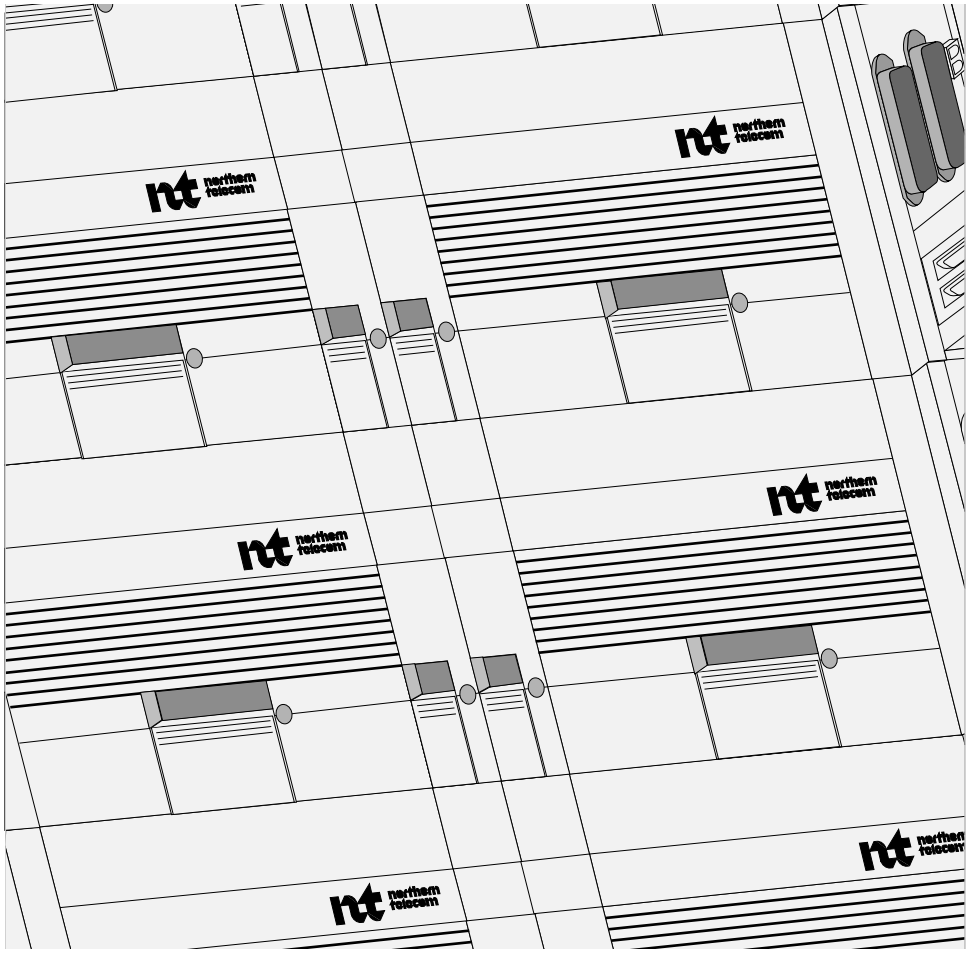
323-3001-211

SONET Products

AccessNode

Modular Cabinet Installation Guide

Issue 2.0 June 1999



NORTEL NETWORKS™

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Modular Cabinet Installation Guide

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AN17 Standard Issue 2.0 of the document. Updated to include CDS and MTA cable layout information.

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Release-Independent Standard Issue 1.0 of the document.

Note: With the February 1999 release, references to the software release number (such as AN15 or AN16) have been deleted, making this document release-independent. This document will be rereleased only when technical changes occur.

September 1997

Standard 01.01 release of the document.

Contents

About this document

This document covers installing the Nortel Networks modular cabinet (ModCab).

Audience

This document is intended for the following groups:

- strategic and current planners
- provisioners
- transmission engineers
- network administrators
- installers
- outside plant personnel

How to use this document

Use this document to install a complete ModCab. Installation information is written in step-by-step procedures.

Contents of this document

This document describes how to install a ModCab. Installation procedures include

- installing the pad and mounting the ModCab
- installing AccessNode equipment and modules
- installing additional equipment
- wiring, routing, and terminating cables (internal and external)

Some of the topics in this manual are covered in greater detail in other parts of the AccessNode documentation set or in additional documents. If so, this document references the appropriate document.

References in this document

This document refers to the following documents:

Description, Volume 1

- *Engineering and Ordering Information*, 323-3001-032

Description, Volume 2A

- *Configuration and Equipment Description*, 323-3001-100
- *Signal Flow and Circuit Pack Description*, 323-3001-102

Commissioning and Testing, Volume 3

Operations, Administration, & Provisioning, Volume 4A

- *System Administration Procedures*, 323-3001-302

Other documentation

- *MPR-25/MPR-15 Series Single Phase -48V 25A Switched Mode Rectifier (M5C06) Equipment Installation and Maintenance Manual*, 169-2071-500
- *Series 800A Outside Plant Cabinet Description*, 323-3001-118
- *Modular Cabinet Description*, 323-3001-119

Abbreviations for the colors of conductor insulation in cables

This document uses a uniform system of abbreviations to represent the cable conductor insulation. Each abbreviation includes the following:

<pair_color> <group_marker_type> <group_marker_color>

Item	Abbreviation		
<pair_color>	This is the background color of the conductor insulation that indicates the pair color.		
	BL	blue	(pair 1 of the binder group)
	O	orange	(pair 2 of the binder group)
	G	green	(pair 3 of the binder group)
	BR	brown	(pair 4 of the binder group)
	S	slate	(pair 5 of the binder group)
<group_marker_type>	This type of group marker is used on the conductor insulation.		
	1	single dots spaced about 18 mm (3/4 in.) apart	
	2	two dots spaced about 3 mm (1/8 in.) apart with about 18 mm (3/4 in.) between each pair of dots	
	3	dashes about 3 mm (1/8 in.) long spaced about 18 mm (3/4 in.) apart	
	none	one colored stripe on conductor jacket	
<group_marker_color>	This is the color of the dot, dots, or the stripe used as the group marker on the conductor insulation.		
	W	white	(binder group 1)
	R	red	(binder group 2)
	BK	black	(binder group 3)
	Y	yellow	(binder group 4)
	V	violet	(binder group 5)

For example, the abbreviation BL 2W (representing Pair 1 of the second 25-pair binder) means that the conductor has a blue insulation background with two white dots spaced 18 mm (3/4 in.) apart. The abbreviation BL W (representing Pair 1 of the first 25-pair binder) means that the conductor has a blue insulation background with a single white stripe.

Planning the installation

This chapter describes planning the modular cabinet (ModCab) installation. It also lists safety warnings and cautions for handling the ModCab and AccessNode equipment.

Read all warnings and cautions before beginning any procedure. Failure to follow these warnings and cautions can cause personal injury and equipment damage.

Chapter contents

This chapter contains the following topics:

Before you begin

Read the “About this document” chapter. This chapter contains general information that applies to the entire document.

ModCab description

The ModCab is a set of outdoor cabinet modules that extends AccessNode services to remote locations. The ModCab system has integrated voice frequency (VF) access and fiber transport services. An optional T1 repeater shelf and DSX module can be added for use as a T1 hub.

The ModCab system is environmentally controlled. All cabinet modules comply with UL/CSA safety specifications, NEC electrical specifications, Bellcore specifications, and FCC emissions regulations.

Configuration

The ModCab consists of modules that can be bolted together in either a back-to-back or a side-by-side configuration. Figure 1-1 on page 1-3 shows the ModCab back-to-back configuration and Figure 1-2 on page 1-4 shows the ModCab side-by-side configuration.

Either configuration can consist of the following cabinet modules:

- NT3W01 dc power module (DCP)
- NT3W02 copper distribution module (CDM)
- NT3W03 common equipment module (CEM)
- NT3W04 large termination module (LTM)
- NT3W05 optional equipment module (OEM)

