two Shelf Manager are present, one acts as the active Shelf Manager and the other as a standby. The Shelf Managers monitor each other and either can trigger a switchover if necessary.

10.9.1 Hardware Redundancy Interface

The hardware redundancy interfaces of the Shelf Managers are as follows:

- Cross connected Shelf Manager present input (PRES_1#) and output (PRES_GND#)
- Cross connected Shelf Manager health input (HLY_Input#) and output (HLY_Output#)
- Cross connected negotiation input (SWR_Input#) and output (SWR_Output#)
- Active output from the ShMM-500 (ACTIVE#) that is used by the ShMM-ACB-IV to enable interfaces that must be exclusively driven by the active Shelf Manager, specifically PWM and fan tachometer buffers
- Two status LEDs using the SWS_LED_G# (Green) and SWS_LED_R# (Red) signals
- The PRES_1# signal is grounded on the redundant Shelf Manager. This indicates both Shelf Managers the presence of the other.

The figure below shows the hardware redundancy interface of the ShMM-ACB-IV.

Figure 32: Shelf Manager redundancy control
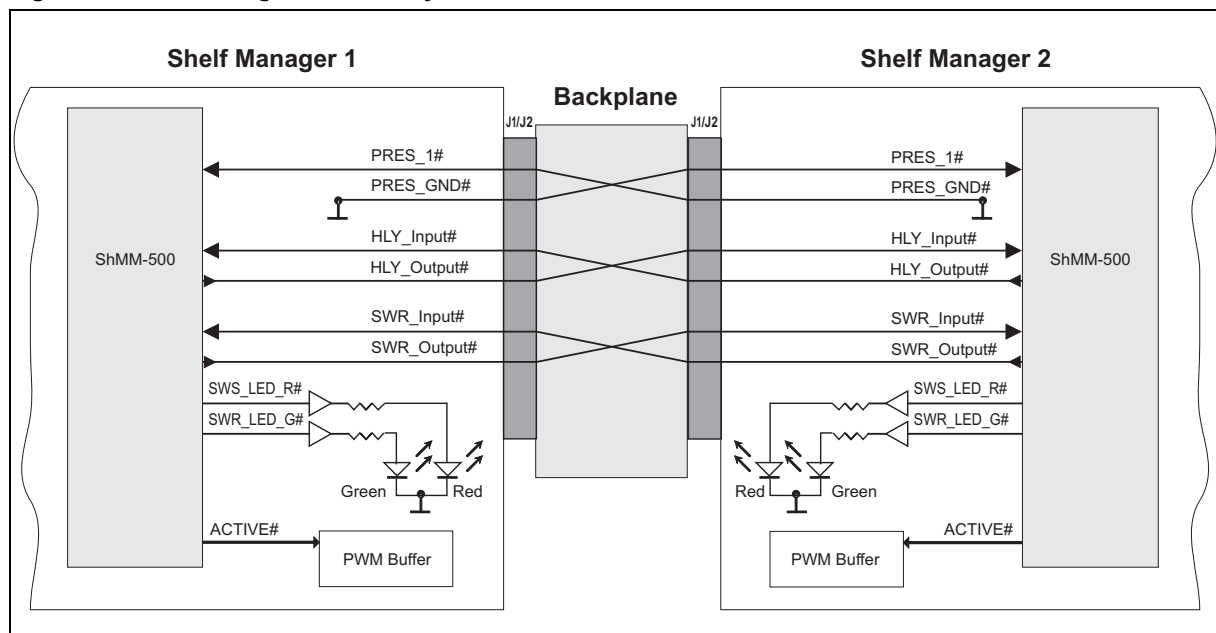
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10.9.2 Board Presence

Each Shelf Manager grounds the PRES_1# input signal of the other Shelf Manager when installed into the ATCA Backplane. This signal is responsible for taking appropriate hardware action as well as signaling the condition to the software.

10.9.3 Hot Swap

The Shelf Manager provides a Hot Swap switch and a blue Hot Swap LED. The Hot swap switch is activated by pulling the extraction handle, the LED indicates when it is safe to "remove" the Shelf Manager from a powered Shelf.

