BASE STATION INSTALLATION PROCEDURES

This chapter provides procedures for installing the rack and their internal components.
It also provides an overview about installing the antenna used with the NPM2000 base station.

Before proceeding with this chapter, you must complete all the tasks described in Chapter 3.

Contents

INSTALLING THE RACK

These procedures describe how to prepare the floor for rack installation, move the rack into place, and secure the rack to the floor, and to the ceiling.

Table 4.1 shows the actions described in this section.

Action	Page
Removing the Rack's Rear Panel	41
Prepare the Installation Location	44
Position the Rack	46
Secure the Rack	48

Table 4.1   Installing the Rack Procedure Summary

> **N O T E :** When you install the rack, finish positioning and leveling the rack. This makes leveling the rack easier and minimizes the potential for errors that may occur during rack placement. The rack is suitable for mounting on concrete or other non-combustible surfaces only.

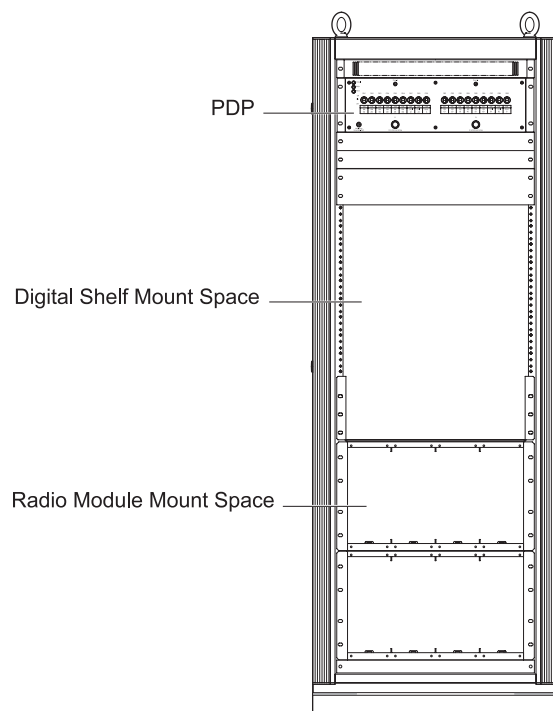Figure 4.1 shows the factory default status of the NPM2000.

Figure 4.1   NPM2000 Factory default status

Removing the Rack's Rear Panel

The rear panel of the rack is removable. Removing the rear panel may improve the efficiency of the installation work in some cases.

Figure 4.2 shows the rear panel to be removed.

To remove the rear panel, raise each lever by pressing the push button as shown in the Figure 4.2. Before fully removing the rear panel, first disconnect the frame ground cable attached to the back of the panel.To attach the panel, place the panel in position and then press each lever to the down position. Also, you can lock/unlock the lever by clicking the small slide lock on it.
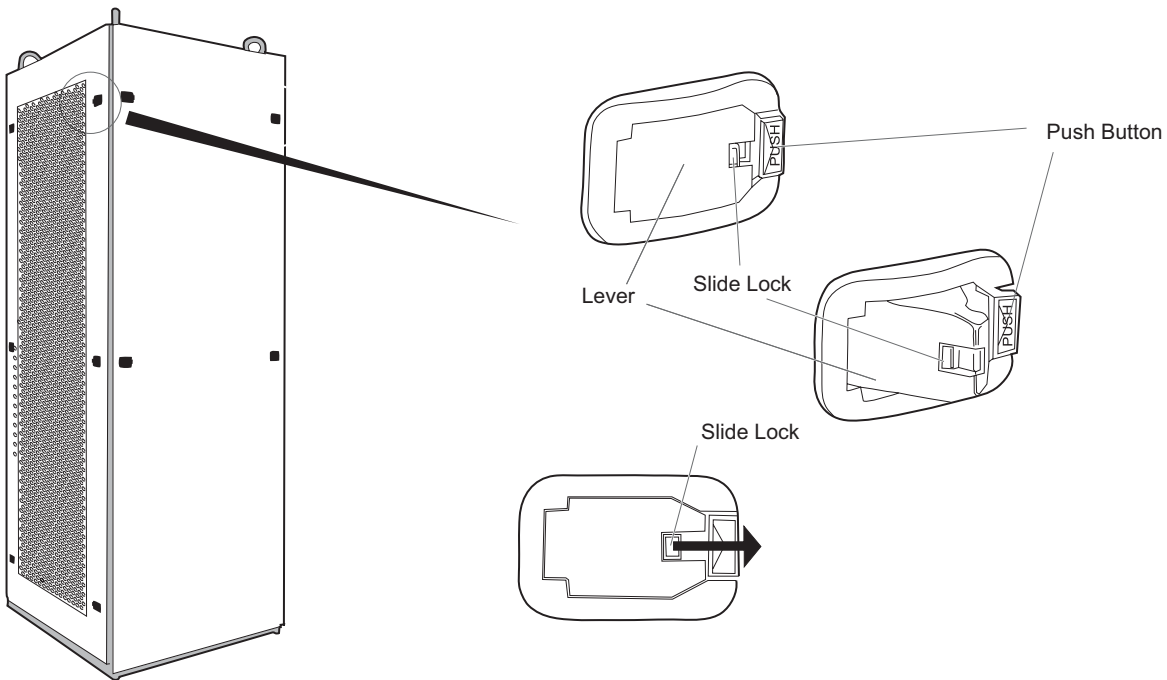
Figure 4.2   Removable Rear Panel of the Rack

Figure 4.3 shows how to remove the frame ground attached to the rack's filler panel.
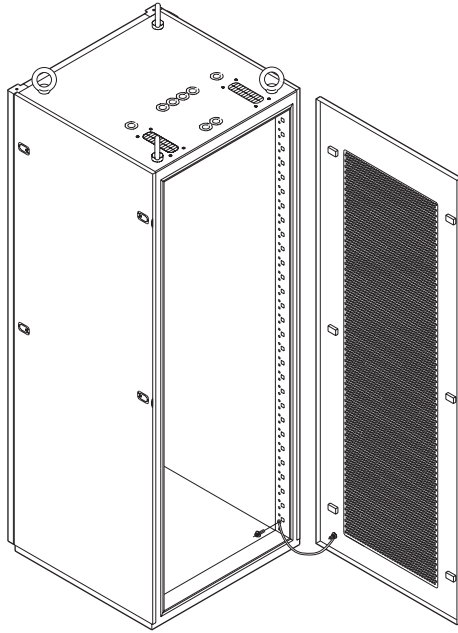

Figure 4.3   Removing the Frame Ground

Figure 4.4 shows the status when the rear panel was removed.

Rack Front
(factory default status)
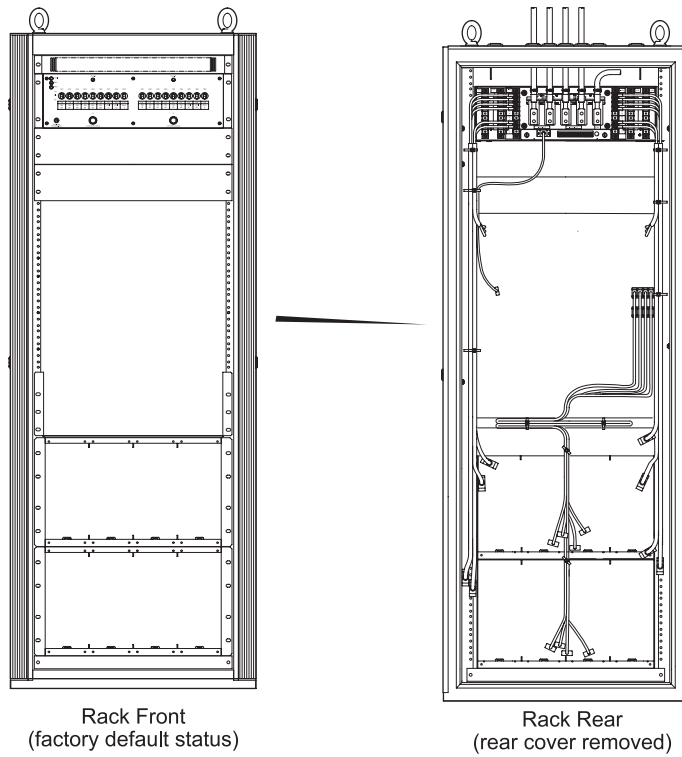
Rack Rear
(rear cover removed)

Figure 4.4   Rack Status with Rear Panel Removed

Prepare the Installation Location

This procedure applies to installing the base station on a concrete floor and securing the rack using M12 concrete expansion bolts (called anchor bolts in this document).

By factory default, a base kit is bolt-attached to the rack. Remove the base kit before installing the rack with the anchor bolts. Also, please be reminded that the isolation pad – a part of the base kit – is required for the anchor-bolt-installation. For positiong the rack with the adjusting bolts on the floor, leave the base kit as it is.

Figure 4.5 shows the base station rack outline.
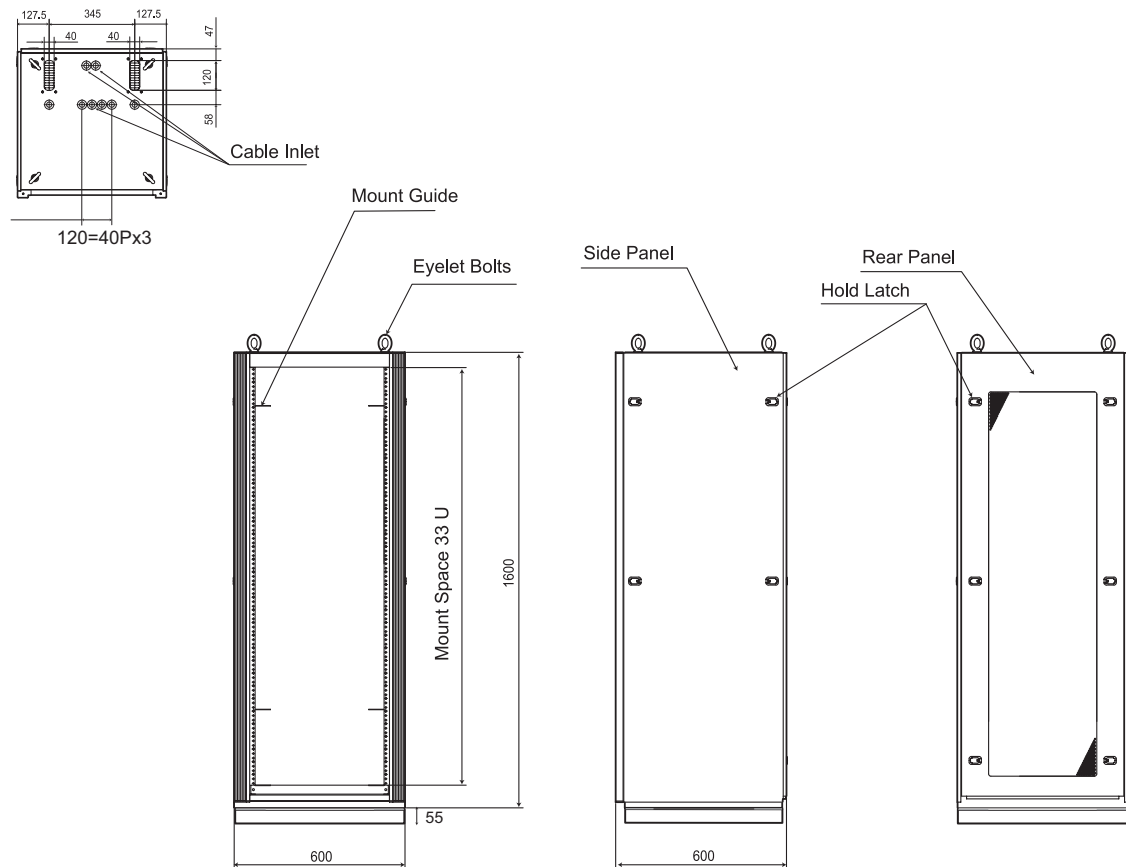
Figure 4.5   NPM2000 Rack Outline

▸ **To prepare the installation location**

    1   Mark with a chalk line the location where you will install the rack. If there are overhead requirements, use a plumb line to align the rack vertically.