Figure 1-1
ModCab back-to-back configuration

PC-16100

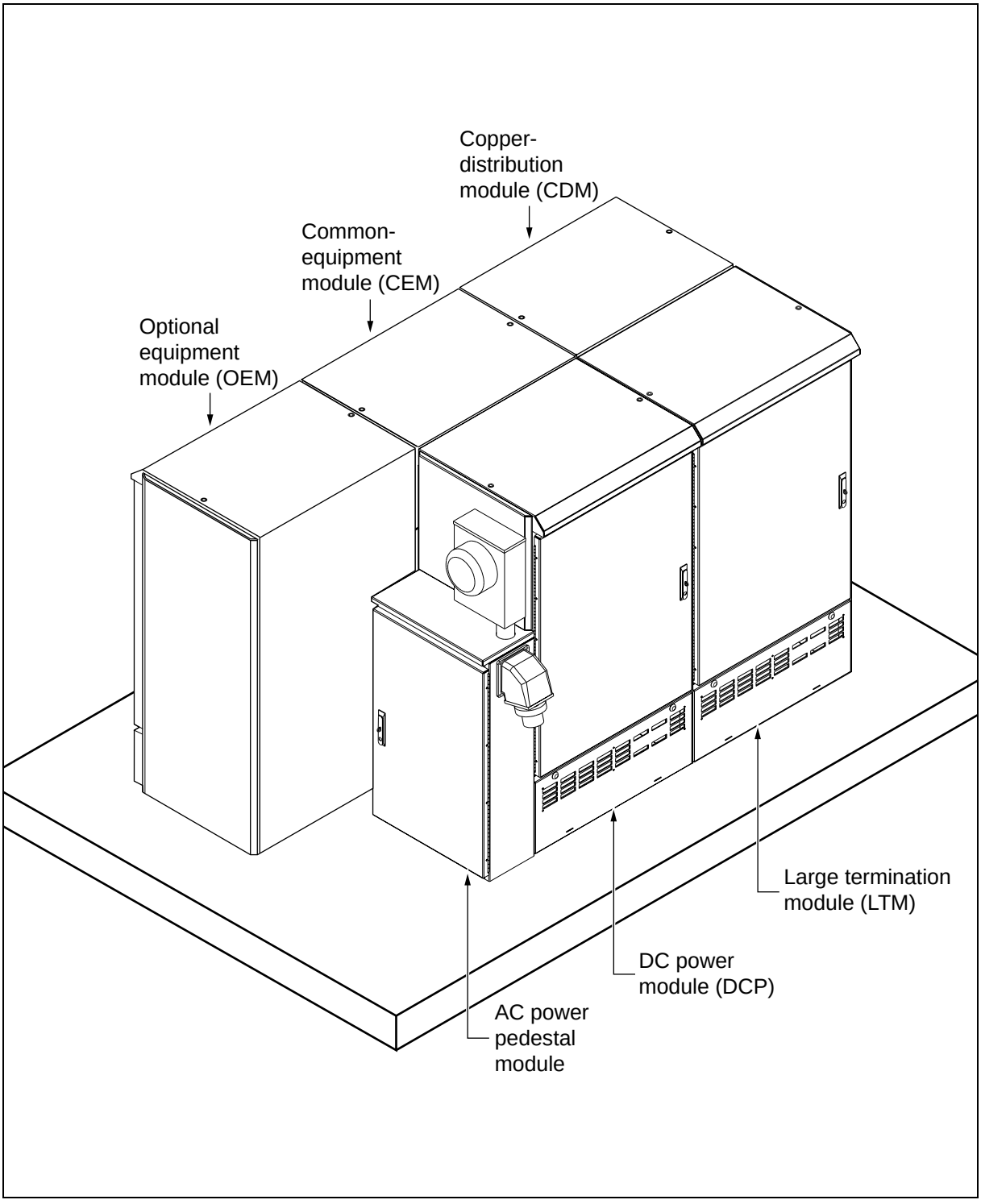

Figure 1-2
ModCab side-by-side configuration

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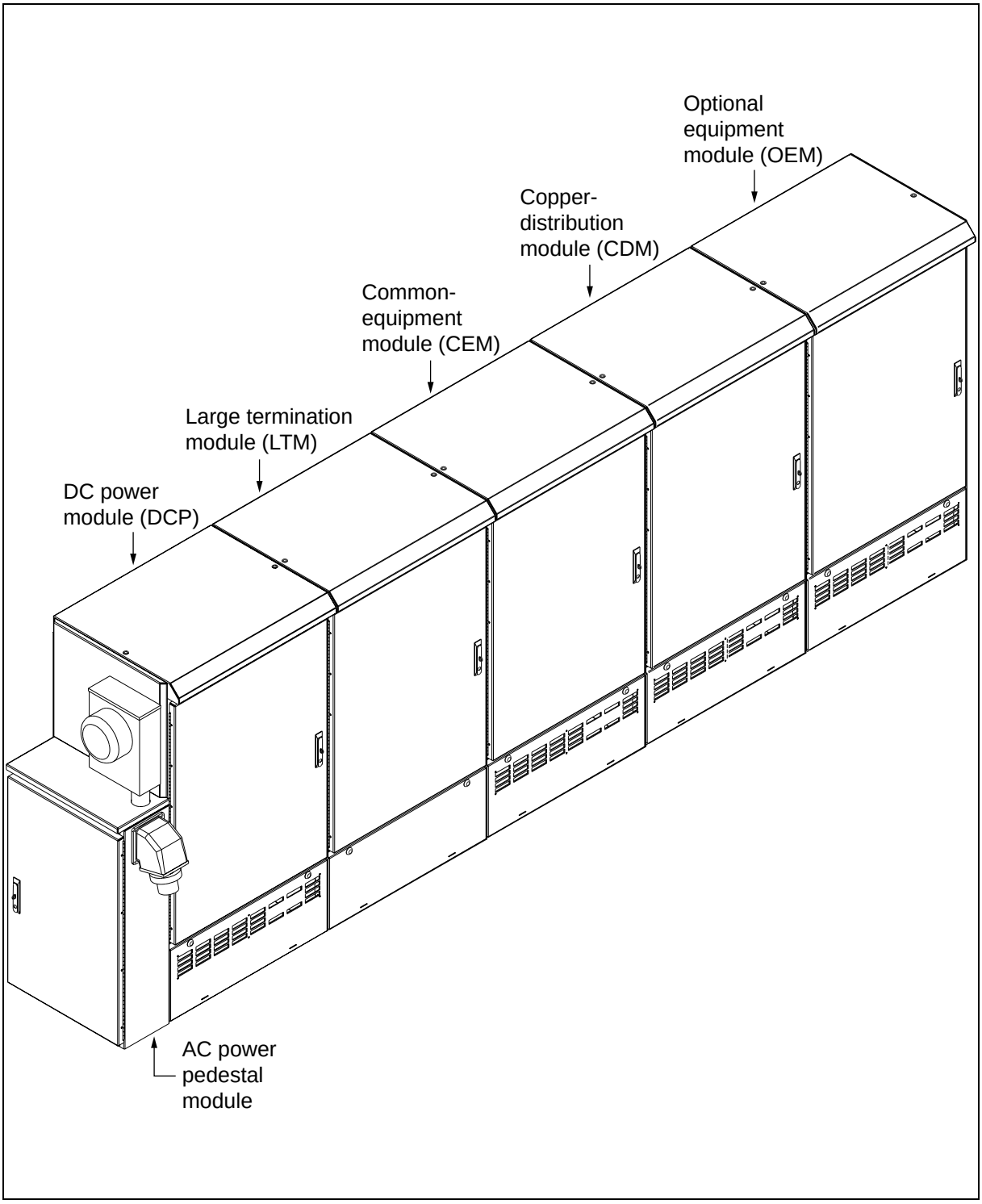

Site considerations

The operating company is responsible for selecting the remote site and complying with local site regulations, such as the applicable electrical codes, right-of-way easements, and noise requirements.

Nortel Networks recommends mounting the ModCab on a concrete pad. When selecting the ModCab remote site, consider the following items:

- The mounting pad location should be above local flood plains to minimize the possibility of damage from flooding.
- Soil conditions must be able to support the weight of the cabinets and concrete mounting pad (reference local building codes).
- Commercial power service must be available for the ac power input to the ModCab.
- The remote site must have sufficient working area around the cabinets and mounting pad.

Anchor plates

Anchor plate assemblies are available for mounting in the wooden form for the mounting pad. The anchor plate assemblies provide cable conduits for the cabinets that require external cable entry. Cable conduits are placed in the anchor plate assemblies before the concrete is poured.

Each anchor plate kit includes an 11-gauge galvanized anchoring template assembly with anchor bolts and temporary support angles.

Mounting pad preparation

For excavated mounting pads, a 305 mm (12-in.) minimum depth is recommended (or as specified by local codes). More stringent rules, regulations, and legal codes may govern excavations in areas with heavy frost.

Floating mounting pads are suitable under the following conditions:

- The location is free of heaving due to frost.
- The mounting pad is reinforced with steel rods or mesh to prevent cracking and subsequent loss of the anchor bolts.

  Note: The operating company is responsible for the final design, based on specific local code requirements.

Cement

Nortel Networks recommends that Portland cement meet the following specifications:

- Type I or III conforming to ASTM specs for Portland cement
- C150 or Type IA of IIIA conforming to the ASTM specifications for air-entraining Portland cement

  Note: If C175 air-entrained admixtures are used, they must conform to ASTM C-268.

Aggregates

Aggregates must conform to the ASTM specifications for concrete aggregates, C33. Coarse aggregates must be graded from 1.09 cm (3/4 in.) to No. 4.

Lightweight aggregates are not permitted.

Water

Water must be free from harmful amounts of impurities. Clean water must be used to meet the specific requirements.

Concrete

All concrete must conform to ASTM specifications for concrete, including the following:

- The slump of the concrete must be 5.08-10.16 cm (2-4 in.), inclusive, determined in accordance with ASTM C143, which tests the slump of Portland cement concrete.
- The minimum acceptable compressive strength for the concrete is 4000 PSI, determined in accordance with ASTM C39, which tests the compressive strength of concrete cylinders.
- The ASTM C143 and ASTM C39 tests must be performed 20 days after you pour the pad for concrete made with Type I or IA Portland cement.
- The applicable ASTM tests must be performed seven days after you pour the pad for concrete made with Type III or IIIA Portland cement.
- Water must not be added to the concrete batch after test samples for slump and strength tests have been taken.
- The equipment, materials, and methods for concrete production must meet the quality requirements and conform to the applicable AC1318 requirements.

Lifting and placing the cabinets

Heavy lifting equipment is required to lift and place the ModCab on the concrete mounting pad. Four removable lifting eye bolts in the top of the ModCab support the load of a back-to-back configuration during installation.The side-by-side configuration is supported by two removable lifting eye bolts. After mounting the ModCab, you remove the lifting bolts and replace them with nylon plugs.

ModCab is shipped in the standard arrangements with the individual cabinets bolted together at the factory.

Standard arrangements include

- individual modules
- 2-module pods
- 4-module pods

Configuration weight

The ModCab consists of an ac pedestal, DCP, LTM, CDM, and a CEM. As shipped, the ModCab weighs approximately 1136.3 kg (2500 lb).

Precautions for crane operation

Always follow all local, state, and federal safety standards for crane operation, including the following guidelines:

- Barricade the lift area.
- Do not allow cars to be parked within 7.6 m (25 ft) of the lift radius.
- Require everyone in the barricaded area to wear a hard hat and steel-toed safety shoes.
- Do not physically assist the rigging crew. Only the crane rigging crew performs crane setup and rigging procedures.
- Align the hoist line over the center of gravity of the load.
- Do not exceed the lifting capacity of the crane.
- Verify that the crane is set up on firm footing.
- Extend the outriggers, block the floaters, and insert safety pins.
- Verify that the crane is “off rubber” during the lift.
- Verify that the crane is level before lifting to prevent tipping.
- Never stand or place any body part underneath the load.
- Use tag lines to maneuver the load.

AC power and ground

A qualified electrician should handle all ac power connections. Nortel Networks recommends the guidelines in this document. In addition, follow all local codes for wiring procedures.

The ModCab operates within specification with voltage range variations of 190 to 253 V ac and a frequency variation range of 55 to 65 Hz.

> ***Note:*** Voltage range variation is measured between Line 1 (L1) and Line 2 (L2) of the ac input leads.

The following configuration shows the ac power requirements for the ModCab:

- 208-240 V ac Voltage
- 100 A
- Three-wire, 1-phase
- 55-65 Hz

The ac ground rod or ring (electrode) must be installed to meet local and National Electric Code (NEC) code requirements. Ground-to-earth resistance must be less than or equal to 25 ¾.

Regulatory compliance

The ModCab meets or exceeds the following regulatory requirements as listed in Table 1-1.

Table 1-1
Regulatory compliance

Item	Requirement
Electrostatic Discharge (ESD)	Bellcore TR-NWT-001089, section 2 (System Level Electrostatic Discharge)
EMC emissions	FCC 47 CFR, Part 15,sub-part B Unintentional Radiators, Class A
Lightning/surge	Bellcore TR-EOP-000001 and TR-TSY-000057
Dielectric	UL 1459
Grounding	Grounding facilities are provided for cable sheath bonding per Nortel Networks Corporate Standard 4122, section 6. All metallic components of the cabinet are adequately grounded per UL 1459. Service receptacles are FGI protected per 1993 National Electric Code (NEC).
Supply voltage	Bellcore TR-TSY-000057 Bellcore TR-EOP-000001
Temperature	USIC Thermal Checklist, TR-NWT-000063, section 5.2 TR-TSY-000487, section 5.1.3.1
Thermal shock	Bellcore TR-TSY-000487, section 5.1.3.3
Condensation	The equipment is protected as necessary to prevent condensation or any deterioration due to humidity that would affect operation, performance, or reliability of the equipment after start-up.
Water intrusion	REA 345-79 PE-69, section 5.12
Ice and Snow Loading	The cabinet can support show or ice loading up to 295 kg/m^2 (60 lbs/sq ft).
Wind	Bellcore TR-TSY-000487, section 5.1.4.5 Door latch open mechanism withstands 144km/h (90 m.p.h.) winds.
Solar radiation	Bellcore TR-TSY-000487, section 5.1.3.9
Sand and dust	Bellcore TR-TSY-000487, section 5.1.4.7
—continued—	

Table 1-1 (continued)
Regulatory compliance

Item	Requirement
Transportation shock	Bellcore TR-TSY-000487, section 5.1.4.10
Drop tests	Bellcore TR-TSY-000487, section 5.1.4.10
Vibration	Bellcore TR-TSY-000487, section 5.1.4.11
Impact resistance	Bellcore TR-TSY-000487, section 5.1.4.3 ASTM D-2197, ASTM D2794
Earthquake	Bellcore TR-EOP-000063, section 4.5.2
Corrosion	Bellcore TR-TSY-000487, section 5.1.3.6
Acoustic noise	US Law 49 CFR Part 325, Bellcore TR-TSY-000487
Fungus	ASTM G-21, section 5.1.3.5
Ballistic shot	Bellcore TR-TSY-000487, section 5.1.4.4
Sunlight	Bellcore TR-TSY-000487, section 5.1.3.8
Outdoor equipment	Canadian Standards Association: CSA 22.2 No. 0-M1982 General requirements - Canadian Electrical Code, Part III CSA 22.2 No. 14-M1985 Industrial Control Equipment CSA 22.2 No. 94-1976 Special Purpose Enclosures 2, 3, 4 and 5 Underwriters Laboratories (UL): UL 94 Test for Flammability of Plastic Materials UL 1459 Telephone Equipment UL 508 Cabinets and Boxes
Polymeric materials	ASTM D-2863
—end—	

Radio frequency emissions notice

The following regulatory notice applies to AccessNode and ModCab equipment:

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

Warnings and cautions

This topic lists safety warnings and cautions for handling the ModCab and AccessNode Equipment.

Read all warnings and cautions before beginning any procedure. Failure to follow these warnings and cautions can cause personal injury and equipment damage.

Handling cabinets

Always observe the following precautions when handling and installing the cabinets:

- Do not install any equipment inside the cabinet until the cabinet is firmly secured to the mounting pad.
- Do not open the cabinet doors unless the cabinet is firmly secured to the shipping pallet or mounting pad. The cabinet can be unstable when it is not secured to the mounting pad or the shipping pallet.

Lifting and moving the cabinets

Before lifting and moving the cabinets, remove any debris from the pad. Verify that the pad is level and free from obstructions.

Always observe the following warnings and cautions when lifting and moving the cabinets:

DANGER
Safety hazard
Do not exceed the lifting capacity of the crane.

Failure to comply with this warning can cause serious or fatal bodily injury.

DANGER
Safety hazard
Do not physically assist the rigging crew. Only the crane rigging crew performs crane setup and rigging procedures.

Failure to comply with this warning can cause serious or fatal bodily injury.

DANGER
Safety hazard
Do not get underneath or on the load. Use extreme caution when routing existing outside plant (OSP) cables through the bottom of the cabinet during the cabinet installation.

Failure to comply with this warning can cause serious or fatal bodily injury.

CAUTION
Install the anchor plate sealant kit
The anchor plate sealant kit must be installed before the cabinet is lifted onto the mounting pad. Improper installation of the sealant kit can cause galvanic corrosion damage to the cabinet.

CAUTION
Align the hoisting straps
Align the hoist line over the center of gravity for the load to eliminate load swinging.

Working with ac power

Always observe the following warnings and cautions when connecting commercial power:

DANGER
Electrical shock hazard
Only a qualified electrician should perform the ac power procedures included in this document.