Table 25: Hot Swap LED

LED State	Condition
Off	The Shelf Manager is not ready to be removed/disconnected from the Shelf
Solid Blue	The Shelf Manager is ready to be removed/disconnected from the Shelf
Long-blink	The Shelf Manager is activating itself
Short-blink	Deactivation has been requested

10.10 RTC Backup Battery

The Backup Battery on the Shelf Manager provides a data retention for the Real Time Clock (RTC).
The lifetime of the battery is aprox. 3 years.

	Caution!
⚠️	*There is a danger of explosion if the battery is incorrectly replaced ore handled. When the battery is replaced, the same type ore an equivalent type recommended by the manufacturer must be used. Used batteries must be disposed of according to the manufacturer's instructions.*

Specification for the Backup Battery

Duracell	DL2016
Varta	CR2016
Maxell	CR2016

10.11 Reprogramming of the FLASH Memory in the ShMM-500

10.11.1 Introduction

The Shelf Management software is stored in the FLASH memory on the ShMM-500. The software is:

U-boot
sentry.kernel
sentry.rfs

The U-boot program is usually permanent and allows the user to configure the software and network environment of the ShMM-500 and install new software from a network server. Sentry.kernel is the ShMM-500's Linux kernel and sentry.rfs is the ShMM-500's root file system.

10.11.2 Reprogramming the Shelf Manager from a TFTP server

- Download the sentry.kernel and sentry.rfs images from: *http://www.a-tca.com* and place them in the /tftpboot directory of your network reachable TFTP server. (A TFTP server is included with most UNIX and Linux systems)
- Connect the first Ethernet port (ETH0) of the Shelf Manager to the TFTP server. There are two ways to do this task:
  - (a) Set the jumpers JP40 - 43 in position 1-2 and connect an Ethernet cable between the Ethernet connector at the Shelf Manager's front panel and the TFTP server, or
  - (b) Set the jumpers JP40 - 43 in position 2-3 and connect the TFTP server to the ATCA Base Interface Hub.
- Connect a serial terminal or emulator to the console port on the front of the Shelf Alarm Panel (SAP).
- Set the terminal to 115000, N, 8, 1.
- Power on your Shelf Manager and interrupt the boot-up process. (When the Shelf Manager is first powered up a message is displayed on the console that says: "Hit any key to stop autoboot:".)
- The Shelf Manager will now allow you to interact with the U-boot program.
- Configure the network settings where the Shelf Manager expects to find the TFTP server.

```
serverip=192.168.0.7
ipaddr=192.168.0.2
netmask=255.255.0.0
gateway=192.168.0.1
```

- Start the upgrade process by typing in: „run net"
- After successfull upgrade reboot the Shelf Manager and log-in as „root".
- Enter the command „clia version" and verify the firmware version.

A detailed instruction on how to reprogram a ShMM-500 is distributed with each new Firmware release.

10.12 Shelf Manager Front Panel and Backplane connectors

Table 26: Front Panel 10/100 Ethernet Service Connector

Pin #	Ethernet Signal	ShMM-500 Signal
1	TX+	TX+
2	TX-	TX-
3	RX+	RX+
4, 5	Unused pair; terminated on **ShMM-ACB-IV**	
6	RX-	RX-
7, 8	Unused pair, terminated on **ShMM-ACB-IV**	

Table 27: Backplane Signal Connector (J1) pin assignment

	a	b	c	d	e
1	-48 V_A	VRTN_A	NC	-48 V_B	VRTN_B
2	removed	removed	removed	removed	removed
3	SHELF_GND	SHELF_GND	SHELF_GND	SHELF_GND	SHELF_GND
4	removed	removed	removed	removed	removed
5	FAN_TACH0	FAN_TACH1	FAN_TACH2	FAN_TACH3	FAN_TACH4
6	FAN_TACH5	FAN_TACH6	FAN_TACH7	FAN_TACH8	PWM_C
7	FAN_SPEED	NC	FAN_24V	FAN_24V_RTN	PWM_E
8	removed	removed	removed	removed	removed
9	PEM_PRES_A	SAP_PRES	SWR_Input#	HLY_Input#	SWR_Output#
10	TX+	TX-	HS_EN	HLY_Output#	HA7
11	AIR_FILT_PR	PEM_PRES_B	RX+	RX-	PRES_1#