        The rack has a footprint of 600 mm by 600 mm. The rack is 1600 mm in height.

        Install two eyelet bolts in the top of the rack if you intend to use a crane to move the rack.

    2   Verify that there is adequate space for the rack:

Remove the radio module shelf at the bottom by loosening eight M5 screws and pulling the radio module shelf forward. If necessary, also remove the guide angle (L shaped metal bracket) which was used for the removed radio moduel shelf.

i Move the rack to the intended installation location.

ii Ensure that you have room for the rack, its cabling, and enough space for airflow and the insertion and removal of components. See page 22 for airflow requirements.

3 Place the rack in the precise location designated for it using the chalk line as your guide.

4 Draw the anchor hole locations on the concrete floor tracing the anchor hole in the rack. Use the four outer locations and trace the entire shape of the anchor holes.

Remove the rack.

Figure 4.6 shows the anchor hole locations to be traced.

Anchor Hole 17 mm x 20 mm

62.5

458   600

79.5

70   460   70

600

FRONT
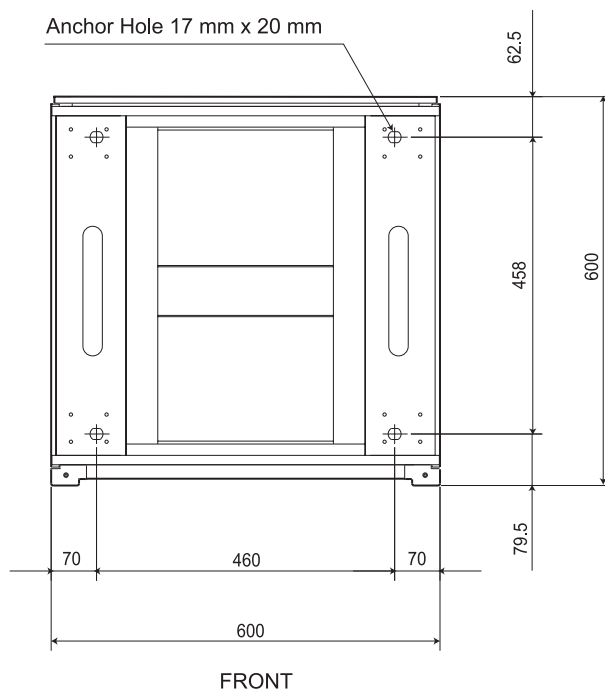
Figure 4.6   Anchor Hole Locations

5 Punch the concrete in the outer edge of each anchor guide using the concrete punch. This will make drilling the anchor holes easier.

6 Drill an anchor hole 100 mm (3.9 inch) deep on the outer edge of each anchor hole using a 12.7 mm (0.5 inch) hammer drill.

7 If the drill bit hits a metal reinforcement bar, move the hole location to the inner edge of the anchor guide and repeat steps 5 and 6.

8 Ensure that the holes are 100 mm (3.9 inch) deep; otherwise, the anchor bolts will not sit properly.

9 Clean each anchor hole thoroughly using a vacuum cleaner with a narrow nozzle attachment that can reach into the hole and remove the debris.

Position the Rack

This procedure describes how to position and level the rack.

▸ **To position the rack**

1 Place the isolation pads at the four corners to fit on the drilled anchor holes.

Figure 4.7 shows how to place the isolation pads.
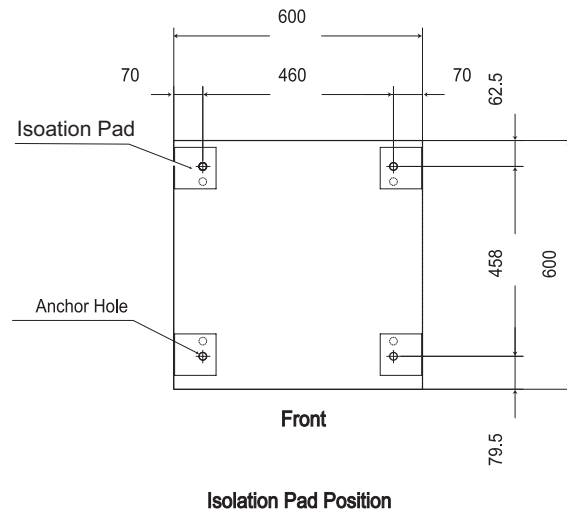
Figure 4.7 Position of the Isolation Pads

2 Place the rack in the precise location designated for the rack using the chalk line and optional drilled holes as your guide. Ensure that the rack is positioned on the isolation pads.

Figure 4.8 shows the correct position of the rack.

PDP

Digital Shelf

Radio Module
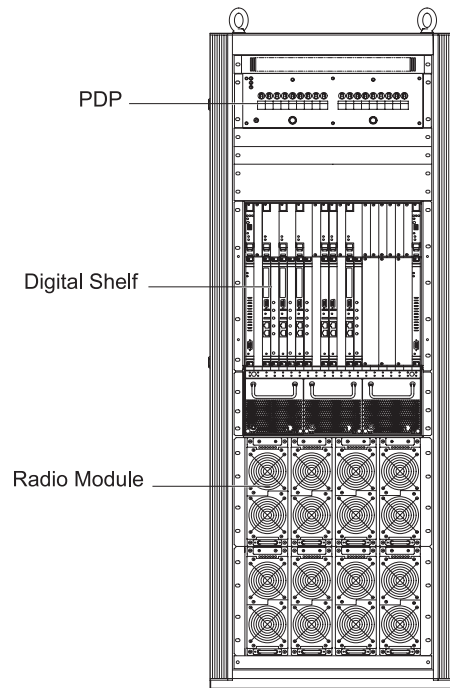
Figure 4.8 The Rack Position

3 Ensure that the rack is vertically aligned and front-to-rear using a torpedo level. Add shims as needed until the rack is level.

Secure the Rack

This procedure describes how to secure the rack in place. The rack may be secured to the ground and to the ceiling.

Figure 4.9 shows the location of the junction bar and the support bolt holes.
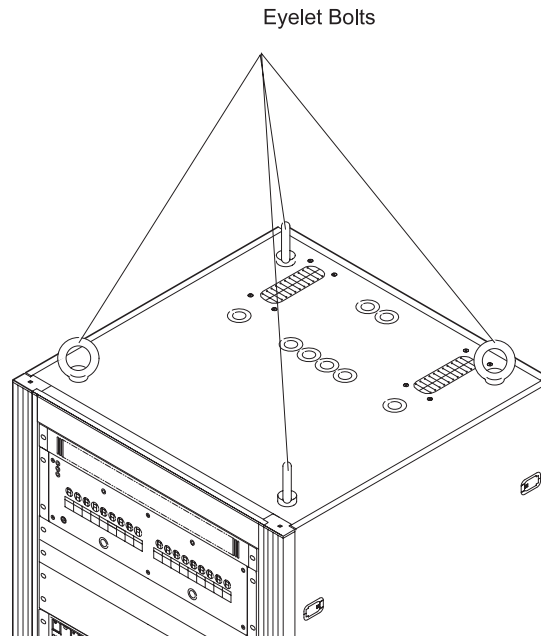
Eyelet Bolts

Figure 4.9 Support Bolt Hole Locations

▸ **To secure the rack**

1 Ensure that the rack is correctly positioned and vertically aligned.

NOTE: To secure the upper part of the rack, remove the elelet bolts bofore securing the rack.

Figure 4.10 shows how to handle the anchor bolts.

Anchor Bolt
Washer
Bush (Isolation)
Rack (bottom)
Isolation Pad (t5mm)
Anchor Hole
Anchor + Isolation Pad

600
70   460   70   62.5
Isolation Pad (t5mm)
Anchor Hole
458   600
Front
79.5
Isolation Pad Position

Figure 4.10 Anchor Bolts

2 Secure the rack to the floor. If you are using anchor bolts, complete the following steps:

i Attach the nuts to the anchor bolts in the manner that the screw part comes first.

ii Ensure that the anchor hole, the rack fixing hole, and the isolation pad fixing hole are properly aligned.

iii Set the isolation bushing to the fixing hole of the rack.

iv Set the flat washer on the isolation bushing.

v Insert the anchor bolt into the anchor hole through the flat washer, the isolation bushing, and the rack.

vi Drive the shaft into until it reaches to the top of the anchor bolt.

vii Tighten the nut using a tool. The torgue value is 42 N•m (371.3 inch-pounds).
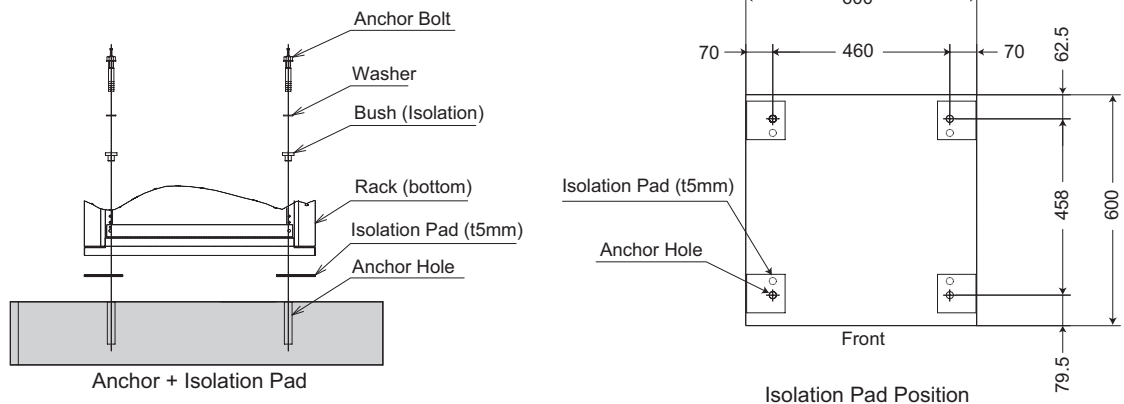
viii Reattach the radio module shelf using the M5 screws. Torque the screws to 3.0 N•m (26.6 inch-pounds).