Failure to comply with this warning can cause severe or fatal electrical shock.

CAUTION
Local and national electrical code restriction
Observe all National Electric Codes (NEC) and local codes for electrical wiring.

CAUTION
AC grounding electrode installation
For a main service panel entrance, an ac grounding electrode system requires bonding to an ac main service power neutral/ground bus. Consult the local power company or operating company for code restrictions or NEC variations.

Handling fiber optic cables

Always observe the following warnings and cautions when installing optical fibers and cables:

- Always wear safety glasses when installing optical fibers.
- Use tweezers and the sticky side of vinyl tape to handle loose fiber ends.
- Handle optical fibers carefully; always position them securely when splicing.
- Avoid contact with glass chips during installation.
- Always use tissue paper to wipe small pieces of glass fiber from your hands before touching the eye area.
- Always protect single fiber optical connectors with clean dust caps.
- Place any discarded fiber cuttings in a plastic bottle that is used specifically for disposal.
- Do not damage the fibers by exceeding the minimum bend radius for fibers, pigtails, or patch cords.

DANGER
Laser radiation hazard
Avoid direct exposure to fiber or optical connector ends. Laser radiation may be present and can damage your eyes.

Failure to comply with this warning can seriously damage your eyes.

DANGER
Eye damage hazard
Always wear safety glasses when installing optical fibers.

Failure to comply with this warning can seriously damage your eye. Get immediate medical attention if a glass chip becomes lodged in or near your eyes.

CAUTION
Risk of damage to fiber optic patchcords
Handle fibers with extreme care. Never bend cables into a curve with a radius smaller than 76 mm (3.0 inches). Tighten connections to the optical units finger tight only.

CAUTION
Clean all optical connectors
Dust adversely affects optical connector performance. Clean all connectors before inserting the connectors into the mating sleeves. Use clean dust caps when connectors are not in use.

CAUTION
Risk of damage to fiber patch cords
Route each fiber patch cord where it cannot snag on the equipment or be damaged when you move or access any equipment inside the cabinet.

Batteries

Always observe the following warnings and cautions when performing battery-related procedures:

DANGER
Electrical shock hazard
Unused battery cables must be disconnected and removed from the battery tray.

Failure to comply with this warning can cause severe electrical shock and/or equipment shorting.

DANGER
Fire Hazard
Remove all paper and any other combustible materials from inside the cabinets before closing the cabinets. Never leave any combustible materials inside the cabinets.

Failure to comply with this warning can cause a fire.

CAUTION
Battery replacement requirements
Do **not** replace individual batteries. When one or more batteries in the same string fail, replace **all** batteries in that string. Replacement batteries should have similar date codes.

CAUTION
DC voltage output levels
For new installations, each rectifier's dc voltage output level ***must*** be tested and adjusted based on the following Nortel Networks recommended float voltages:

Johnson Controls TEL12-90: −54.5 ± 0.10 V dc

Note: These ranges are subject to change without notice.

Rectifiers

Always observe the following warnings and cautions when performing any rectifier procedures:

DANGER
Overvoltage damage to equipment
DO NOT adjust the voltage above −56.0 V dc.

Failure to comply with this warning can damage the AccessNode equipment.

DANGER
Electrical shock hazard
When adjusting rectifiers, always perform the steps in the order shown.

Failure to comply with this warning can damage the rectifiers because the sequence of turning the circuit breakers on and off is critical.

DANGER
Fire hazard
Remove all paper and any other combustible materials from inside the cabinet before powering up the cabinet.

Failure to comply with this warning can cause a fire.

CAUTION
DC voltage output levels
For new installations, each rectifier's dc voltage output level ***must*** be tested and adjusted based on the following Nortel Networks recommended float voltages:

Johnson Controls TEL12-90: −54.5 ± 0.10 V dc

Note: These ranges are subject to change without notice.

Protector modules

Always observe the following caution when working with protector modules:

CAUTION
Risk of damage to equipment
During initial setup of the AccessNode, Nortel Networks recommends keeping the equipment side disconnected from the outside plant subscriber loops (at the protector modules) until the line cards are installed and powered up.

For example, when using five-pin protector modules, pull the modules out slightly (to the first notch) to disconnect the modules.

Miscellaneous

Observe the following general warnings and cautions:

DANGER
Fire hazard
Remove all paper and any other combustible materials from inside the cabinet before powering up the cabinet.

Failure to comply with this warning can cause a fire.

DANGER
Fan replacement requirement
Fans must be replaced within four hours of failure.

Failure to comply with this warning can cause equipment damage from excessive heat build-up in the cabinet.

Installing the mounting pad

This chapter describes preparing and installing the concrete mounting pad for the ModCab.

Before installing the pad, read “Site considerations” on page 1-5. Also see *Modular Cabinet Description*, 323-3001-119, for additional considerations and rules you must review before installing the pad.

Complete the tasks in the order listed. If you cannot successfully complete these tasks, contact your next level of support.

Chapter task list

This chapter includes the following tasks:

Procedure	Task	See
2-1	Preparing the wooden form	page 2-5
2-2	Pouring the concrete	page 2-13

Anchor plates

The two anchor plate assemblies are as follows:

- ac power pedestal (PP) assembly (see Figure 2-1 on page 2-3)
- main equipment module (MEM) and large termination module (LTM) assembly (see Figure 2-2 on page 2-4)

Anchor plates are bolted together to match the ModCab configuration being installed. The anchor plate assemblies must be attached to the concrete forms before the concrete is poured.

> ***Note:*** Verify that the anchor plates are placed in the proper order and orientation. The PP and the LTM have cable conduits in the bottom of the cabinet.

Anchor plates installation rules

The PP anchor plate is always connected to the left side of the dc power module (DCP) anchor plate.

Only the LTMs and the PPs require cable conduit.

All conduit trade sizes listed in Table 2-1 are based on Schedule 40 PVC.

Anchor bolts and cable conduits must be installed and aligned properly; otherwise, the cabinets may not fit the poured pad.

To properly align the anchor bolts and conduits, use the following guidelines:

- Only the PP and LTM locations have conduit routed through the anchor plates.
- The designated conduit trade sizes must be in the correct conduit holes in the anchor plate.
- Each conduit and anchor bolt must be centered within its specific anchor plate hole.
- Each conduit and anchor bolt must be vertical to the top of the anchor pad.
- Each anchor plate should be installed with its flanges pointing up.

Nortel Networks recommends replacing misaligned poured pads. Anchor bolts and cable conduits must enter the cabinets at the correct locations.

Power pedestal anchor plate assembly

The PP anchor plate has cable conduits for ac power and earth ground.

Note: All conduit trade sizes listed in Table 2-1 are based on Schedule 40 PVC.

Table 2-1 and Figure 2-1 show the PP conduit openings and anchor plate.

Table 2-1
PP conduit openings

	Opening size	Conduit trade size	Function
A1	8.89 cm (3.50 in.)	2.50 in.	Commercial ac cable entrance (LINE)
B1	5.08 cm (2 in.)	1.25 in.	Earth ground cable entrance
B2	5.08 cm (2 in.)	1.25 in.	Outside plant (OSP) cable entrance
B3	5.08 cm (2 in.)	1.25 in.	OSP cable entrance

Figure 2-1
PP anchor plate

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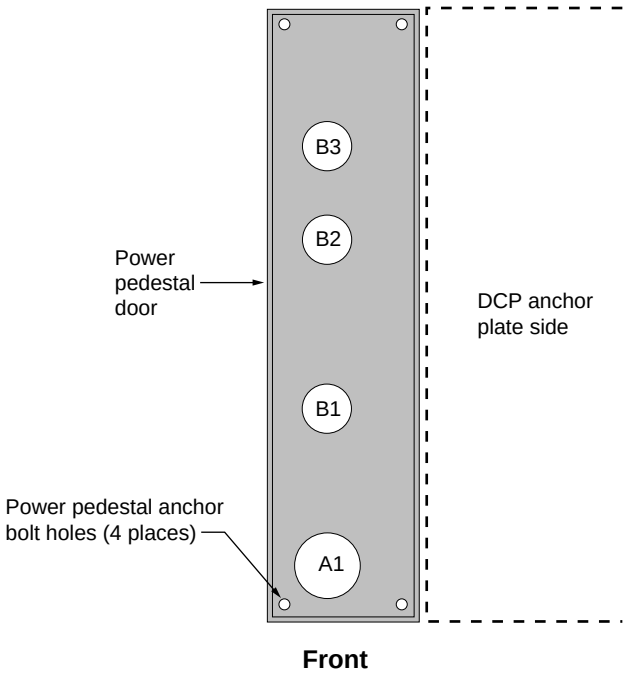

Note: The power pedestal anchor plate always mounts to the left of the DCP anchor plate.

LTM and MEM anchor plate assembly

The LTM uses the same anchor plate assembly as the MEM. However, only the LTM requires cable conduits.

Table 2-2 and Figure 2-2 show the LTM and MEM conduit openings and anchor plate.

Table 2-2
LTM and MEM conduit openings

Opening size	Conduit trade size	Function
11.43 cm (4.50 in.)	4.0 in.	Voice frequency (VF) pairs and outside plant (OSP) cable entrances (three places)
6.35 cm (2.50 in.)	2.0 in.	Fiber cable and DS1 cable pairs entrances (three places)

Figure 2-2
LTM and MEM anchor plate

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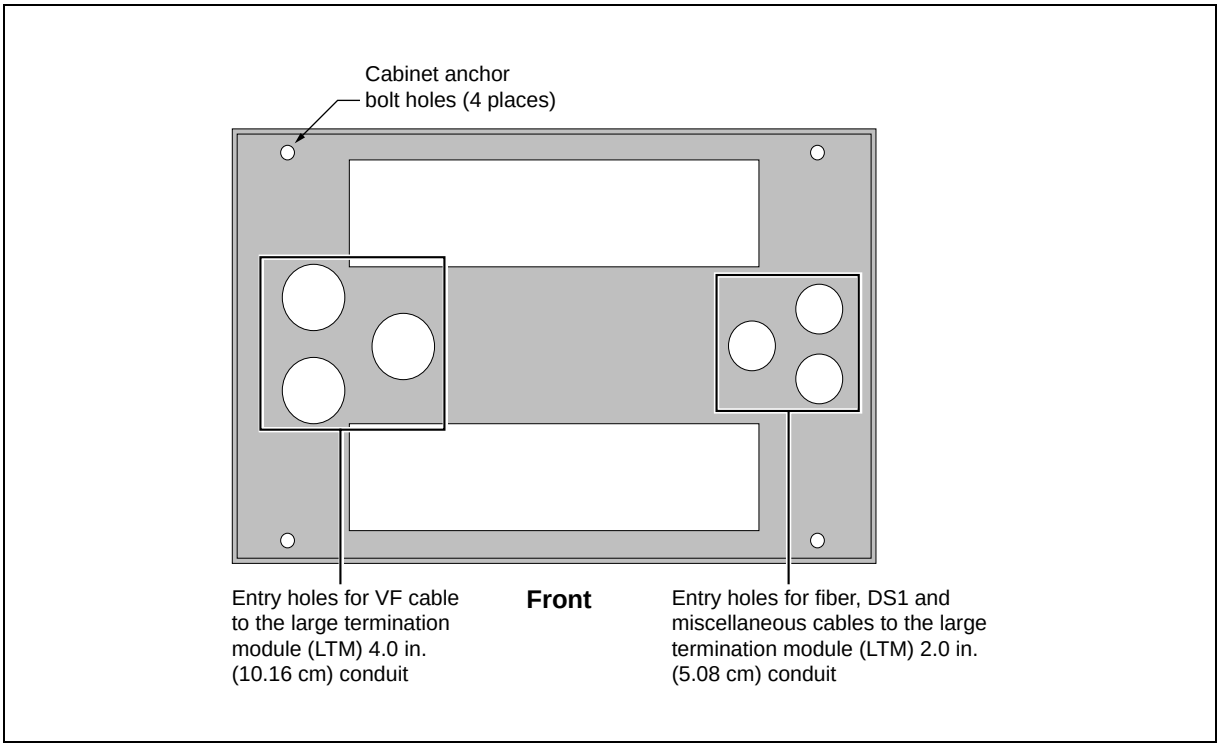


Procedure 2-1
Preparing the wooden form

Use this procedure to prepare the wooden form that is used when you pour the concrete for the mounting pad.

Requirements

The operating company is responsible for selecting the configuration and remote site as well as complying with local regulations such as the applicable electrical codes, right-of-way easements, and noise requirements.

Before beginning this procedure, verify the following items:

- The concrete mounting pad is being installed above local flooding levels.
- The cabinet doors have 81 cm (32 in.) minimum clearance.
- All tools and materials are available and ready for installation.
- All required drawings, local installation instructions, job specifications, and other documentation are available and ready for use.