Table 28:　Backplane Signal Connector (J2) pin assignment

	a	b	c	d	e	f
1	FAN_PRES0	TXD0	TXD1	FAN_PRES2	INT#	GND
2	FAN_PRES1	DTR	Pres_GND	CI	DSR	
3	CD	RTS	RXD1	HA[0]	CTS	GND
4	RXD0	SDA_CH1	INV_ACTIVE	SDA_CH0	GND	
5	SCL_CH1	SCL_CH0	RI	GND	SDA_CH3	GND
6	S1_TX+	S1_TX-	GND	S2_TX+	S2_TX-	
7	S1_RX+	S1_RX-	GND	S2_RX+	S2_RX-	GND
8	SDA_CH4	SCL_CH4	SCL_CH3	SCL_CH2	I2C_PWR_B	
9	SCL_B15_R	SDA_B15_R	SCL_A15_R	SDA_A15_R	SDA_CH2	GND
10	SDA_B16_R	SCL_B16_R	SDA_A16_R	SCL_A16_R	I2C_PWR_A	
11	SDA_A3_R	SDA_B3_R	SCL_B3_R	SDA_B8_R	SCL_B8_R	GND
12	SCL_A3_R	SDA_A5_R	SCL_A5_R	SDA_A8_R	SCL_A8_R	
13	SDA_A1_R	SDA_B7_R	SCL_A1_R	SDA_A10_R	SCL_A10_R	GND
14	SCL_B7_R	SDA_A7_R	SCL_A7_R	SDA_A6_R	SCL_A6_R	
15	SDA_A9_R	SDA_B14_R	SCL_B14_R	SDA_B10_R	SCL_B10_R	GND
16	SCL_A9_R	SDA_A4_R	SCL_A4_R	SDA_B6_R	SCL_B6_R	
17	CROSS_SDA_B	SDA_B11_R	SCL_B11_R	SDA_B4_R	SCL_B4_R	GND
18	CROSS_SCL_B	SDA_A11_R	SCL_A11_R	SDA_A14_R	SCL_A14_R	
19	SDA_A13_R	SCL_A13_R	SCL_B12_R	SDA_B12_R	SDA_B9_R	GND
20	SDA_B1_R	SCL_B1_R	CROSS_SCL_A	CROSS_SDA_A	SCL_B9_R	
21	SDA_B13_R	SDA_B5_R	SCL_B5_R	SDA_B2_R	SCL_B2_R	GND
22	SCL_B13_R	SDA_A12_R	SCL_A12_R	SDA_A2_R	SCL_A2_R	

Table 29: Backplane connector (J1) and (J2) pin description

-48V_A	-48 VDC supply A
-48V_B	-48 VDC supply B
AIR_FILT_PR	Air filter presence (connected to switch to detect a missing air filter)
CD	Carrier Detect
CI	Shelf Intrusion signal
CROSS_SCL_A	Serial Clock of IPMB_A, cross-connected to serial clock of IPMB_B of other Shelf Manager
CROSS_SCL_B	Serial Clock of IPMB_B, cross-connected to serial clock of IPMB_A of other Shelf Manager
CROSS_SDA_A	Serial Data of IPMB_A, cross-connected to serial clock of IPMB_B of other Shelf Manager
CROSS_SDA_B	Serial Data of IPMB_B, cross-connected to serial clock of IPMB_A of other Shelf Manager
CTS	Clear To Send
DSR	Data Set Ready
DTR	Data Terminal Ready
FAN_24V	Auxiliary 24 VDC supply, generated on Fan Trays
FAN_24V_RTN	Auxiliary 24 VDC, generated on Fan Trays, return path
FAN_PRES[0...2]	Fan Tray present (grounded when present)
FAN_SPEED	DC for Fan Speed Control (1.5V = min. speed, 10V = max speed)
FAN_TACH[1...9]	Tachometer signals from Fan Trays
GND	logic ground
HA[0]	Hardware address of Shelf Manager, bit 0
HA7	Hardware address of Shelf Manager, bit 7
HLY_Input#	Health of the other Shelf Manager
HLY_Output#	Health of this Shelf Manager
HS_EN	Tells the Shelf Manager that it is plugged in
I2C_PWR_A	3.3V power redundant path A for Shelf I^{2}C-devices
I2C_PWR_B	3.3V power redundant path B for Shelf I^{2}C-devices
INT#	External Interrupt request (Master Only I^{2}C-bus)
INV_ACTIVE	This ShMM is in active mode (inverted signal of ShMM)
NC	not connected
PEM_PRES_[A, B]	PEM [A, B] presence (grounded when present)
PRES_1#	Board presence signal of the other Shelf Manager
PWM_C	Opto isolated PWM signal for fan speed control, collector
PWM_E	Opto isolated PWM signal for fan speed control, emitter
RI	Ring Indication
RTS	Request To Send
RX(+-)	Ethernet interface (ETH1) to Hub-Slot (ShMC cross connect)