▶ ## Position the rack on the floor without anchors

In the case of positiong the rack on the floor without anchors, follow the procedures below.

1 Remove the radio module shelf at the bottom of the rack by loosening eight M5 screws and pulling the radio module shelf forward. If necessary, also remove the guide angle (L shaped bracket) which was used for the removed radio moduel shelf.

2 Raising the rack or lying the rack on its side for the stability, attach the ajusting bolts on the bottom of the base.

Figure 4.11 shows how to push the adjusting bolts.
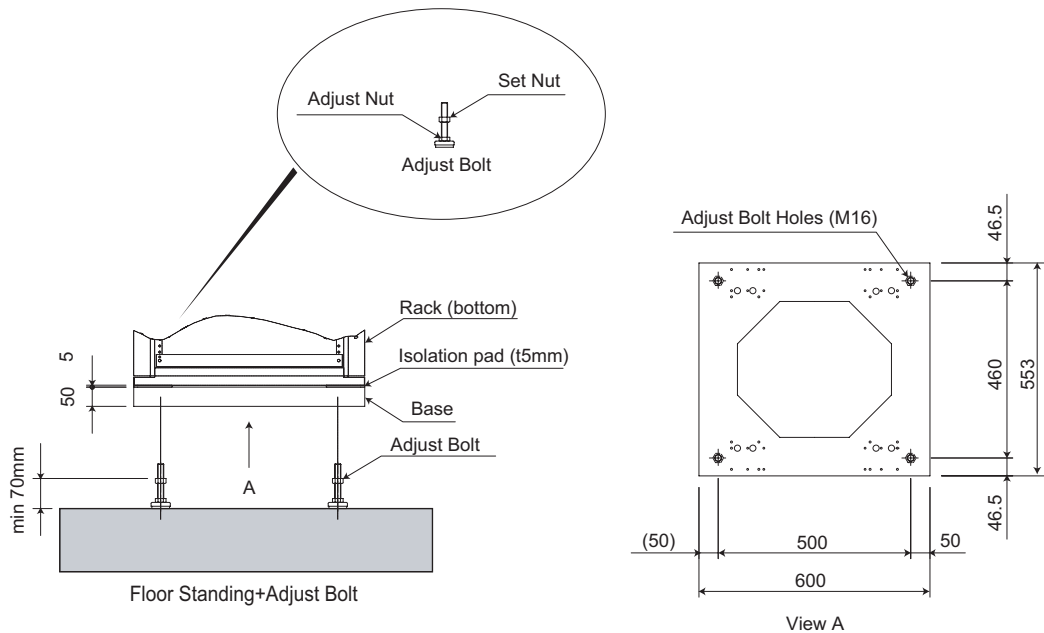
Figure 4.11 Adjusting Bolts

> **NOTE:** Ensure that the screw part of the adjusting bolt is pushed 15 mm deep into
> the base. Fix the adjusting bolts so that the loading is evenly supported by four adjust-
> ing bolts. Do not use the adjusting bolts under the the following locations:
> - Where a waterdrop is likely to spread out (i.e. outdoor location)
> - Where high tempereature, high humidity, or corrodible gas is likely to occur.
> - Where much dust or oil mist is likely to occur.

3   Position the rack on the given location.

WARNING: Ensure that the gross weight of the rack does not overload on either
adjusting bolt while the rack being raised or being put on the floor. Otherwise, the rack
might be damaged.

4   Fix the adjusting bolts with the nuts so that the rack is leveled. Then, secure the adjusting bolts with the
fixing nuts.

WARNING: For the safety reason, it is recommended to secure the rack using
the anchor bolts.

ATTACHING GROUND AND POWER CABLES

These procedures describe how to ground and power the base station. Table 4.2 shows the actions described in this section.

Action	Page
Ground the Rack	52
Attach the Main and Return Power Cables	54

Table 4.2   Attaching Ground and Power Cables Procedure Summary

WARNING: Ensure that all of the circuit breakers on power distribution panel (PDP) are in the OFF (down) position before attaching any cables. Failure to do so may result in personal injury and cause damage to or destruction of the base station.

Ground the Rack

The rack requires a ground cable connecting the rack to the building's grounding system.

Figure 4.12 shows the cables used to ground the rack.
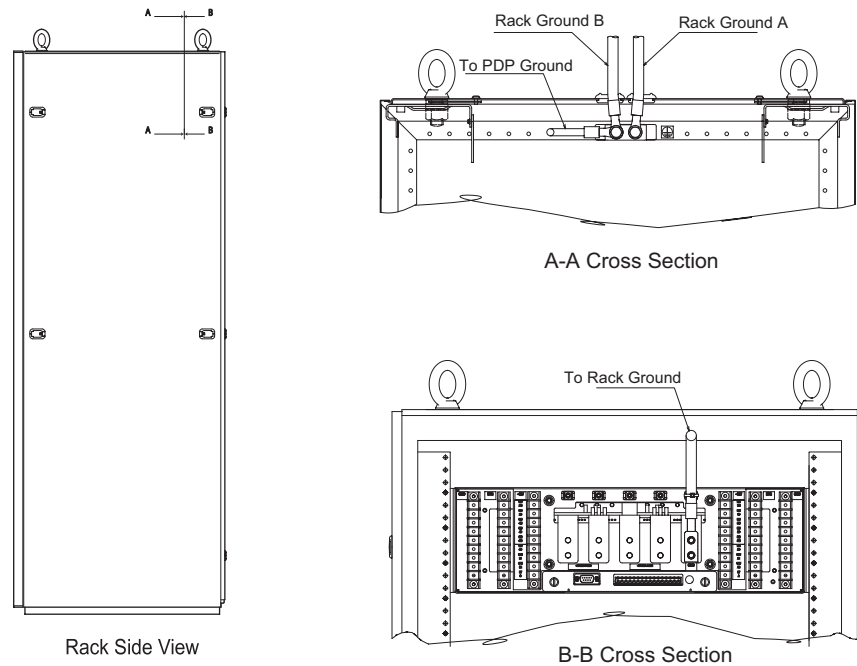
Figure 4.12 Ground Cables

▸ **To ground the rack**

1   Ensure that all the circuit breakers on the PDP are in the OFF (down) position.

2   Connect the main ground cable to the building's grounding system using a minimum of #6 AWG stranded copper wire.

3   Terminate the main ground cable with a two-hole compression lug. Apply an anti-oxidant solution to the cable before attaching the compression lug.

> **N O T E :** When crimping the compression lug, ensure that you are using the appropriate tool. Compression lugs for #6 AWG wire are colored blue and require that a blue die be used with the crimping tool.

Figure 4.13 shows the dimension of the compression lug.
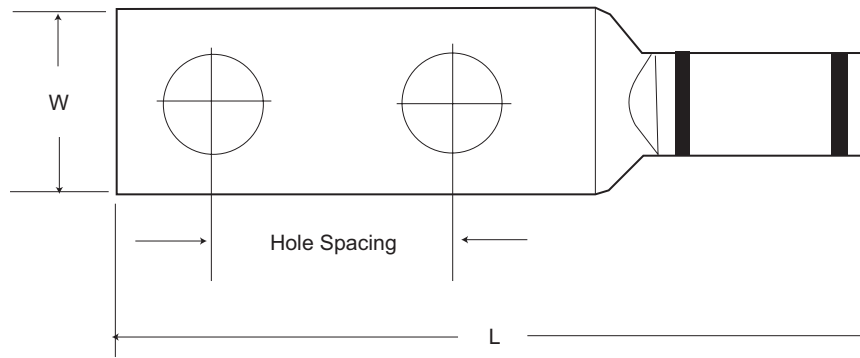
L : 2.52"
W: 0.6"

Hole Spacing: 0.75"
Stud Hole Size: 1/4

Figure 4.13 Compression Lug Dimensions

4   Apply an anti-oxidant solution to the ground terminals on the rack.

5   Connect the compression lug on the main ground cable to one of the two ground terminals, as shown in Figure 4.14. Use a hex nut with a split-lock washer when securing the cable. Torque each hex nut to 0.90 N•m (8.0 inch-pounds).

Figure 4.14 Ground Terminals on the PDP

Attach the compression lug using two hex screws with locking and external tooth washers.

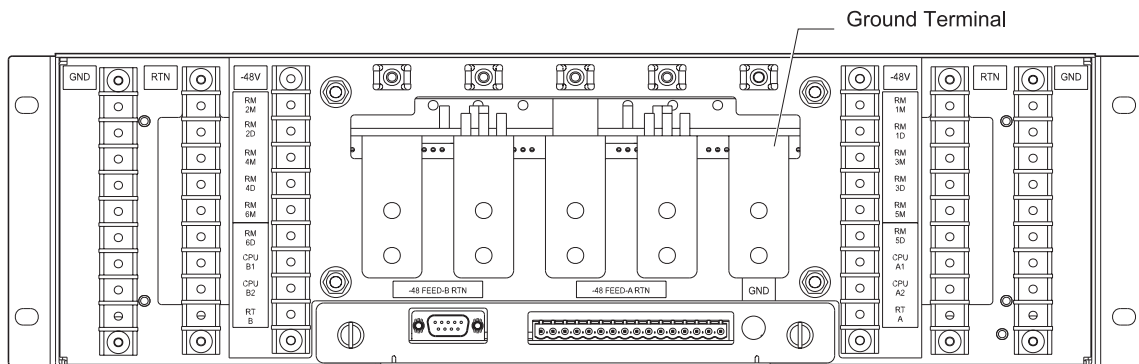**6**   Dress and label the ground cables according to the standards and requirements of your site.

Attach the Main and Return Power Cables

Before proceeding with this procedure, ensure that all the necessary site cable layout, runaway, and grid work has been completed.

WARNING: Ensure that the necessary requirements and procedures have been reviewed prior to the start of any power-related activity. Ensure that the –48V DC power supply and the base station are powered off before you begin this procedure. Failure to turn off the power supply may result in personal injury or death and cause damage to or destruction of the base station and surrounding equipment.

▸ **To attach the main and return power cables**

1   Ensure that all the circuit breakers on the PDP are in the OFF (down) position.

2   Ensure that the main –48V DC power supply is powered off.

3   FEED-A

   i   Connect the main power cable FEED-A to the negative terminal on your –48V DC power supply using a minimum of #2 AWG stranded copper wire.

   ii   Connect the return power cable FEED-A to the positive terminal on your –48V DC power supply using a minimum of #2 AWG stranded copper wire.

4   FEED-B

   i   Connect the main power cable FEED-B to the negative terminal on your –48V DC power supply using a minimum of #2 AWG stranded copper wire.

   ii   Connect the return power cable FEED-B to the positive terminal on your –48V DC power supply using a minimum of #2 AWG stranded copper wire.