Tools and materials

You need the following tools and materials:

- spirit level
- medium claw hammer
- wire cutters
- sledgehammer
- anchor plate assemblies (power pedestal and large termination module [LTM])
- temporary angle supports (as required for the anchor plate assemblies)
- 2 x 8s (exactly 15.24 cm [6 in.] wide)
- 2 x 6s (exactly 10.16 cm [4 in.] wide)
- double headed nails (to ease form removal)
- miscellaneous braces and stakes (1 x 2s and 2 x 2s as required)
- 10 gauge x 6 in. (15.24 cm) spacing of welded wire mesh (for concrete reinforcement)
- reinforcing rods (#4 x 10 in. [25.4 cm] spacing) when required

—continued—

Procedure 2-1 (continued)
Preparing the wooden form

Action

Step	Action
1	Assemble the wooden concrete form to match the ModCab configuration. See Figure 2-3 on page 2-7 (back-to-back) or Figure 2-4 on page 2-8 (side-by-side).
2	Place and level the form as required by the site plans.

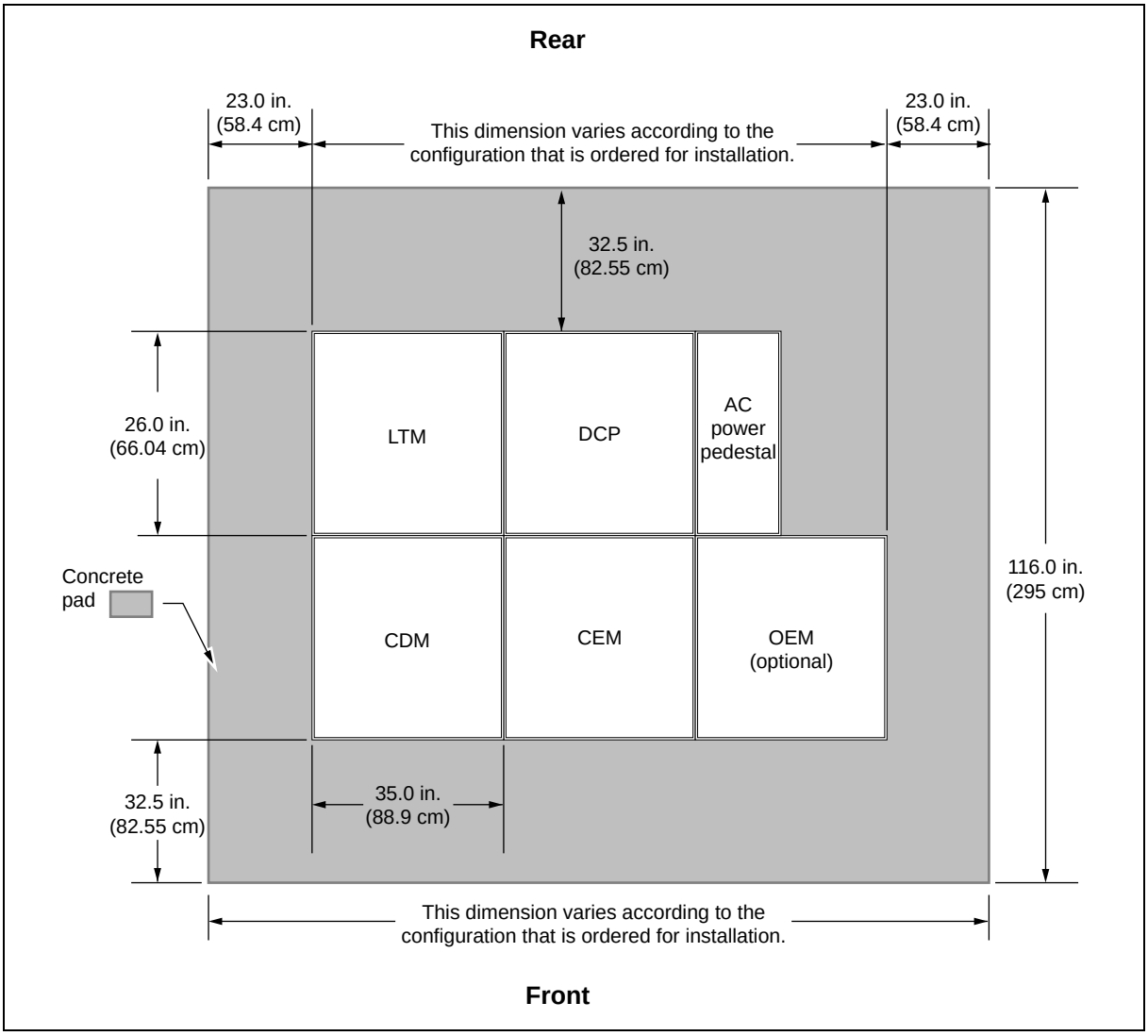
—continued—

Procedure 2-1 (continued)
Preparing the wooden form

Step	Action

Figure 2-3
Back-to-back, basic pad layout, 5 cabinets and an ac pedestal

PC-16077



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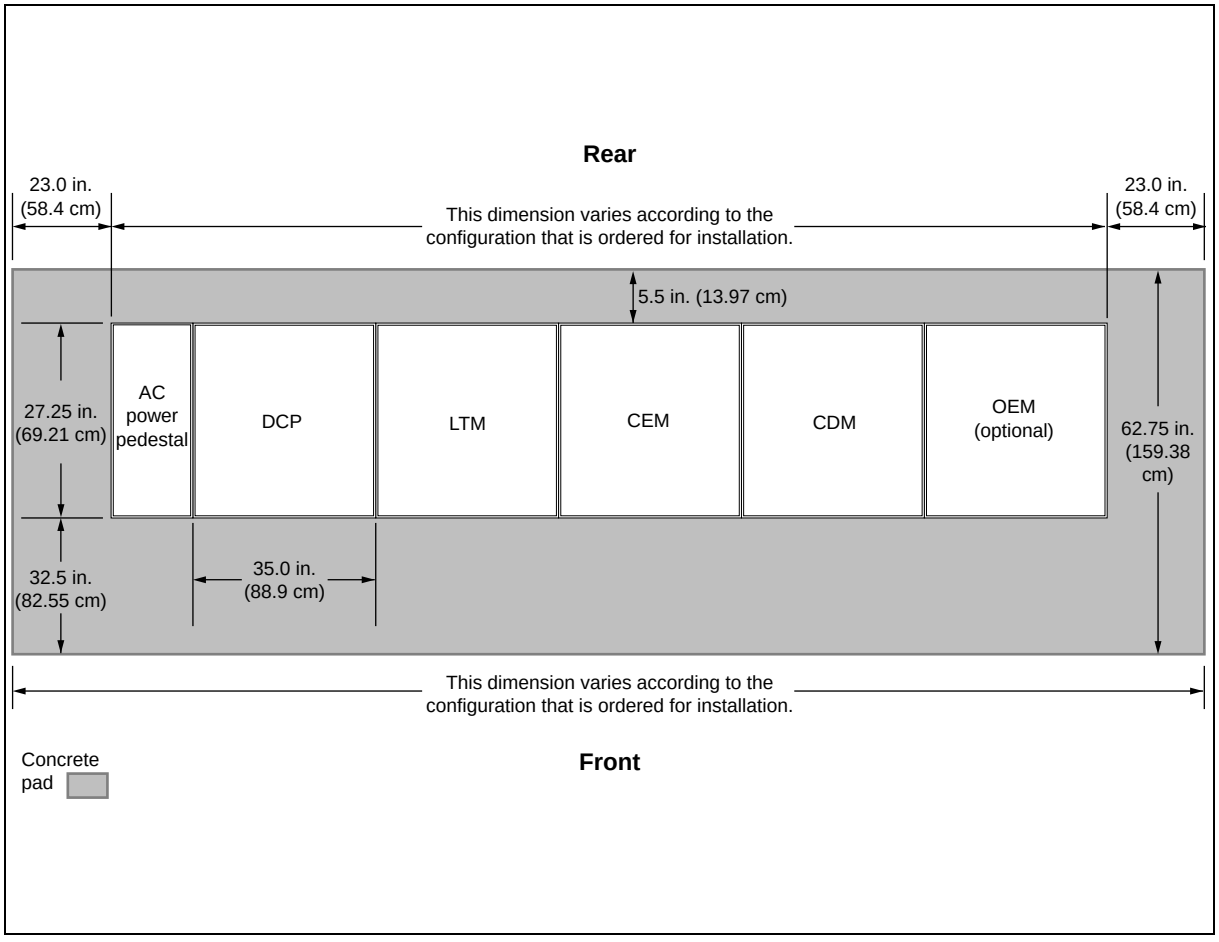
Procedure 2-1 (continued)
Preparing the wooden form

Step	Action

Figure 2-4
Side-to-side, basic pad layout, 5 cabinets and an ac pedestal

PC-16078



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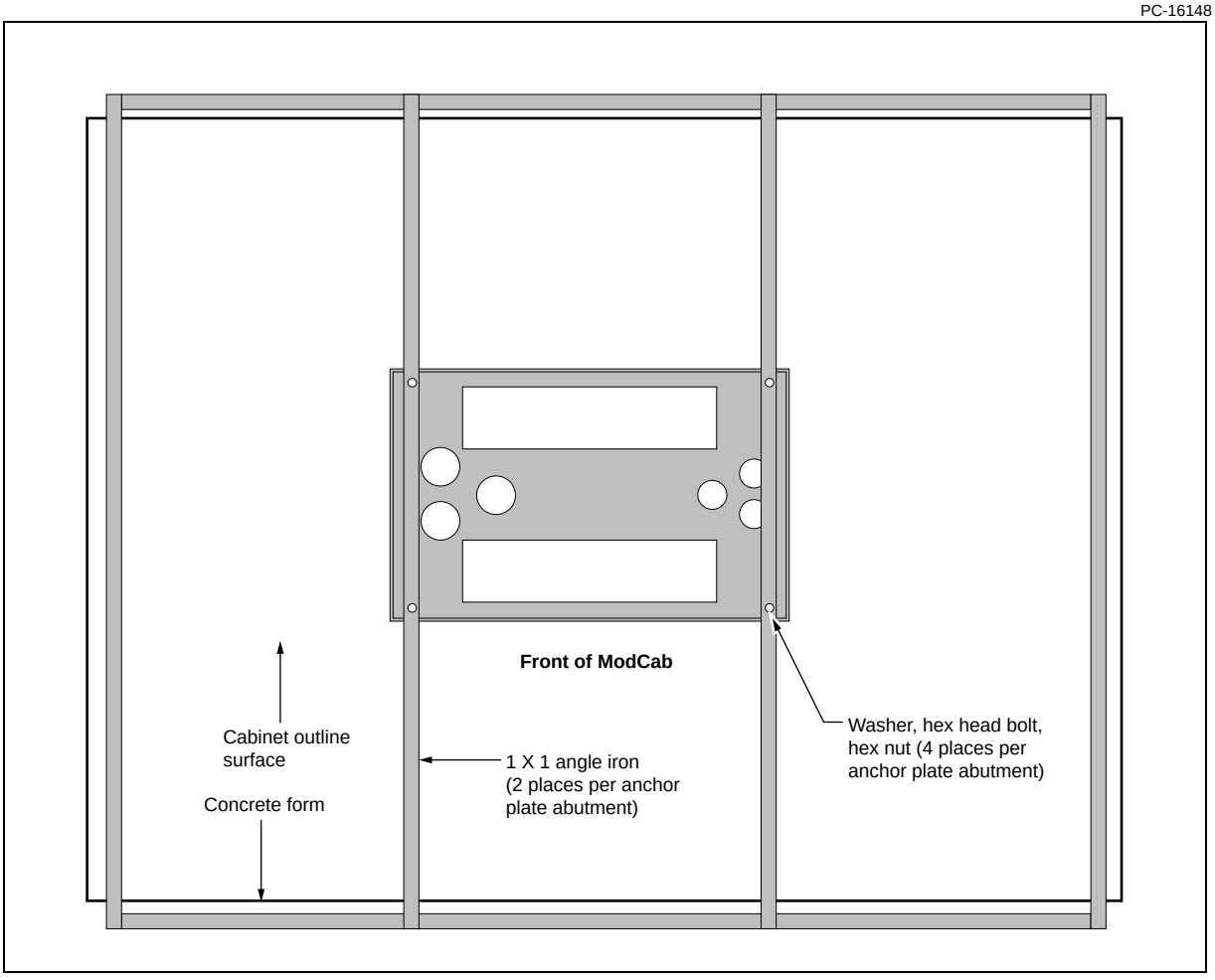
Procedure 2-1 (continued)
Preparing the wooden form

Step	Action
3	Construct the anchor plate assemblies. Each anchor plate assembly includes the following items: • galvanized steel plate, 11-gauge • anchoring bolts • plastic caps to protect the bolt threads ***Note:*** Temporary angle supports supplied by the customer will also be required to construct the anchor plate assemblies.