-48V_A	-48 VDC supply A
RXD[0...1]	Serial interface receive data
S1_RX(+-)	Ethernet interface (ETH0) to either front panel or hub-slot base interface (jumper configurable)
S1_TX(+-)	Ethernet interface (ETH0) to either front panel or hub-slot base interface (jumper configurable)
S2_RX(+-)	USB interface to other Shelf Manager
S2_TX(+-)	USB interface to other Shelf Manager
SAP_PRES	Presence signal of SAP (Grounded when present)
SCL_A_[1...13, 15...16]	Serial Clock, radial IPMB_A
SCL_A_14	Serial Clock, IPMB_A Channel 14 (for bused IPMB, or radial IPMB to logical slot (14)
SCL_B_[1...13, 15...16]	Serial Clock, radial IPMB_B
SCL_B_14	Serial Clock, IPMB_B channel 14 (for bused IPMB, or radial IPMB to logical slot (14)
SCL_CH0	Master Only-I^2C-bus to SAP
SCL_CH1	Master-Only I^2C-bus Channel 1 (to CDM1 FRU SEEPROM)
SCL_CH2	Master-Only I^2C-bus Channel 2 (to CDM2 FRU SEEPROM)
SCL_CH3	Master-Only I^2C-bus Channel 3 (to Fan Trays)
SCL_CH4	Master-Only I^2C-bus Channel 4 (to PEMs)
SDA_A_[1...13, 15...16]	Serial Data, radial IPMB_A
SDA_A_14	Serial Data, IPMB_A Channel 14 (for bused IPMB, or radial IPMB to logical slot (14)
SDA_B_[1...13, 15...16]	Serial Data, radial IPMB_B
SDA_B_14	Serial Data, IPMB B channel 14 (for bused IPMB, or radial IPMB to logical slot (14)
SDA_CH0	Master Only-I^2C-bus to SAP
SDA_CH1	Master-Only I^2C-bus Channel 1 (to Backplane FRU SEEPROM1)
SDA_CH2	Master-Only I^2C-bus Channel 2 (to Backplane FRU SEEPROM2)
SDA_CH3	Master-Only I^2C-bus Channel 3 (to Fan Trays)
SDA_CH4	Master-Only I^2C-bus Channel 4 (to PEMs)
SHELF_GND	Shelf Ground
SWR_Input#	Switchover signal from the other Shelf Manager
SWR_Output#	Switchover signal to the other Shelf Manager
TX(+-)	Ethernet interface (ETH1) to Hub-Slot (ShMC cross connect)
TXD[0...1]	Serial interface transmit data
VRTN_A	Voltage return supply A
VRTN_B	Voltage return supply B

11 Technical Data

Table 30: Technical Data

Physical Dimensions	
Height	577.05 mm
Width	482.6 mm
Depth	410 mm
Weight	
Shipping weight completely assembled with packaging	46 Kg
Shelf weight (w/o fan tray and w/o PEMs)	19 Kg
Shelf weight completely assembled	32 Kg
Power	
Input voltage	-40.5 VDC …. -72 VDC
Input Power	80 A per power feed
Overcurrent Protection	30 A Fuses on PEM
Cooling Capacity	
Front Boards	200 W / Board
Environmental	
Ambient temperature	+5°C…+45°C
Humidity	+5%...+85%, no condensation
EMI	
Conducted Emissions	EN 55022 Class B
Radiated Emissions	EN 55022 Class B
Safety	
Protected Earth Test	EN60950, test current 25 A, resistance <100mOhm
Hipot Test	EN60950, 1000V