5   Terminate each of the cables with a two-hole compression lug with the dimensions shown in Figure 4.13 on page 53. Apply an anti-oxidant solution to each cable before attaching the compression lug.

   NOTE: When crimping the compression lug, ensure that you are using the appropriate tool. Compression lugs for #2 AWG wire are colored brown and require that a brown die be used with the crimping tool.

6   Apply an anti-oxidant solution to the main and return terminals on the PDP.

7   Connect the compression lugs on the return power cables to each return terminal shown in Figure 4.15. Use hex nuts with split-lock washers when securing the cables. Torque each hex nut TBD N•m (inch - pounds).

8   Connect the compression lugs on the main power cables to each –48V DC power terminal shown in Figure 4.15. Use hex nuts with split-lock washers when securing the cables. Torque each hex nut to TBD N•m (inch-pounds).

Table 4.3 shows the preferable cable thickness proportional to its loop length.

Loop Length	f	65	130	195	260
Sector	m	19.8	39.6	59.4	79.2
1		#7	#4	#2	#1
2		#4	#2	1/0	2/0
3		#3	1/0	3/0	4/0
4		#2	2/0	4/0	–

Table 4.3 Cable Thickness
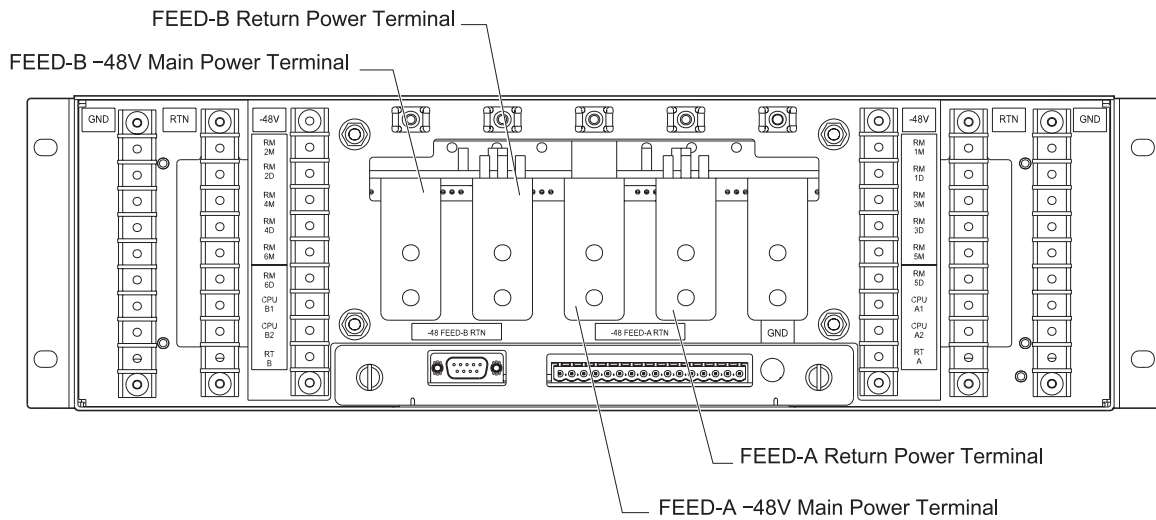
Figure 4.15 Main and Return Power Terminals

1 Ensure the main and return power cables are connected to the main power supply correctly by performing a continuity test on each cable.

2 Dress and label the main and return power cables according to the standards and requirements of your site.

> **N O T E :** Ensure that the main and return power cables are tied in a manner that minimizes the potential for creating electromagnetic fields. When tied together, the main and return power cables should be arranged in an alternating order.

▸ **To test the power supply voltage and ground**

1 Ensure that all circuit breakers (CB) are in the OFF (down) position.

2 Remove the fuse F1 and F2 from the PDP by holding down and turning it counterclockwise.

3 Configure your multimeter to read DC voltage. Autoscaling may be used.

4 If the base station has a pre-installed digital shelf, disconnect the power cable from the power connector which is connected to FlexAlarm A and B on the digital shelf. Leave the power cables connected to terminals "CPCI A1", "CPCI A2", "CPCI B1", "CPCI B2", and "GND" on the PDP.

5 Test the voltage potential between the ground and return pins:

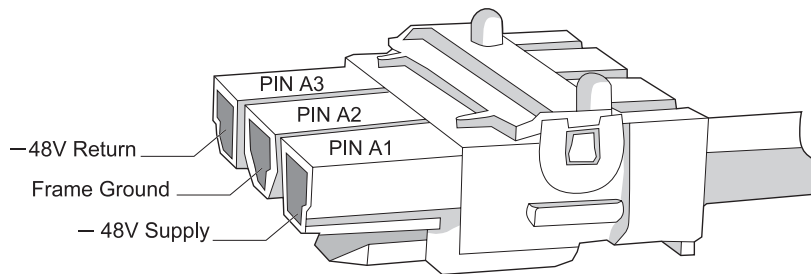Figure 4.16 shows the pinout of the power cable connector.

PIN A3
PIN A2
PIN A1
— 48V Return
Frame Ground
— 48V Supply

Figure 4.16 Power cable connector pinout

    i Connect the multimeter probes to pins A2 (Ground) and A3 (Return). The probes to be connected to pins A2 and A3 are not specified. Each probe may be connected to either pin.

    ii Observe the voltage reading on the multimeter. The voltage should be less than ± 0.5V from 0.

    If the voltage is greater than ± 0.5V, there may be a grounding problem. See the documentation that ships with your power supply for troubleshooting procedures. Do not power on the base station until the problem has been resolved.

6 Test the voltage potential between the A1 (–48V) and A3 (Return) pins:

    i Turn on CBA7 on the PDP.

    ii Connect the black multimeter probe (–) to pin A3 (Return).

    iii Connect the red multimeter probe (+) to pin A1 (–48V).

    iv Observe the voltage reading on the multimeter. The voltage should be between –46V and –56V.

    If the voltage is not between –46V and –56V, there may be a problem with the main power supply. See the documentation that ships with your power supply for troubleshooting procedures. Do not power on the base station until the problem has been resolved.

7 Test the voltage potential between the –48V and ground pins:

    i Ensure that CBA7 on the PDP is turned on.

    ii Connect the black multimeter probe (–) to pin A2 (Ground).

    iii Connect the red multimeter probe (+) the pin A1 (–48 V).

    iv Observe the voltage reading on the multimeter. The voltage should be between –46V and –56V.

    v If the voltage is not between –46V and –56V, there may be a problem with the ground or the main power supply. See the documentation that ships with your power supply for troubleshooting procedures. Do not power on the base station until the problem has been resolved.

8 Test the voltage potential between the ground and return pins while the circuit is powered on:

    i Ensure that CBA7 on the PDP is turned on.

    ii Connect the black multimeter probe (–) to pin A2 (Ground).

    iii Connect the red multimeter probe (+) the pin A3 (Return).

    iv   Observe the voltage reading on the multimeter. The voltage should be less than ±0.5V.

          If the voltage is greater than ±0.5V, there may be a grounding problem. See the documentation that ships with your power supply for troubleshooting procedures. Do not power on the base station until the problem has been resolved.

9   If all the tests described in steps 5-8 passed, then the rack is properly grounded and the main power supply is operating correctly. If any of the tests failed, investigate and correct the problem. Repeat this procedure after corrective action is taken. Do not power on the base station if any of the tests failed.

10   Disconnect both probes from the power cable.

11   Power off CBA7 on the PDP by setting it to the OFF (down) position.

12   Reconnect the power cable to the power connector which is connected to FlexAlarm A and B on the digital shelf.

13   Reinstall the fuses F1 & F2 in the PDP by holding down and pressing it clockwise.

ATTACHING THE SHELVES AND MODULES

These procedures describe how to attach the shelves and modules to the rack.

Table 4.4 shows the actions described in this section.

Action	Page
Attach the Digital Shelf to the Rack	60
Attach the Radio Module to the Rack	62
Cover Empty Radio Module Slots	63

Table 4.4   Attaching the Shelves and Modules Procedure Summary

Rack Layout

The digital shelf slides into its bay and bolt directly to the rack using M5 screws. The recommended torque value for each M5 screw is 3.0 N•m (26.6 inch-pounds).

The radio modules slide into their respective slots and bolt to each radio module shelf using thumb screws. The empty slots are covered with filler panels.
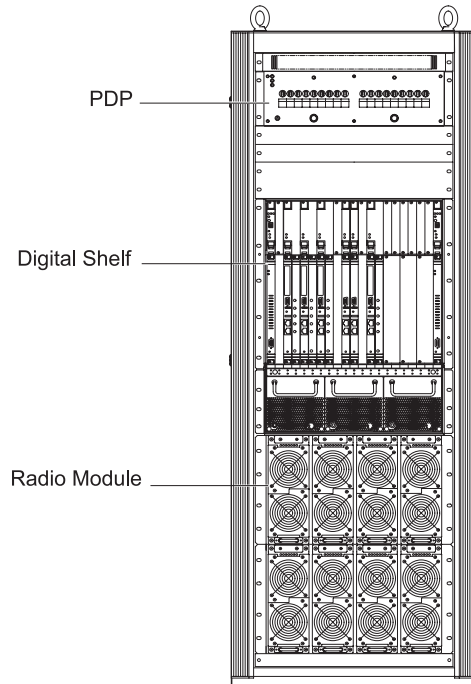
 shows the rack layout.

PDP

Digital Shelf

Radio Module

Figure 4.17 Rack Layout

Attach the Digital Shelf to the Rack

The digital shelf is installed in the middle bay in the rack.

▸ **To attach the digital shelf to the rack**

⚠ **WARNING:** Your base station may arrive with the digital shelf already populated with cards. If this is the case, ensure that you are properly grounded before handling the shelves. Failure to do so may damage the cards.

1   Remove the digital shelf from its protective bag.

> **NOTE:** The shelf weighs approximately 35 kg before it is filled with cards.

2   Slide the digital shelf into the middle bay in the rack. If the bay is too tight to accommodate the digital shelf, loosen the M5 screws that hold the units to be located on above/below the accommodation area. This should provide enough space for you to slide in the digital shelf. If any of the cable brackets interfere with the insertion of the digital shelf, remove them. The cable brackets attach to the rack using M5 screws.

Figure 4.18 shows the digital shelf and its mounting space in the rack.