Figure 2-5 shows the anchor plate junctions.

Figure 2-5
Anchor plate junctions

PC-16148



—continued—

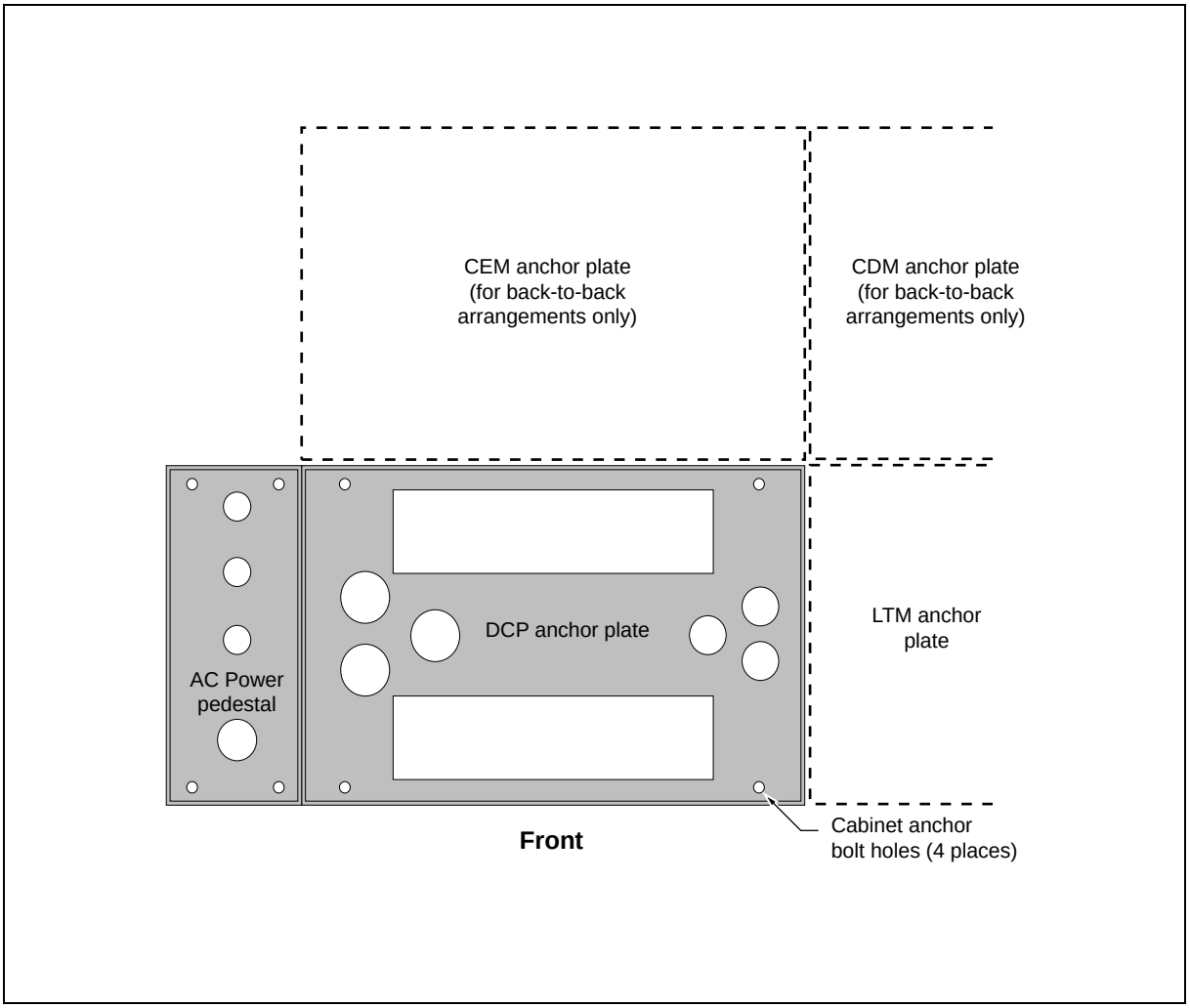
Procedure 2-1 (continued)
Preparing the wooden form

Step	Action

Figure 2-6 shows the anchor plate assembly layout.

Figure 2-6
Anchor plate assembly layout

PC-16079

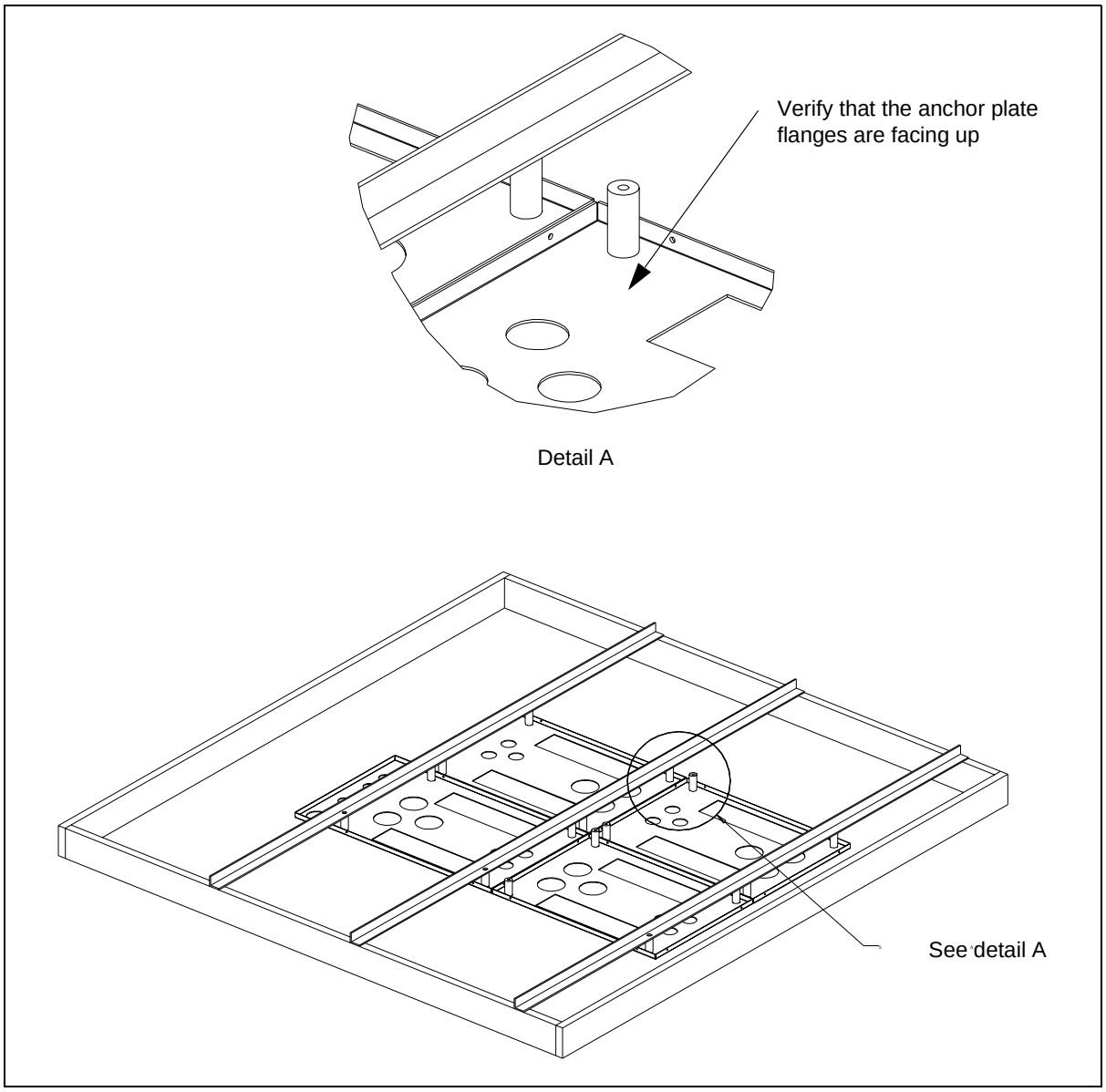


—continued—

Procedure 2-1 (continued)
Preparing the wooden form

Step	Action
4	Lay the anchor plate assemblies on top of the wooden forms.
5	Position the anchor plate with the flanges facing up. See Figure 2-7.

Figure 2-7
Anchor plate flanges (for back-to-back configuration)



—continued—

Procedure 2-1 (continued)
Preparing the wooden form

Step	Action
6	To secure the anchor plate assemblies, nail the angles to the wooden forms. ***Note:*** Use the provided plastic caps to protect the anchor bolt threads.
7	Place the cable conduits under the ground level into the forms. Position the conduits through the PP and the LTM anchor plate openings. ***Note:*** Conduits should extend at least 51 mm (2 in.) above the anchor plate assembly. Plug each conduit to keep concrete out.
8	Place the welded wire mesh or reinforcement rods into the wooden form.
9	Add bracing supports along the length of the wooden form. The bracing supports help keep the form squared against the anchor plate and prevent bowing when the concrete is poured.
10	Secure each cable conduit to keep it vertically aligned when you pour the concrete.
11	Go to Procedure 2-2, “Pouring the concrete” on page 2-13.

—end—

Procedure 2-2
Pouring the concrete

Use this procedure to pour concrete into the wooden form.

Requirements

Before beginning this procedure, complete the following items:

- Review the cement and concrete specifications in Chapter 1, “Planning the installation.”
- Verify that Procedure 2-1, “Preparing the wooden form” has been properly completed.

Tools and materials

You need the following tools and materials:

- spirit level
- pole or rod (to distribute concrete inside the template)
- reinforcing rods (#4 x 10 in. [25.4 cm] spacing) when required

Action

Step	Action
1	Pour the concrete through the large openings at each end of the anchor plate assembly. ***Note 1:*** The anchor plate should be completely covered by 5.08-7.62 cm (2-3 in.) of concrete. ***Note 2:*** When 5.08 cm (2 in.) of concrete covers the bottom of the wooden form, lift the welded wire mesh up through the concrete and let it sit on top of the concrete.
2	Evenly distribute the concrete throughout the wooden form, especially around the cable conduits. ***Note:*** Use a rod or pole to push the concrete into the corners of the wooden form.
3	Level the concrete with a trowel. Verify that the concrete surface is even with the top of the standoff holes. ***Note 1:*** Verify that the surface does not slant toward the cable conduits, which can cause water to pool around the cabinet base. ***Note 2:*** Before the concrete sets, check the leveling with a spirit level.

—continued—

Procedure 2-2 (continued)
Pouring the concrete

Action

Step	Action
4	Keep the standoff holes clear of any concrete.
5	When the concrete begins to set, edge all corners for a smooth finish.
6	Allow the concrete to dry and cure.
7	Remove the wooden form and cross angles.
8	Edge and patch the concrete as needed. ***Note:*** Verify that each conduit opening extends above the concrete pad and has no sharp edges or burrs.
9	After removing the cross angles, reinstall the washers, nuts, and plastic caps on the anchor bolts. ***Note:*** Verify that the concrete surface is sound and free of honeycomb. A minimum of patching and finishing may be required to fill holes or to remove minor irregularities. Any chips or voids 0.64 cm (1/4 in.) deep or greater (1.27 cm [1/2 in.] at the edges) should be patched. **No cracks should go through the concrete pad.**

—end—

Installing the cabinet modules

This chapter describes how to prepare the concrete mounting pad and mounting the modular cabinet (ModCab) on the pad.

Chapter task list

This chapter includes the following tasks:

Procedure	Task	See
3-1	Unpacking the ModCab	page 3-2
3-2	Preparing the pad	page 3-3
3-3	Preparing to lift the ModCab	page 3-5
3-4	Mounting the modules on the pad	page 3-11

Prerequisites for installation

The operating company is responsible for selecting the remote site and for complying with local regulations, such as the applicable electrical codes, right-of-way easements, and noise requirements.

Before beginning any procedure, verify that all tools, hardware, and materials are available and ready for installation.

Configuration weight

The ModCab consists of an ac power pedestal, common equipment module (CEM), copper distribution module (CDM), dc power module (DCP), and a large termination module (LTM). As shipped, the ModCab weighs approximately 1136.3 kg (2500 lbs). It can be shipped in either a back-to-back or a side-by-side configuration (special order).

Procedure 3-1
Unpacking the ModCab

Use this procedure to unpack the ModCab.

Requirements

The concrete mounting pad must be complete and ready for cabinet installation.