11.1 Part Numbers

Table 31: Part Numbers

Number	Part
11596-006	14-Slot ATCA Shelf, Dual Star Backplane, bused IPMB
21593-375	Shelf Manager ShMM-ACB-IV with bused IPMB
21594-052	Replacement Fan Tray
	Replacement PEM
21191-207	Fuse 30 A/80 V for PEM (10 pcs)
21596-002	Air Filter Element
21596-012	Filler Panel for empty Shelf Manager slot
21591-079	Filler Panel with airflow buffle for empty front slots
	Chassis Data Module (CDM)
21596-022	Shelf Alarm Panel (SAP)

11.2 Shelf Mechanical Dimensions

Figure 33: Shelf dimensions, front view
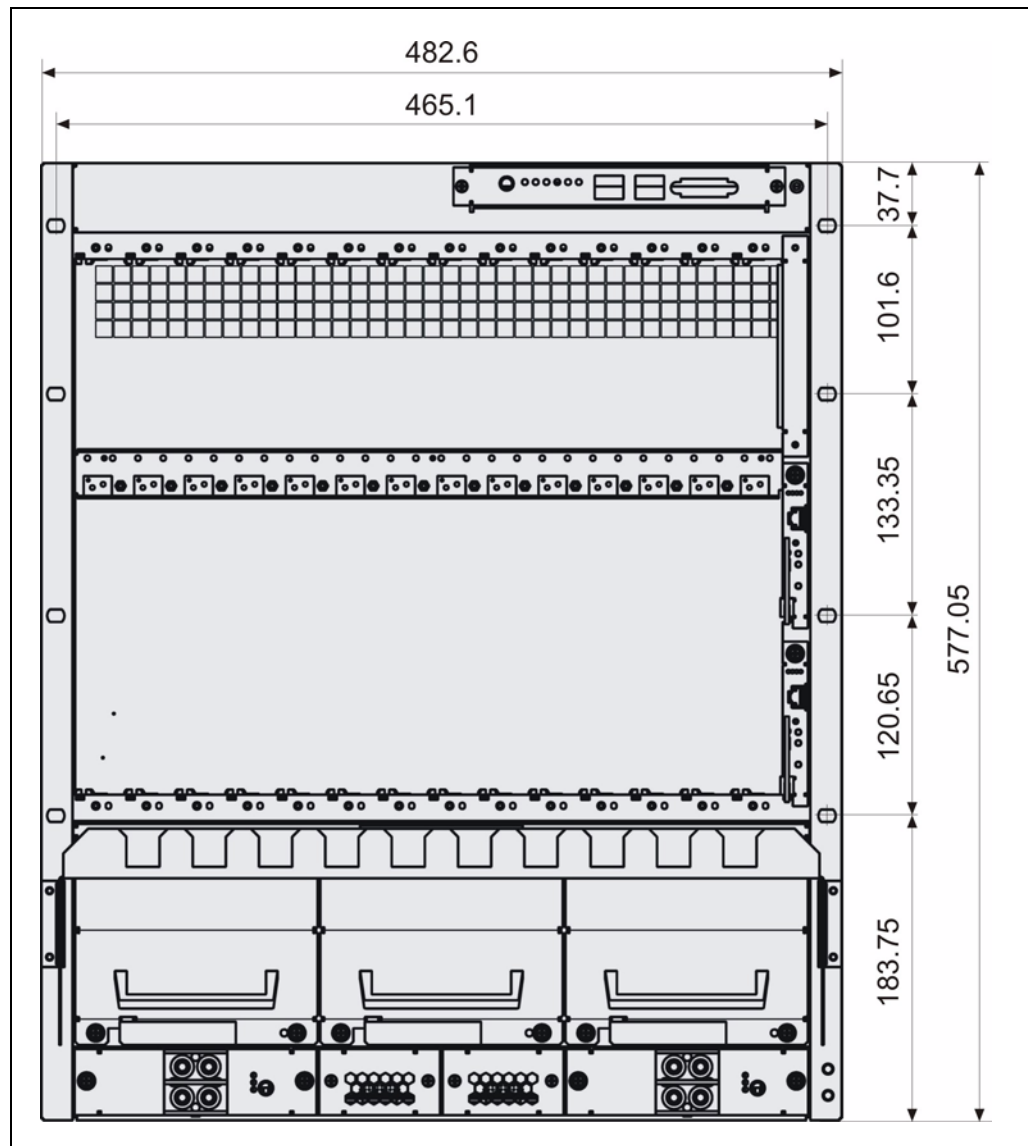
12706839

All dimensions are in millimeters (mm).