Digital Shelf Mounted
(seen from the rear side)

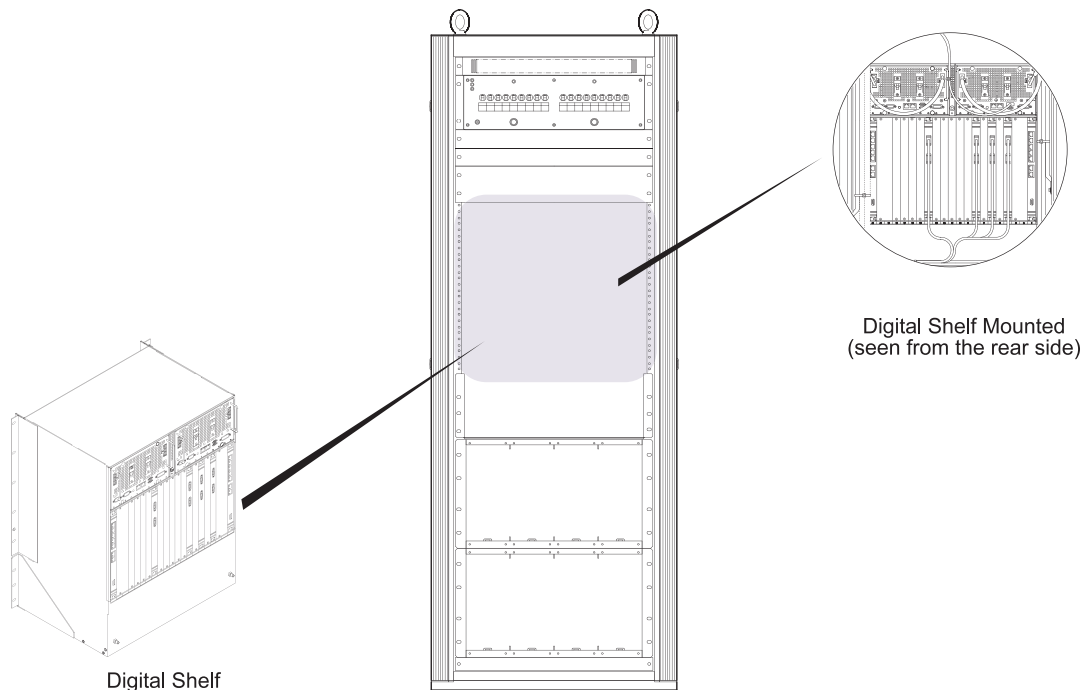Digital Shelf

Figure 4.18 Digital Shelf Mounting

3 Attach the digital shelf to the rack using ten M5 screws. Torque each screw to 3.0 N•m (26.6 inch-pounds).
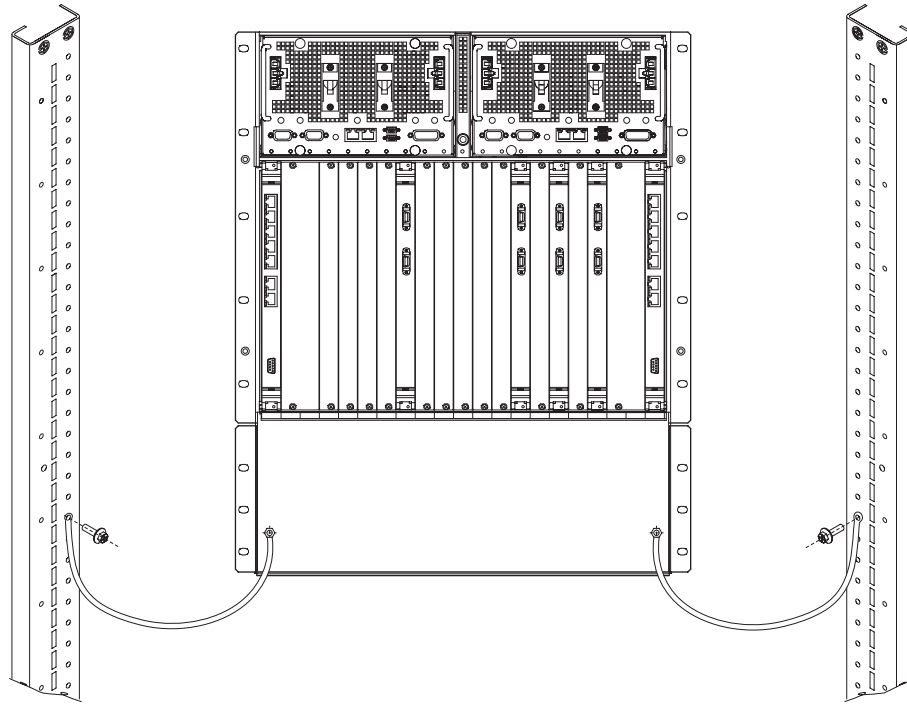

Figure 4.19 Mount Screws

4 Connect two frame ground cables to the rack and reattach any cable brackets you removed.

5 Retighten any M5 screws that hold the units to be located on above/below the accommodation area.

Attach the Radio Module to the Rack

Some slots for your base station's radio module may be covered with filler panels.

C A U T I O N : Each radio module weighs approximately 11kg.

▶ **To insert the radio modules in the rack**

1 Remove the radio module from its protective bag.

2 Orient the radio module properly.

3 Slide the radio module into the first available radio module slot. The slots should be filled from left to right, then top to bottom.

4 Ensure that the radio module is anchored into the guide shoe in the back of the radio module shelf.

Figure 4.20 shows how to anchor the radio module into the guide in the back of the radio module shelf.

Back of Radio Module Shelf

Radio Module Rear Side
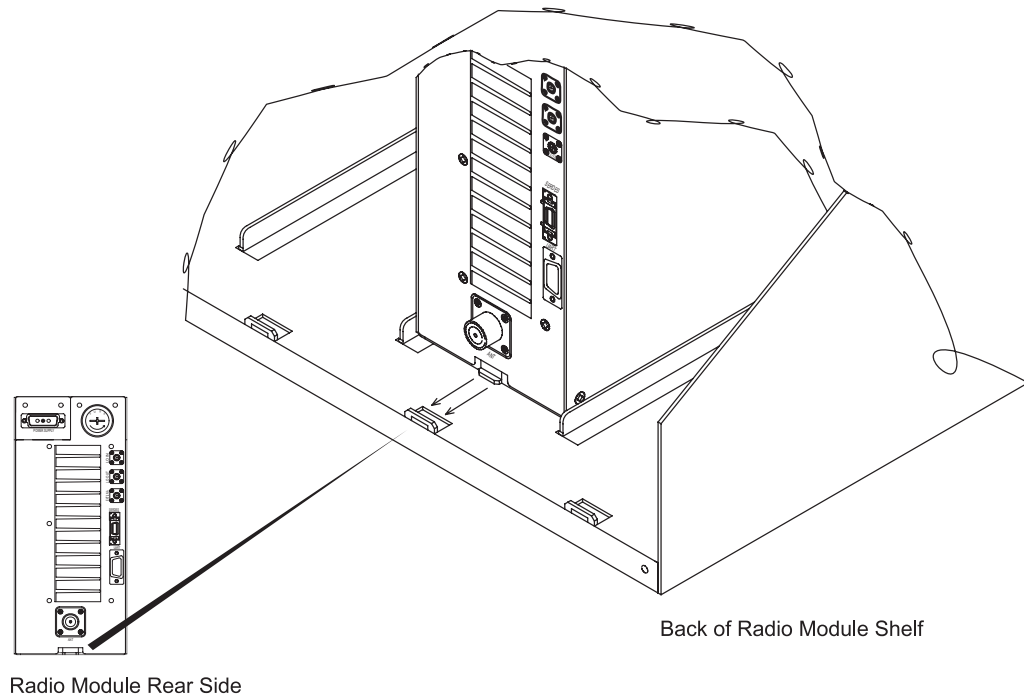
Figure 4.20 Back of the Radio Module Shelf

5 Secure the module in the slot using four thumb screws, one in each corner. Torque the thumb screws to 1.5 N•m (13.3 inch-pounds).

6 Ensure that the radio module is secure by grasping the handle on the front panel and pulling lightly. The radio module should not move. If the radio module does move, ensure that the thumb screws are attached to the shelf assembly and that the module is seated correctly. If necessary, remove the module and repeat this procedure.

7 Repeat steps 1 to 6 for the remaining radio modules.

Cover Empty Radio Module Slots

Any empty slots in the radio module shelves should be covered with radio module filler panels. The radio module filler panels protect the other radio module from dust.

▶ **To cover unused slots with radio module filler panels**

    1   Remove the radio module filler panel from its protective bag.

    2   Orient the filler panel vertically.

    3   Secure the filler panel over the radio module slots using four thumb screws, one on each corner. Torque the screws to 1.5 N•m (13.3 inch-pounds).

    4   Ensure that the filler panel is secure by grasping the thumb screw on the front panel and pulling lightly. The filler panel should not move. If the filler panel does move, ensure that the mounting screws are attached to the radio module shelf assembly. If necessary, remove the filler panel and repeat this procedure.

POPULATING THE DIGITAL SHELF

These procedures describe how to install the CompactPCI power supplies and cards into the digital shelf. Table 4.5 lists the actions described in this section.

Action	Page
Insert CompactPCI Power Supplies	67
Test CompactPCI Power Supplies	68
Insert the Digital Shelf Cards	70
Cover Unused Card Slots	72

Table 4.5   Populating the Shelves Procedure Summary

> **N O T E :** Your base station may arrive with the shelves already populated. If this is the case, ensure that the cards are properly secured in the shelf and proceed to the next section. Depending on the configuration of your base station, the exact number, layout, model, and faceplates of the cards may vary.

W A R N I N G : Failure to insert a card in the correct slot may result in damage to or destruction of the card or shelf. Ensure that all the cards are in the correct slots before powering on the shelf.

Shelf Layout

Digital Shelf Layout

Table 4.6 and Figure 4.21 show the layout of the front-facing cards on the digital shelf.