Tools

You need the following tools:

- wrench, 6-8 in. adjustable or open-end 5/8 in.
- claw hammer or ripping bar to remove crating material
- deep-well socket driver set, 1/2 in. driver

Action

Step	Action
1	Use the packing notes to verify all items are included. ***Note:*** Immediately report any discrepancies to Nortel Networks.
2	Inspect the shipping container for evidence of damage during shipping. ***Note:*** Immediately report any evidence of damage to the shipping company.
3	Carefully remove all crating material from the ModCab and pallet. ***Note:*** Do not remove the ModCab from the shipping pallet until you are ready to place it on the mounting pad.
4	Open the ac power pedestal door. Remove all conduit cap plugs on the bottom conduit entrances.
5	Open the large termination module (LTM) door. Remove all conduit cap plugs on the bottom conduit entrances.
6	Close all of the ModCab doors.
7	Go to Procedure 3-2, “Preparing the pad” on page 3-3.

—end—

Procedure 3-2
Preparing the pad

Use this procedure to prepare the pad for the ModCab.

Tools and materials

You need the following tools and materials:

- hacksaw or similar cutting tool to cut the cable conduit
- 2.5 in. trade size PVC conduit straight coupling (supplied)
- Lexan isolator sheets

Action

Step	Action
1	Remove any loose hardware that was shipped in the cabinets.
2	Trim the cable conduits protruding from the top of the pad as follows:

Pad conduit	Trim to this height
ac cable entrance	9.82 ± 0.3175 cm (3.87 ± 0.125 in.) above concrete pad Measure the distance from the bottom of the ac conduit to the bottom of the ac power pedestal as shown in Figure 3-1 on page 3-4. When cutting, leave a 0.635 cm (0.25 in.) gap between the pad and the power pedestal conduit (after the power pedestal is in place).
all other conduits	cut even with concrete pad surface

3	Place a 6.35 cm (2.5 in.) PVC straight coupling on the pad's ac conduit.
4	Place 10.16 cm (4 in.) threaded alignment rods into two opposite anchor holes on the concrete pad. (These rods help align the cabinet during installation.)
5	Clear the pad of any debris. The pad must be level and free of obstructions.
6	Install the Lexan isolator sheets under each module.
7	Go to Procedure 3-3, "Preparing to lift the ModCab" on page 3-5.

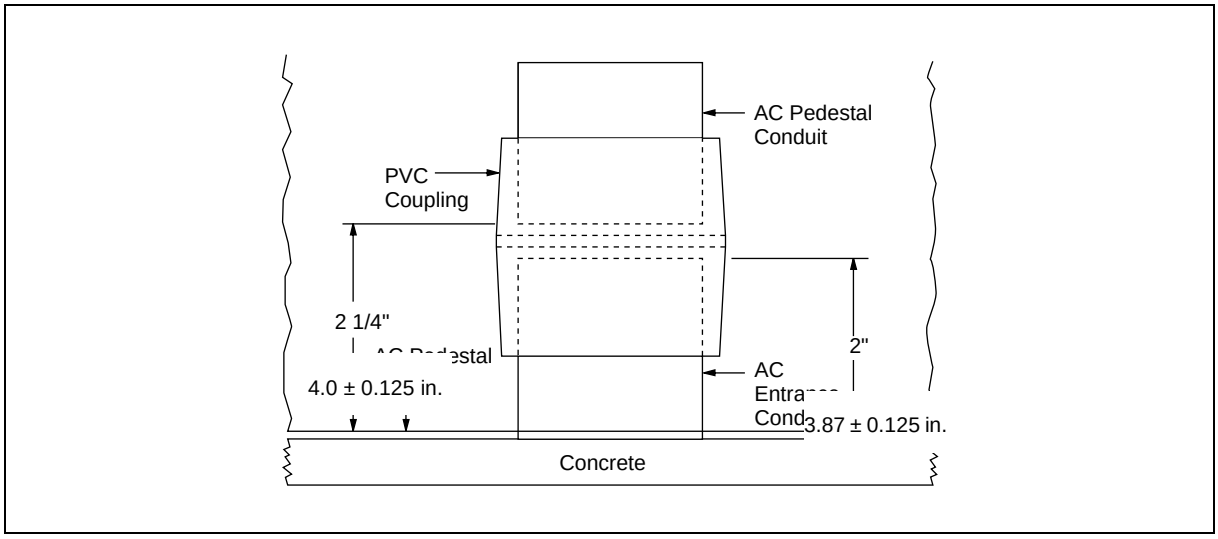
—continued—

Procedure 3-2 (continued)
Preparing the pad

Step	Action

Figure 3-1
Conduit cuts in the ac pedestal enclosure

PC-15113



—end—

Procedure 3-3
Preparing to lift the ModCab

Use this procedure to connect the lifting crane to the ModCab and prepare for the lift.

Warnings and cautions

Before beginning this procedure, read the following warnings and cautions:

DANGER
Safety hazard
Do not exceed the lifting capacity of the crane.

Failure to comply with this warning can cause serious or fatal bodily injury.

DANGER
Safety hazard
Do not physically assist the rigging crew. Only the crane rigging crew performs crane setup and rigging procedures.

Failure to comply with this warning can cause serious or fatal bodily injury.

CAUTION
Align the hoisting straps
Align the hoist line over the center for gravity of the load to eliminate load swinging.

—continued—

Procedure 3-3 (continued)
Preparing to lift the ModCab

Follow all local, state, and federal safety standards for crane operation.

- Barricade the lift area.
- Do not allow cars to be parked within 7.6 m (25 ft) of the lift radius.
- Require everyone in the barricaded area to wear a hard hat and steel-toed safety shoes.
- Verify that the crane is set up on firm footing.
- Extend the outriggers, block the floaters, and insert safety pins.
- Verify that the crane is “off rubber” during the lift.
- Verify that the crane is level before lifting to prevent tipping.
- Never stand or place any body part underneath the load.
- Do not stand on the load.
- Use tag lines to maneuver the load.
- Verify that the lifting sling cable is at least 1.5 m (5 ft). The recommended length is 2.4 to 3.7 m (8 to 12 ft).

Tools

You need the following tools:

- wrench and socket set (including 7/16 in. and 9/16 in. wrenches)
- 5/16 x 8 in. screwdriver

—continued—

Procedure 3-3 (continued)
Preparing to lift the ModCab

Action

Step	Action
1	Securely attach the lifting cable sling to the lifting eye bolts on top of the ModCab modules as shown in Figure 3-2. ***Note:*** Align the hoisting strap over the center of the load and see the following figures as needed: • Figure 3-3, “Lifting cable sling length for a back-to-back configuration” on page 3-9 • Figure 3-4, “Lifting cable sling length for a side-by-side configuration” on page 3-10

Figure 3-2
Connecting the lifting sling to the eye bolts

PC-DP-10017

2	Open the cabinet doors.
3	Remove the pallet mounting bolts located in the bottom of each module. ***Note:*** Each cabinet module has 4 bolts except for the ac power pedestal, which has 2.

—continued—

Procedure 3-3 (continued)
Preparing to lift the modules

Step	Action
	Removing the swing frame shipping bracket
	Note: In the main equipment module (MEM), the bottom right edge of the swing frame has a shipping bracket which needs to be removed.
4	Using a 9/16 in. wrench, loosen the nut on the bottom of the shipping bracket (on the leveling foot).
5	After you loosen the leveling foot nut, unscrew and remove the leveling foot bolt.
6	Using a 7/16 in. wrench, remove both nuts (and corresponding bolts) from the top edge of the shipping bracket.
7	Remove the shipping bracket and dispose of it.
	Removing the pallet mounting bolts and load-spreading washers
8	Remove the pallet mounting bolts and square load-spreading washers in the bottom of the MEM.
	Note: Save the square load-spreading washers which are removed in this step. They are reused in the next procedure.