Figure 34: Shelf dimensions, side view
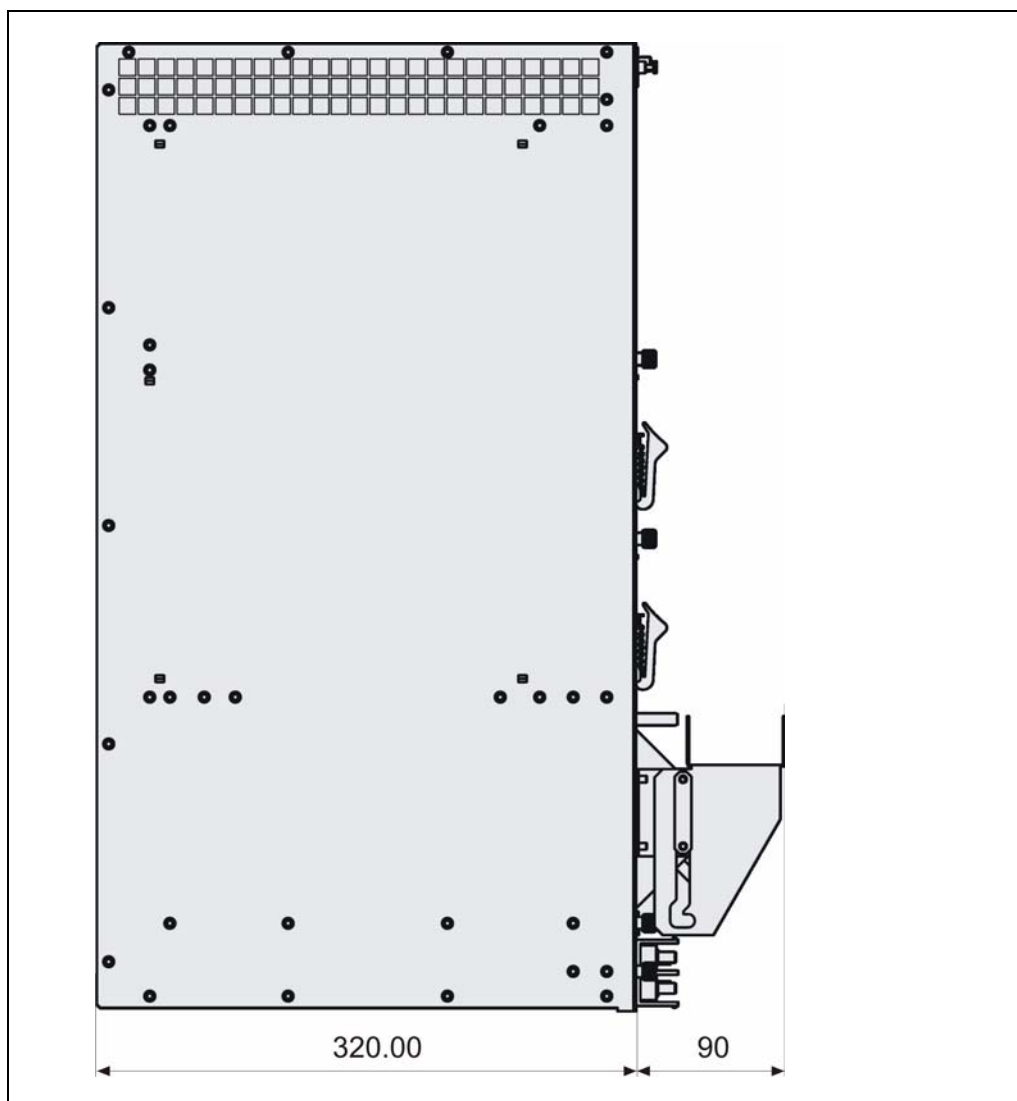
12706840

All dimensions are in millimeters (mm).

Figures

Tables