Slot	Front-Facing Card		Slot	From-Facing Card	
	Upper (3U)	Lower (6U)		Upper (3U)	Lower (6U)
1	FlexManager	Ethernet Switch 1	11	Flex Power	MC2 (incl. HDD)
2			12		
3	Flex Power	Sector1-SC	13	Flex Power	Sector4-SC
4	FlexPower	Sector1-MDM	14	Flex Power	Sector4-MDM
5	Flex Power	Sector2-SC	15		
6	Flex Power	Sector2-MDM	16		
7	Flex Power	Sector3-SC	17		
8	Flex Power	Sector3-MDM	18		
9			19-20		
10	FlexPower	MC1 (incl. HDD)	21	FlexManager	Ethernet Switch2

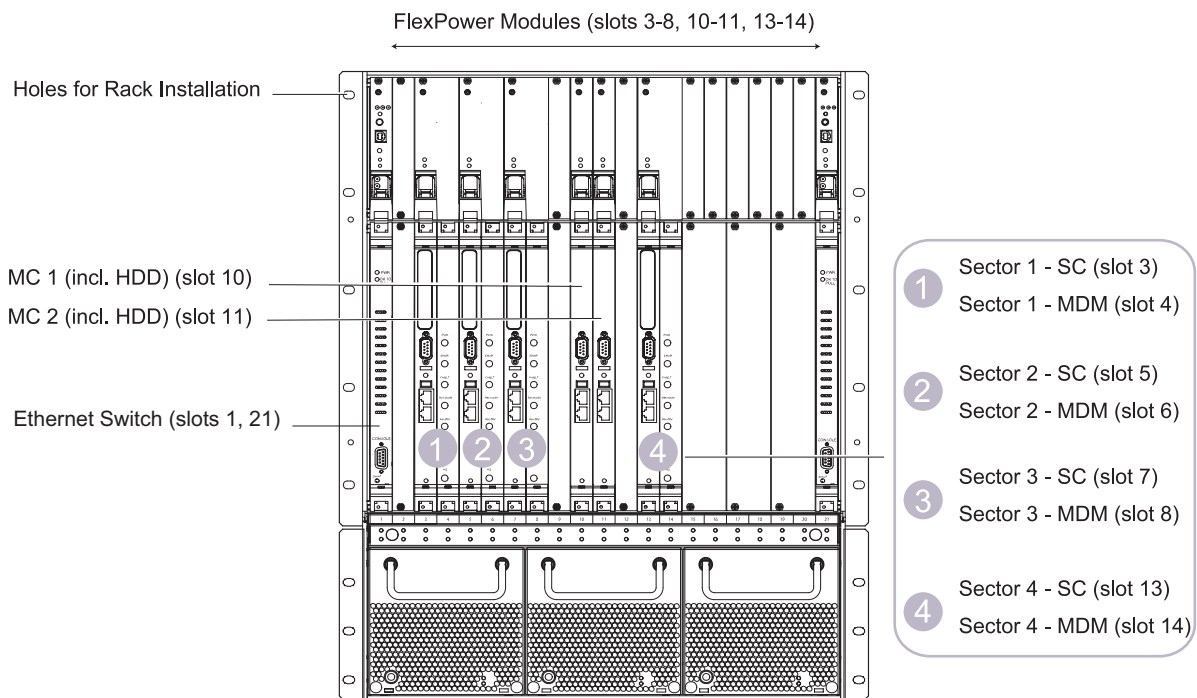**Table 4.6** Digital Shelf Layout (Front-Facing Cards)

Figure 4.21 Digital Shelf Layout (Front View)

Table 4.7 and Figure 4.22 show the layout of the rear-facing cards on the digital shelf.

Slot	Rear-Facing Card	Slot	Rear-Facing Card
1	Switch RTM	11	
2		12	
3		13	
4	MDM RTM	14	MDM RTM
5		15	
6	MDM RTM	16	
7		17	
8	MDM RTM	18	
9		19-20	
10		21	Switch RTM

Table 4.7 Digital Shelf Layout (Rear-Facing Cards)

FlexAlarm Modules

Switch RTM (Slot 21)

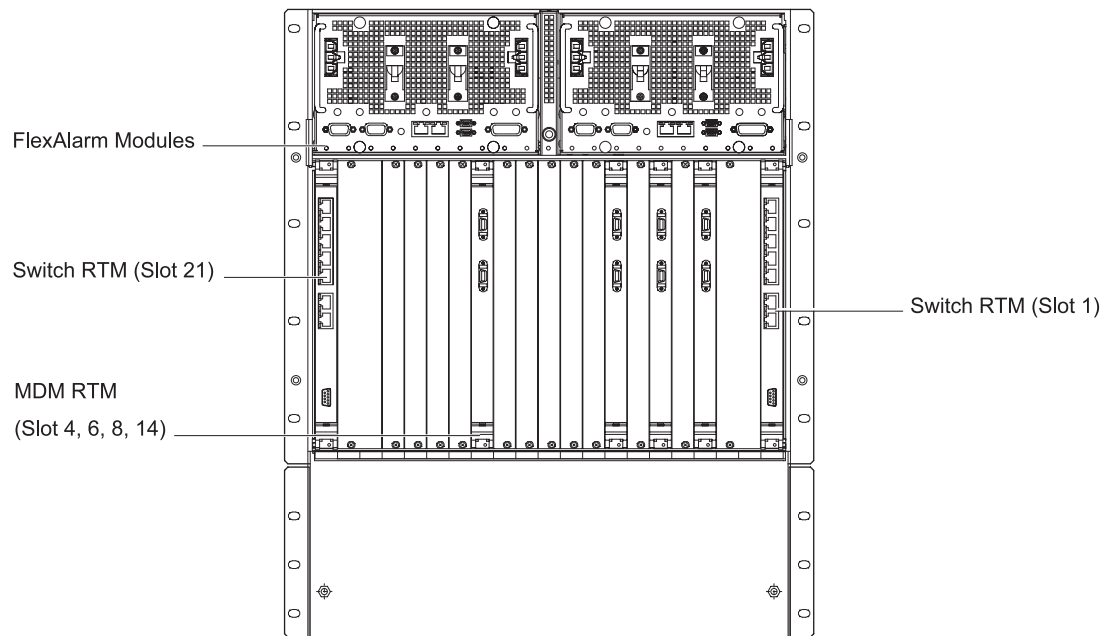Switch RTM (Slot 1)

MDM RTM
(Slot 4, 6, 8, 14)

Figure 4.22 Digital Shelf Layout (Rear View)

Insert CompactPCI Power Supplies

There are two FlexAlarm modules and two grounding studs on the rear side of the digital shelf, as shown in Figure 4.22. The FlexAlarm modules are where the power input connectors and circuit breakers are located.

W A R N I N G : The power supplies use components that are sensitive to electro-static discharges (ESD). Make sure you are wearing an approved and regularly tested grounded wrist strap connected to the grounding point on the PDP. When you handle the power supplies, hold them by their handles or edges. Do not touch electrical connections, pins, or soldered surfaces.

The module cards are installed into the digital shelf in a standard way that should be familiar to all service technicians. The cards can be installed into slots 2 through 20. (Slots 1 and 21 are reserved for the factory-installed network switches.)

▷ **To insert CompactPCI power supplies**

1   Push the ejector latch handles toward each other (at the same time) while applying forward pressure to secure the module to the system chassis. See Figure 4.23.

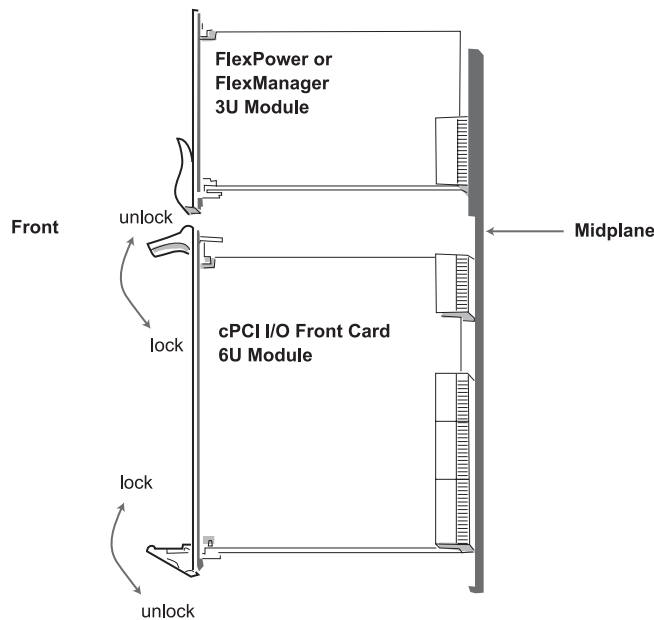2   Secure the captive screws on each ejector latch handle.

Figure 4.23 3U and 6U Modules

Test CompactPCI Power Supplies

This procedure describes how to test the digital shelf and the power supplies for it to check the electrical faults. Testing the power supplies and the shelf before inserting the cards ensures that, in the unlikely event that an electrical fault does occur, no cards will be damaged.

▸ **To test CompactPCI power supplies**

1   Verify that all four circuit breakers are in the OFF (down) position before turning on the power.

2   Turn on the CBA7, CBA8, CBB7, and CBB8 on the PDP.

The PWR GOOD LED near each power connector should illuminate. This indicates that the power source is providing voltage on that feed. If one of these LEDs is not illuminated, check the cabling and the power source for that feed.

Power Supply	Circuit Breaker
FlexAlarm A (1-10)	PDP, CBA7
FlexAlarm A (11-21)	PDP, CBA8
FlexAlarm B (1-10)	PDP, CBB7
FlexAlarm B (11-21)	PDP, CBB8

Table 4.8   Digital Shelf Power Supply Circuit Breaker Summary

Switch all four circuit breakers to the ON position. It is suggested that you switch on both circuit breakers on one FlexAlarm unit, and then switch on both circuit breakers on the other FlexAlarm unit.

The FlexCool fan units will begin cooling the chassis and the FlexManager cards will boot automatically.

C A U T I O N : After powering up the system, check the fan status LEDs to make sure that the ventilating fans are operational.
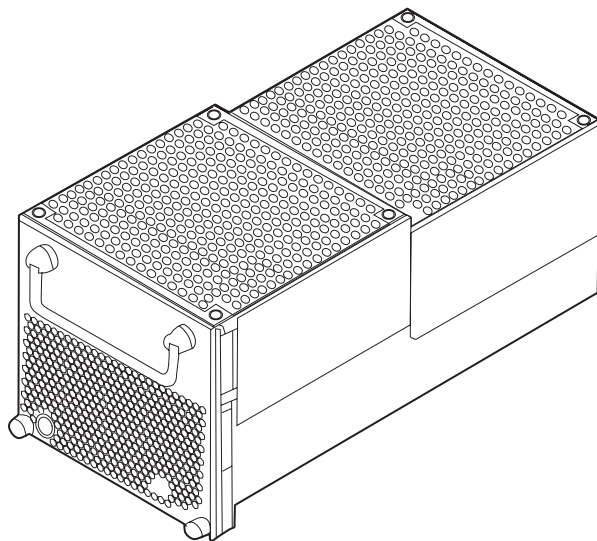
Figure 4.24 shows a FlexCool Module.

Figure 4.24 FlexCool Module

3   Power off all the power supplies in the digital shelf.

4   Power off your main –48V DC power supply.

Insert the Digital Shelf Cards

See Figure 4.21 for the location of each card. If the configuration of your base station does not use a full complement of cards, some slots will be left empty.

⚠️ The cards use components that are sensitive to electrostatic discharges (ESD). Make sure you are wearing an approved and regularly tested grounded wrist strap connected to the grounding point on the PDP. When you handle the cards, hold them by their handles or edges. Do not touch electrical connections, pins, or soldered surfaces.