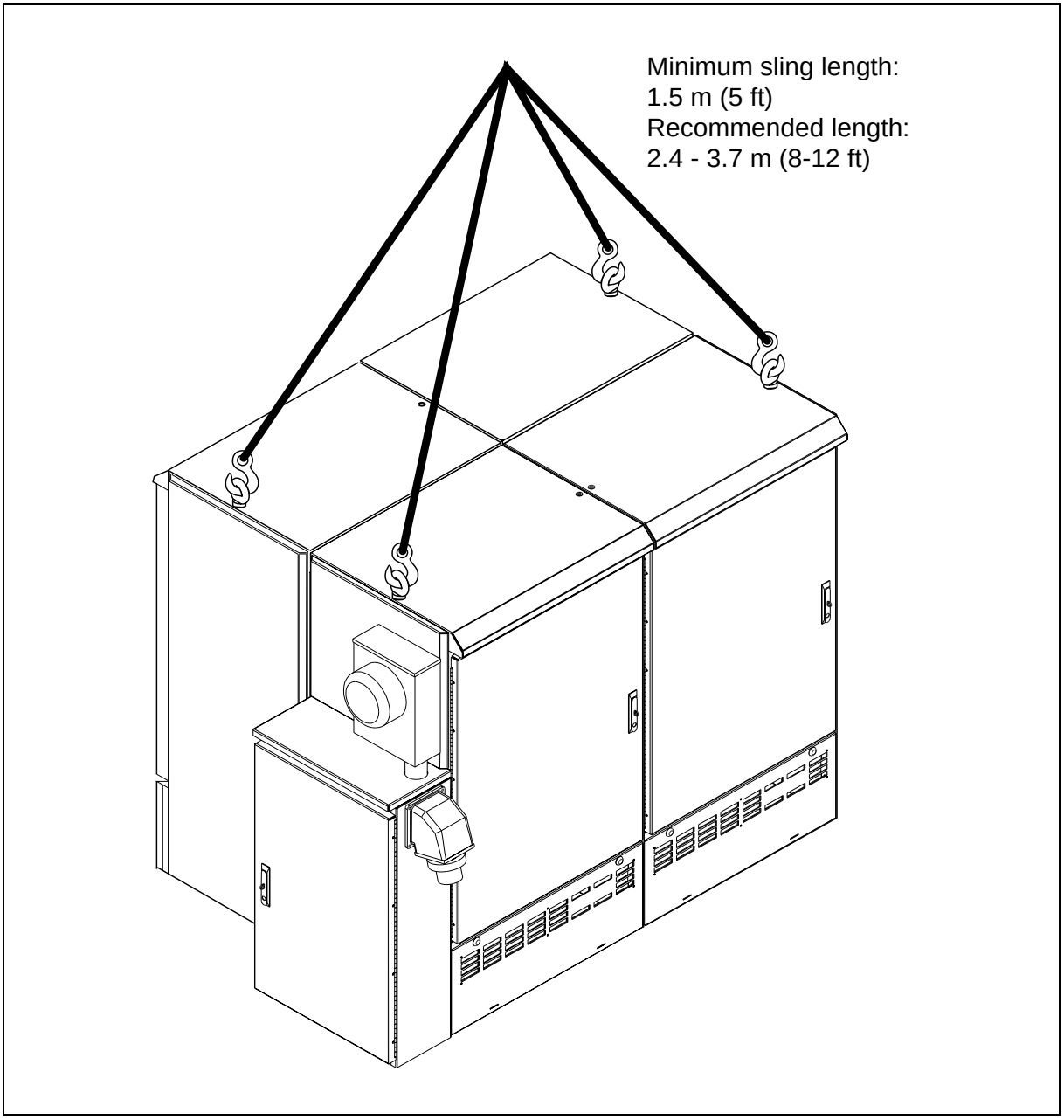
—continued—

Procedure 3-3 (continued)
Preparing to lift the ModCab

Step	Action

Figure 3-3
Lifting cable sling length for a back-to-back configuration

PC-16099



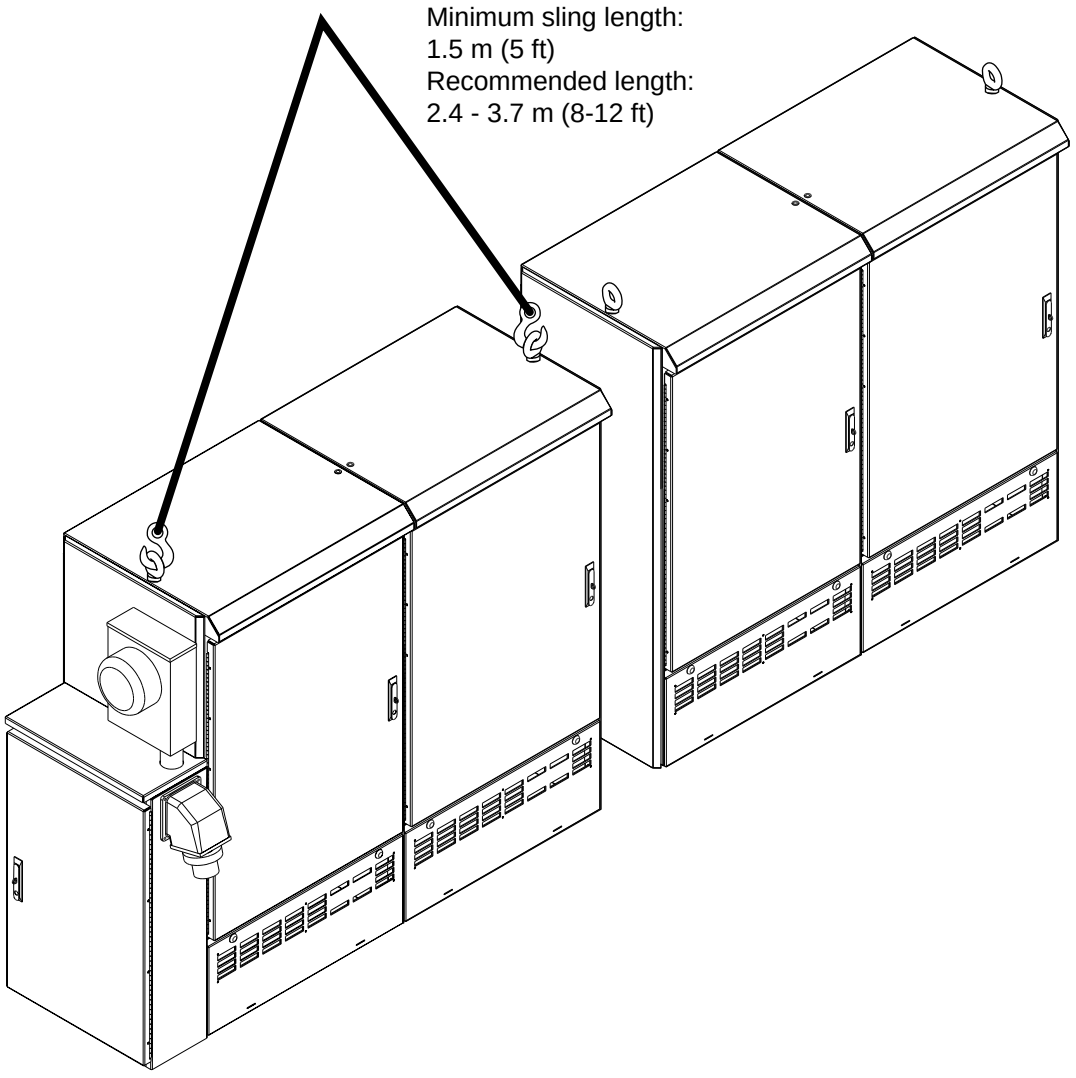
—continued—

Procedure 3-3 (continued)
Preparing to lift the ModCab

Step	Action

Figure 3-4
Lifting cable sling length for a side-by-side configuration

PC-16096



Note: Cabinets for the side-by-side configuration are shipped in 2-module pods. This illustration shows the 4-module configuration. Only 2 modules are lifted at a time.

—end—

Procedure 3-4
Mounting the modules on the pad

Use this procedure to lift the modules and mount them on the pad.

Warnings

Always observe the following warnings during installation:

DANGER
Safety hazard
Do not physically assist the rigging crew. Only the crane rigging crew performs crane setup and rigging procedures.

Failure to comply with this warning can cause serious or fatal bodily injury.

DANGER
Safety hazard
Do not get underneath or on the load. Use extreme caution when routing existing outside plant (OSP) cables through the bottom of the modules during the installation process.

Failure to comply with this warning can cause serious or fatal bodily injury.

Tools and materials

You need the following tools and materials:

- wrench, 6-8-in. adjustable or box-end 5/8 in.
- socket driver set, deep-well sockets
- leveling shims
- conduit plugging compound
- spirit level

—continued—

Procedure 3-4 (continued)
Mounting the modules on the pad

Action

Step	Action
1	Ensure that all personnel wear hard hats during the lift.
2	Lift the ModCab using the crane.
3	Position the ModCab above the concrete pad.
4	Evenly lower the ModCab over the alignment rods and isolator sheets.

CAUTION
Safety hazard
Do not get underneath or on the load. Use extreme caution when routing existing OSP cables through the bottom of the modules.

5	Lower the ModCab onto the pad, aligning the pad conduits with the proper conduit entry holes. The ac entry conduit has the coupling attached.
6	Verify that the ModCab sits securely on the pad and is fully seated on the isolator sheets.
7	Check leveling with a spirit level.
8	If needed, place shims under the edge of the ModCab; recheck the leveling.
9	Remove the battery trays in the main equipment modules.
10	Install and tighten the four anchor bolt washers and nuts in every module. ***Note:*** Tighten the nuts to 50 ft-lb torque.
11	Install and tighten the square load-spreading washers and nuts. ***Note 1:*** The square load-spreading washers were removed from the main equipment module (MEM) and saved during the previous procedure. ***Note 2:*** Tighten each nut to 50 ft-lb torque.

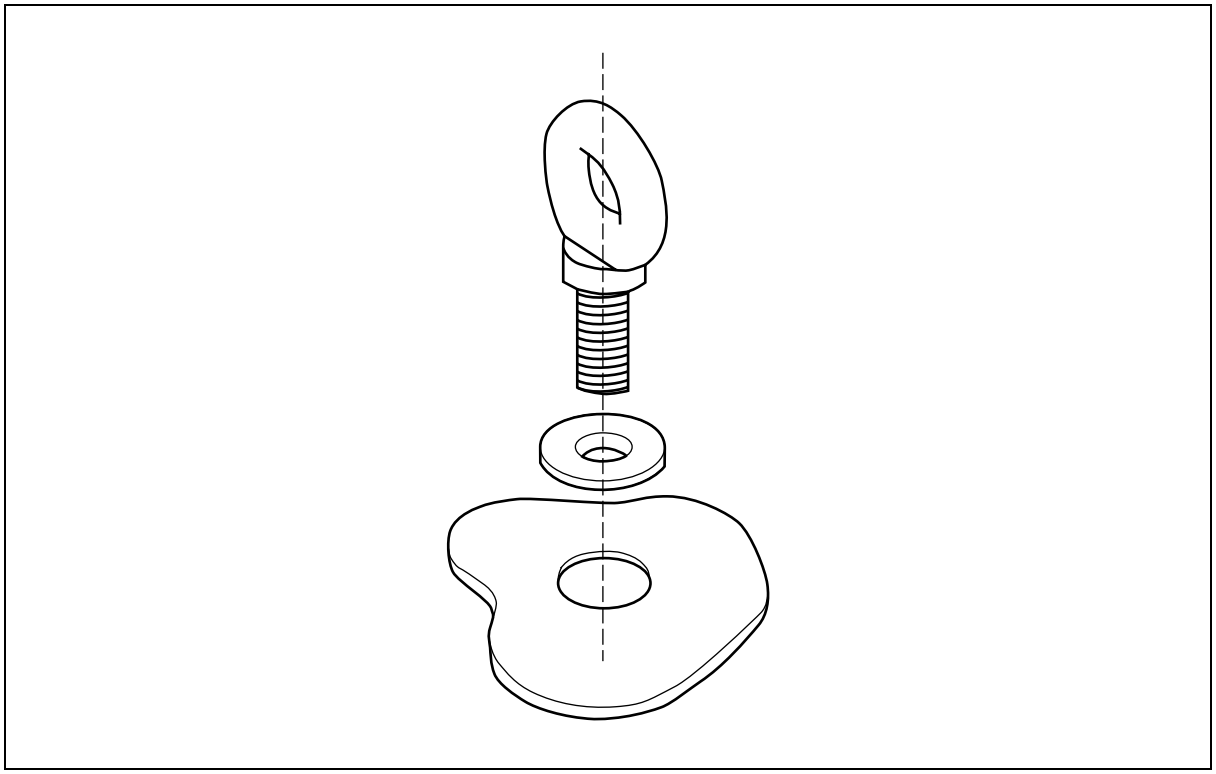
—continued—

Procedure 3-4 (continued)
Mounting the modules on the pad

Step	Action
12	Disconnect the lifting cable sling from the lifting eye bolts.
13	Remove the lifting eye bolts in the top of the modules.
14	Replace the eye bolts with the nylon top plugs that are included with each module (see Figure 3-5).

Figure 3-5
Eyebolt removal

PC-16080



15	**Do not** remove the desiccant pouches from the bottom of the compartments until commercial power is connected.
16	Using plug compound (or equivalent), seal around each conduit entrance to ensure a watertight seal against moisture.

—end—

Connecting commercial power

This chapter describes how to connect commercial ac power to the ac power pedestal.

Chapter task list

This chapter includes the following tasks:

Procedure	Task	See
4-1	Connecting earth ground to the ac power pedestal	page 4-4
4-2	Connecting power leads to ac power pedestal	page 4-7

Power requirements

A qualified electrician should handle all ac power connections. Nortel Networks recommends the guidelines in this document. Also, follow all local codes for wiring procedures.

The modular cabinet (ModCab) operates within specification with voltage range variations of 190 to 253 V ac and a frequency variation range of 55 to 65 Hz.

> ***Note:*** Voltage range variation is measured between Line 1 (L1) and Line 2 (L2) of the ac input leads.

The basic configuration for the ac power requirements is as follows:

- 208-240 V ac
- 100 A
- three-wire, single phase
- 55-60 Hz

Cable conduit entry ports in the ac power pedestal

Cable conduit entry ports are located in the bottom of the ac power pedestal. The ac power and earth ground enters the ac power pedestal through the conduits and route to the load box and ground points.

Note: All conduit trade sizes listed are based on Schedule 40 PVC.

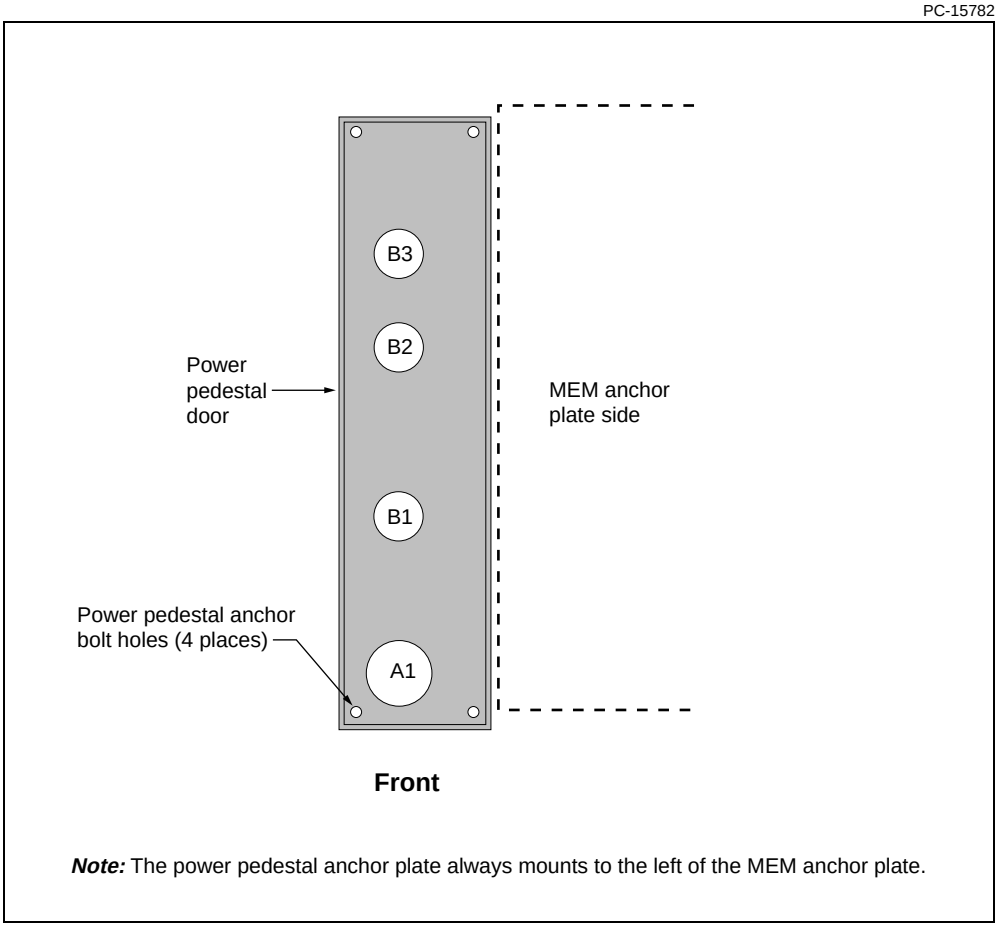
Table 4-1 and Figure 4-1 show the ac power pedestal conduit openings and the anchor plate.