The pins on the backplane are easily damaged. When inserting cards (especially the hard disk drives), ensure that the connectors are properly aligned before applying sufficient pressure to seat the card. Apply equal

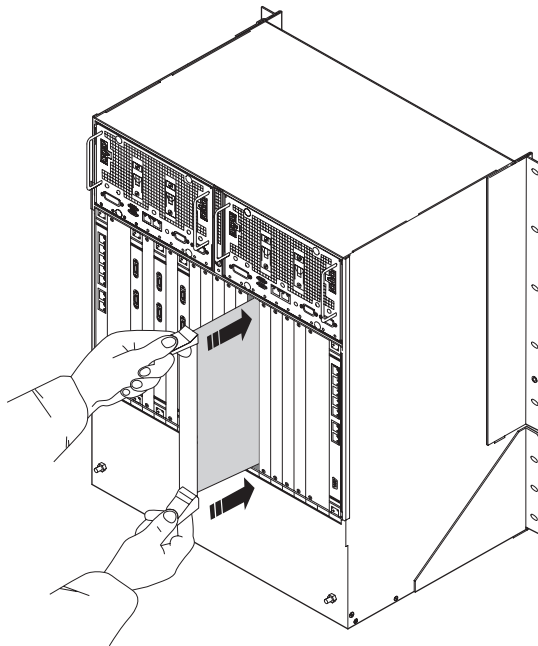Figure 4.25 shows how to properly insert a card into a shelf.

Figure 4.25 Card Insertion

▸ **To insert the cards into the digital shelf**

    1   Ensure that there are no obstructions in the slot or on the guide rails and check the backplane for bent pins.

        If there are bent pins, the backplane is damaged and requires repair. Report any damaged equipment to your field support coordinator as soon as possible.

    2   Remove the card from its antistatic bag.

    3   Set the two ejectors handles on the card in the open position by turning the handles away from the center of the front panel.

        In the open position, the ejector handles are at an approximately 45° angle from the front panel.

4   Ensure that the mounting screws are withdrawn enough to allow for the insertion of the card.

Single-slot cards have two mounting screws, one located under each ejector handle.

5   Orient the card so that the text on the front panel is right-side up. The guide pins should be located to the right of the ejector handles.

6   Slide the card into the correct slot. Slot locations are shown on Figure 4.21. Use the guide rails to ensure the connectors are aligned.

7   Apply sufficient pressure to fully mate the card by pressing on both ejector handles with equal force. If present on the card, the guide pins should slide into the round holes located at the top and the bottom of each slot on the right-hand side.

8   Lock the card in the slot by turning the ejector handles towards the center of the front panel.

In the lock position, the ejector handles are at a 90° angle from the front panel.

9   Secure the card in the slot by installing the 2.5-mm mounting screws. Torque each screw to 0.36 N•m (3.2 inch-pounds).

10   Repeat steps 1 to 9 for the remaining cards.

Cover Unused Card Slots

Any empty slots in the digital shelf should be covered with filler panels. The filler panels ensure airflow to the other cards and protect the cards from dust and electromagnetic interference.

▶ **To cover the unused slots with filler panels**

1. Remove the filler panel from its protective bag.

2. Single-slot filler panels have two mounting screws. Secure the filler panel in the slot by installing the 2.5-mm (0.1 inch) mounting screws. Torque each screw to 0.36 N•m (3.2 inch-pounds).

3. If the filler panel does move, ensure that the mounting screws are attached to the shelf frame. If necessary, remove the panel and repeat this procedure.

4. Repeat steps 1 to 3 until all the empty slots are covered with filler panels.

CONNECTING THE CABLES

This section describes the cables connecting the different systems in the base station. Table 4.8 shows the actions described in this section.

Action	Page
Connect the PDP Power Cables	74
Connect the MDM Signal Cables	77
Connect the Ethernet Cables (where applicable)	79

Table 4.9   Connecting the Cables Procedure Summary

> **N O T E :** The cables are packaged according to their type. Each cable package is labeled with a part number. Use this part number to identify each cable, and refer to the tables provided in this section for its intended origin and termination point.

Connect the PDP Power Cables

The PDP power cables are attached to the PDP at the factory. The power cables are already tied to the rack.

The PDP power cables consist of #10 or #12 AWG wire with compression lugs on each end. The compression lugs are secured to the terminals with 1/8-inch screws.

Component Numbering

When viewed from the back of the base station, the terminals for the PDP circuit breakers are labeled from upper to the lower on the left side of the terminals. That is, "RM 1M" (upper of –48V terminals on the right side), "RM 2M" (upper of –48V terminals on the left side), "RT A" (lowest of –48V terminals on the right side), and "RT B" (lowest of –48V terminals on the left side).

When viewed from the back of the base station, the digital shelf has four power supply connectors. Two are in the FlexAlarm Module A and other two are in the FlexAlarm Module B. The power supply connector in the right is described as –48V 1-10 and another one in the left is described as –48V 11-21. Each FlexAlarm Module A and B is mounted on the top of the digital shelf.

When viewed from the front of the base station, the radio module in the shelf are numbered from left to right and bottom to top that is, RM1-M, RM1-D, RM2-M, RM2-D, RM3-M, RM3-D, RM4-M, and RM4-D.

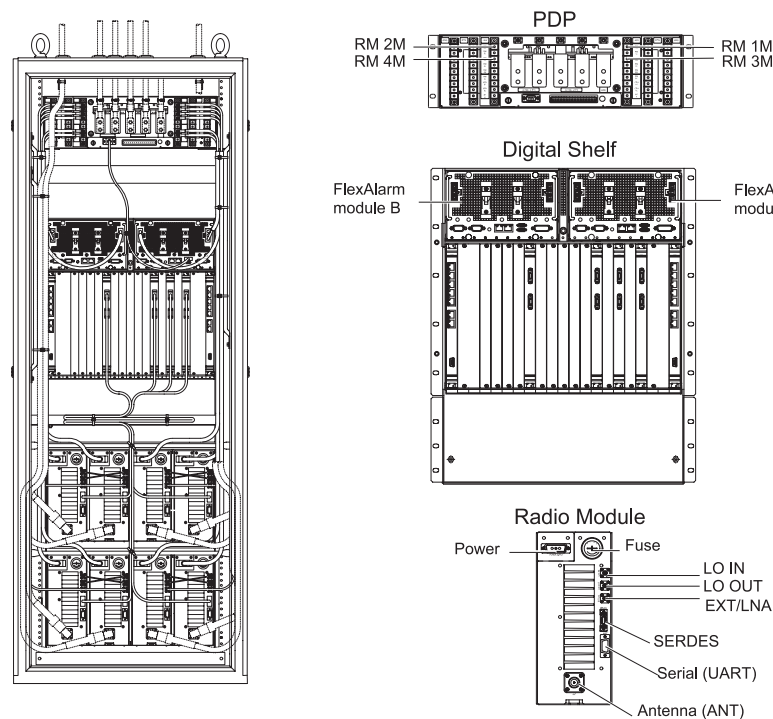Figure 4.26 shows the location of the power connectors on the rack.

Figure 4.26 Rack Connector Layout

▶ **To connect the PDP power cables**

1   Ensure that PDP circuit breaker in the rack is in the OFF (down) position.

2   Connect each PDP power cable in the rack. The power connectors are all in the back of the rack. Table 4.10 shows the origin and termination point of each cable.

Origin	Termination	Origin	Termination
RM 1M (CBA1)	Radio Module Shelf, RM 1-M		
RM 1D (CBB1)	Radio Module Shelf, RM 1-D		
RM 2M (CBA2)	Radio Module Shelf, RM 2-M		
RM 2D (CBB2)	Radio Module Shelf, RM 2-D		
RM 3M (CBA3)	Radio Module Shelf, RM 3-M	CPCI A1 (CBA7)	Digital Shelf FlexAlarm A 1-10
RM 3D (CBB3)	Radio Module Shelf, RM 3-D	CPCI A2 (CBA8)	Digital Shelf FlexAlarm A 11-21
RM 4M (CBA4)	Radio Module Shelf, RM 4-M	CPCI B1 (CBB7)	Digital Shelf FlexAlarm B 1-10
RM 4D (CBB4)	Radio Module Shelf, RM 4-D	CPCI B2 (CBB8)	Digital Shelf FlexAlarm B 11-21

Table 4.10 Rack Power Cable Summary

Figure 4.27 shows the PDP power connectors on the rack.

PDP Power Cables

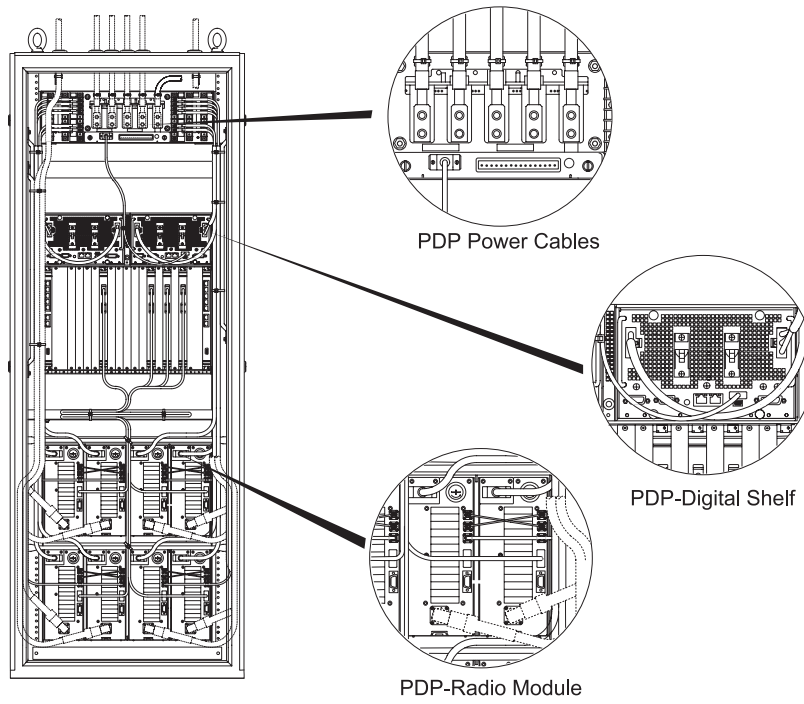PDP-Digital Shelf

PDP-Radio Module

Figure 4.27 PDP Power Cable Connection

Connect the MDM Signal Cables

The signal cables are LVDS cables with 14-pin MDR (Miniature Delta Ribbon) connectors on each end. The connectors are secured to their receptacles with latches.

To keep the power cables and the antenna cables from being interfered, ensure that the MDM signal cable runs through the middle of the rack's rear side.

Component Numbering

When viewed from the front of the base station, the radio modules in the bottom shelf are numbered from left to right and top to bottom, that is, RM1-M, RM1-D, RM2-M, RM2-D, RM3-M, RM3-D, RM4-M, and RM4-D.

The digital shelf contains a MDM RTM card in slot 4.

▸ **To connect the MDM signal cables**

1   Connect each MDM signal cable. Table 4.11 shows the origin and termination point of each cable.

Origin	Termination
Radio Module Shelf 1 Radio Module 1-M SERDES connector	Digital Shelf MDM RTM card (slot4) MAIN connector
Radio Module Shelf 1 Radio module 1-D SERDES connector	Digital Shelf MDM RTM card (slot 4) DIV connector
Radio Module Shelf 1 Radio Module 2-M SERDES connector	Digital Shelf MDM RTM card (slot 6) MAIN connector
Radio Module Shelf 1 Radio Module 2-D SERDES connector	Digital Shelf MDM RTM card (slot 6) DIV connector
Radio Module Shelf 2 Radio Module 3-M SERDES connector	Digital Shelf MDM RTM card (slot 8) MAIN connector
Radio Module Shelf 2 Radio Module 3-D SERDES connector	Digital Shelf MDM RTM card (slot 8) DIV connector
Radio Module Shelf 2 Radio Module 4-M SERDES connector	Digital Shelf MDM RTM card (slot 14) MAIN connector
Radio Module Shelf 2 Radio Module 4-D SERDES connector	Digital Shelf MDM RTM card (slot 14) DIV connector

Table 4.11   Radio Module - MDM Signal Cable Summary

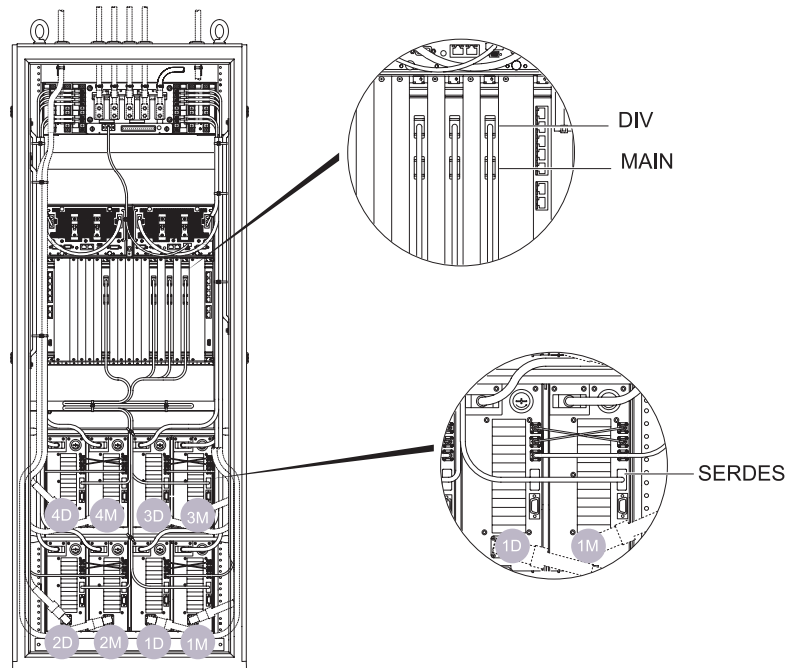Figure 4.28 shows the MDM signal cable connectors on the rack.

Figure 4.28 MDM Signal Cables Connection

Connect the Ethernet Cables (where applicable)

The Ethernet cables are CAT5 cables with RJ-45 connectors on each end. The cable is the straight-through cable, and each Ethernet switch is connected to each edge router with the straight-through cables. Connect each edge router to two among "22", "23", and "24", all of which are mounted on the digital shelf.

Table 4.12 shows the Ethernet cabling for the base station.

Origin	Termination
Edge Router 0	Switch RTM (Slot 1) one of "22", "23", "24"
Edge Router 0	Switch RTM (Slot 21) one of "22", "23", "24"
Edge Router 1	Switch RTM (Slot 1) one of "22", "23", "24"
Edge Router 1	Switch RTM (Slot 21) one of "22", "23, "24"

Table 4.12   Ethernet Cable Summary   Edge Router 1: Redundant Router

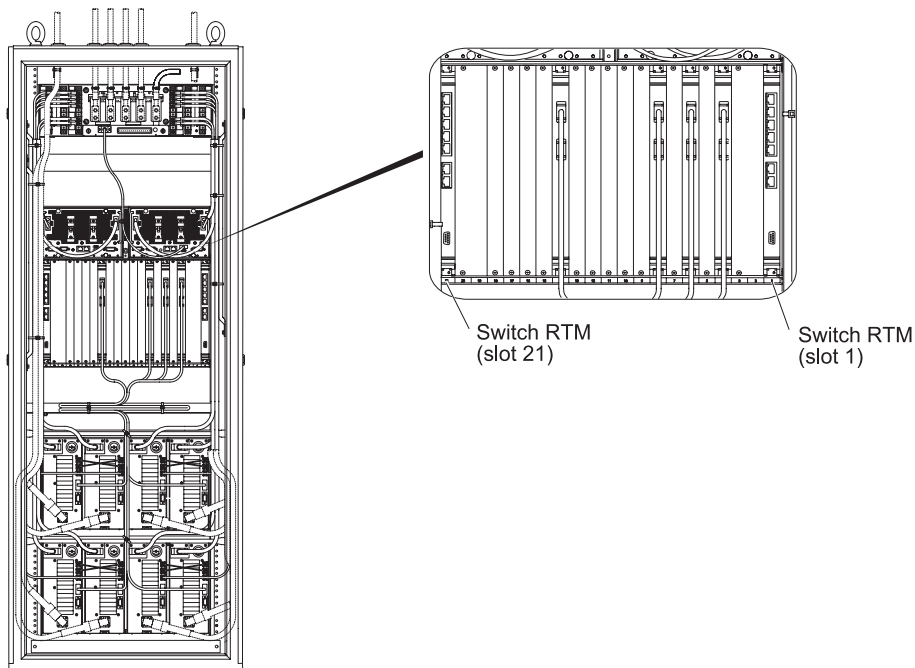Figure 4.29 shows the Ethernet cable connectors on the rack.

Switch RTM
(slot 21)

Switch RTM
(slot 1)

Figure 4.29   Ethernet Cables Connection

▸ **To connect the Ethernet cables**

1   Connect the Ethernet cables to the Ethernet switches. Table 4.12 shows the origin and termination point of each cable.

Connect the Edge router 0 to any among "22", "23", and "24" for both slot 1 and slot 21 of the Switch RTM.

Connect the PDP Monitor Cable

The PDP monitor cable is shielded twisted pair cable with 9-pin Micro D subminiature connector and 9-pin standard D subminiature connector. The connectors are secured to their receptacles with screws.

To keep the power cables and the antenna cables from being interfered, ensure that the PDP monitor cable runs through the middle of the rack's rear side.

Connect the Micro D9 connector to the Digital Shelf and the standard D9 connector to the PDP Alarm Board.

Table 4.13 shows the PDP monitor cabling for the base station.

Origin	Termination
PDP Alarm Board PDP Monitor	Digital Shelf FlexAlarm A - ALARM PANEL 2

Table 4.13 PDP Monitor Cable Summary

Figure 4.30 shows the PDP monitor cable connectors on the rack.
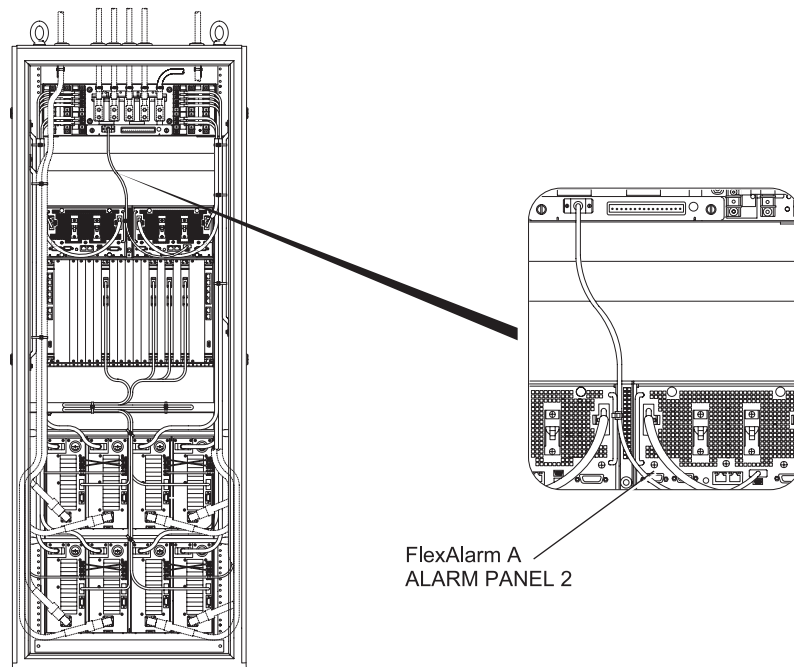

FlexAlarm A
ALARM PANEL 2

Figure 4.30 PDP Monitor Cable Connection

▶ To connect the PDP monitor cable

1   Connect the PDP monitor cable between the PDP and the Digital Shelf.
    Table 4.13 shows the origin and termination point of each cable.

Connect the LO Crossover Cables

The LO crossover cable is coaxial cable with SMA connectors. The connectors are secured to their receptacles with screw coupler.

This cable is connected between RM-1M and RM-1D, RM-2M and RM2-D, RM-3M and RM-3D, RM-4M and RM-4D.

Table 4.14 shows the LO crossover cabling for the base station.

Origin	Termination	Origin	Termination
RM-1M LO IN	RM-ID LO OUT	RM-3M LO IN	RM-3D LO OUT
RM-1M LO OUT	RM-1D LO IN	RM-3M LO OUT	RM-3D LO IN
RM-2M LO IN	RM-2D LO OUT	RM-4M LO IN	RM-4D LO OUT
RM-2M LO OUT	RM-2D LO IN	RM-4M LO OUT	RM-4D LO IN

Table 4.14 Lo Cable Summary

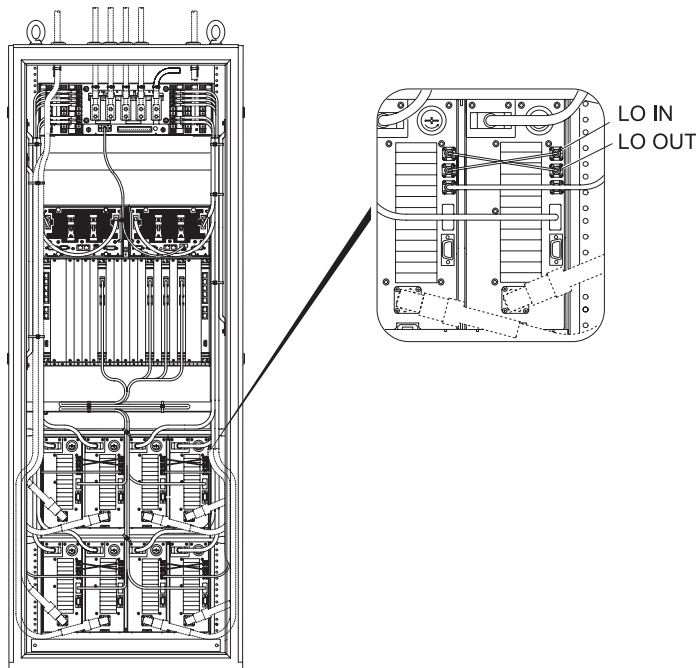Figure 4.31 shows the LO connectors on the rack.

Figure 4.31 LO Cable Connection

▸ **To connect the Lo cables**

1   Connect the LO crossover cables between the PDP and the Digital Shelf.
    Table 4.14 shows the origin and termination point of each cable.