Table 4-1
AC power pedestal conduit openings

	Opening size	Conduit trade size	Function
A1	8.89 cm (3.50 in.)	6.35 cm (2.50 in.)	Commercial ac cable entrance
B1	5.08 cm (2.00 in.)	3.18 cm (1.25 in.)	Earth ground cable entrance
B2	5.08 cm (2.00 in.)	3.18 cm (1.25 in.)	Available conduit
B3	5.08 cm (2.00 in.)	3.18 cm (1.25 in.)	Available conduit

Figure 4-1
AC power pedestal anchor plate

PC-15782



Note: The power pedestal anchor plate always mounts to the left of the MEM anchor plate.

Warnings and cautions

Always observe the following safety warnings and cautions while connecting commercial power:

DANGER
Electrical shock hazard
A qualified electrician should perform the ac power procedures listed in this document.

Failure to comply with this warning can cause severe or fatal electrical shock.

CAUTION
Electrical shock hazard
The procedures in this chapter are recommended guidelines; be sure to follow all local codes for wiring procedures.

CAUTION
Fire hazard
Remove all paper and any other combustible materials from inside the cabinet before powering up the cabinet. Failure to comply with this warning can cause a fire.

CAUTION
Local and national electrical code restriction
Observe all National Electric Codes (NEC) and local codes for electrical wiring.

CAUTION
AC grounding electrode installation
For a main service panel entrance, an ac grounding electrode system requires bonding to an ac main service power neutral/ground bus. Consult the local power company or operating company for code restrictions or NEC variations.

Procedure 4-1
Connecting earth ground to the ac power pedestal

Use this procedure to connect the earth ground to the ac power pedestal. The earth ground rod is normally buried in the ground next to the cabinet according to local code and National Electrical Code (NEC) requirements.

Requirements

You must do the following to perform this procedure:

- Read the safety cautions and warnings on page 4-3 before beginning this procedure.
- Follow all local electrical codes for buried grounding techniques and their requirements.

Tools and materials

You need the following tools and materials:

- voltmeter
- small flat blade screwdriver
- medium flat blade screwdriver
- wire stripper for 6 AWG
- 6 AWG bare tinned-copper wire (length as per local requirements)

Action

Step	Action
1	Open the ac power pedestal door.
2	Turn off all circuit breakers in the ac load box.
3	Unbolt and set aside the upper and lower power pedestal panels. Be sure to save the hardware.
4	Verify that the ac ground rod or electrode ring has been installed according to local code and NEC requirements.

—continued—

Procedure 4-1 (continued)
Connecting earth ground to the ac power pedestal

Step	Action
5	Measure the ground-to-earth resistance. ***Note:*** The ground-to-earth resistance must be less than or equal to 25 ¾.
6	Attach a 6 AWG tinned-copper wire to the exterior cabinet ground rod.
7	Route the wire into the cabinet through the 3.18 cm (1.25 in.) earth ground conduit. See Table 4-1 and Figure 4-1 on page 4-2.
8	Route the ground wire through the existing opening and attach it to an available grounding bus bar position in the load box (based on NEC 250-23/81/84/91/92). See Figure 4-2 on page 4-6.
9	Go to Procedure 4-2, “Connecting power leads to ac power pedestal.”

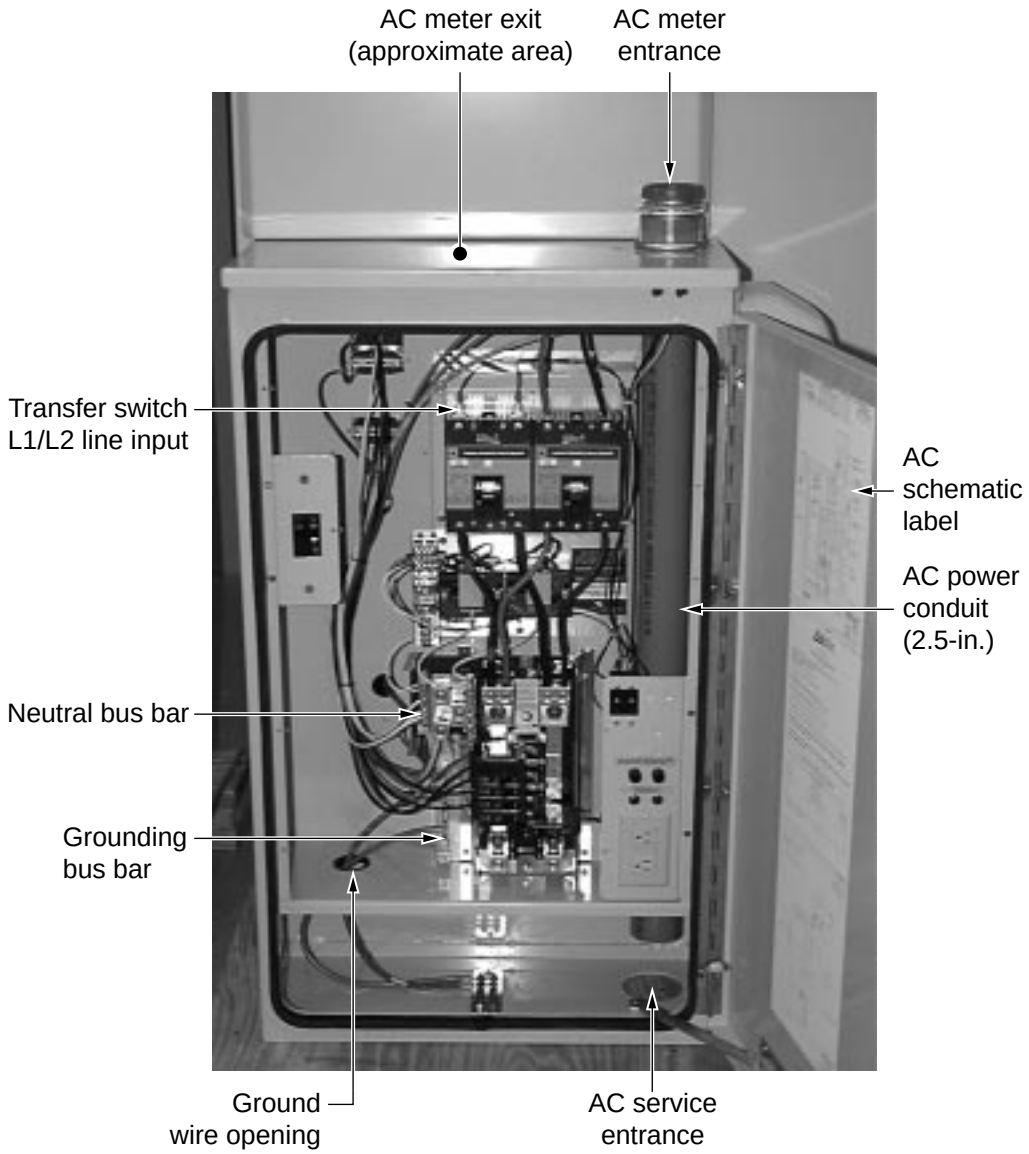
—continued—

Procedure 4-1 (continued)
Connecting earth ground to the ac power pedestal

Step	Action

Figure 4-2
AC power pedestal (for North American market only)

PC-16228



—end—

Procedure 4-2
Connecting power leads to ac power pedestal

Use this procedure to route and connect commercial ac power cabling in the ac power pedestal option.

Requirements

Before beginning this procedure, read the safety cautions and warnings in the "Cable conduit entry ports in the ac power pedestal" section on page 4-1.

Note: Refer to the ac schematic label on the inside of the power pedestal door.

Tools and materials

You need the following tools and materials:

- ac power meter (customer provided)
- voltmeter
- small flat blade screwdriver
- medium flat blade screwdriver
- wire strippers for 6 AWG
- 5/8 in. sheet metal screws
- sheet-metal hole-punch tool

Action

Step	Action
1	Verify that the external ac power feed circuit breakers for the commercial power leads are in the Off position. Verify that power is not present on the ac power leads.
2	Remove the top-mounted hub locking collar. See Figure 4-2 on page 4-6.
3	Punch out both the appropriate left and right knockouts located on the bottom of the ac meter socket panel (customer provided).
4	Mark the hole location for the ac meter exit on top of the power pedestal.
5	Using a sheet-metal hole-punch tool, punch an appropriately sized hole at the mark.
6	Attach the ac meter socket panel to the power pedestal hub on top of the power pedestal.
7	Align the meter socket against the rear pedestal solar panel and fasten using 5/8 in. sheet metal screws.

—continued—

Procedure 4-2 (continued)
Connecting power leads to ac power pedestal

Step	Action
8	Route the ac power leads (L1, L2, and Gnd) from the commercial ac power source through the 2.5-in. conduit in the ac power pedestal into the power meter panel and terminate the leads. ***Note:*** Use conductor sizes and lengths according to local conditions. Follow all NEC and local codes for wiring commercial ac power leads to the power pedestal.
9	Route the 6 AWG L1 and L2 ac line leads, the 6 AWG neutral (N) lead, and the 6 AWG Ground (Gnd) lead through the ac meter exit into the load center.
10	Connect the L1 and L2 leads to the transfer switch on the L1/L2 line lugs.
11	Connect the 6 AWG N lead to the load box neutral bus bar.
12	Connect the 6 AWG Gnd lead to the load box grounding bus bar.
13	Check that the neutral bonding screw in the cabinet ac load box panel is tightly secured to the neutral ground bar.
14	Verify all connections in the power pedestal.
15	Turn the commercial ac service on.
16	Turn the commercial ac power feed circuit breakers to the On position.
17	Use a voltmeter to verify the following power measurements:

Measurement points	**AC voltage**
L1 bar to L2 bar	~ 230 V ac
L1 bar to N bar	~ 115 V ac
L2 bar to N bar	~ 115 V ac

18	Turn off all circuit breakers in the power pedestal.
19	Reinstall all cover panels and secure tightly.
20	Close and secure the power pedestal door.

—end—

Routing internal VF cables

This chapter describes how to route and terminate the internal cabling in the modular cabinet (ModCab).

Chapter task list

This chapter includes the following tasks:

Cabling ports

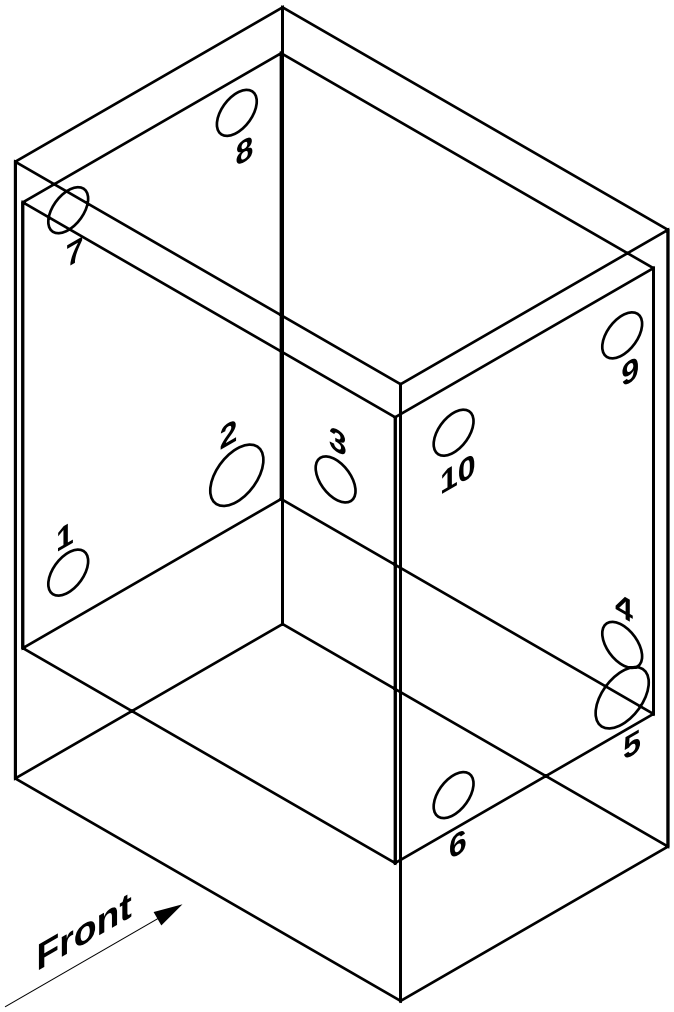
The ModCab has cable routing ports on the left, right, and back wall of the modules. Ports 1, 3, 4, and 6 to 10 are 7.62 cm (3 in.) in diameter. Ports 2 and 5 are 10.16 cm (4 in.) in diameter.

Figure 5-1 shows the cabling ports on the cabinet walls (as seen from the inside of the cabinet). These ports are used throughout the cabling process. The port designations signify which port to use for routing the cables.

Internal cabling is routed through these ports from one module to the next. The routing of the cables depends on the module configuration.

Figure 5-1
Cabling ports in the ModCab modules

PC-15958



Note: The diagram shows the walls as viewed from the inside of the cabinet.

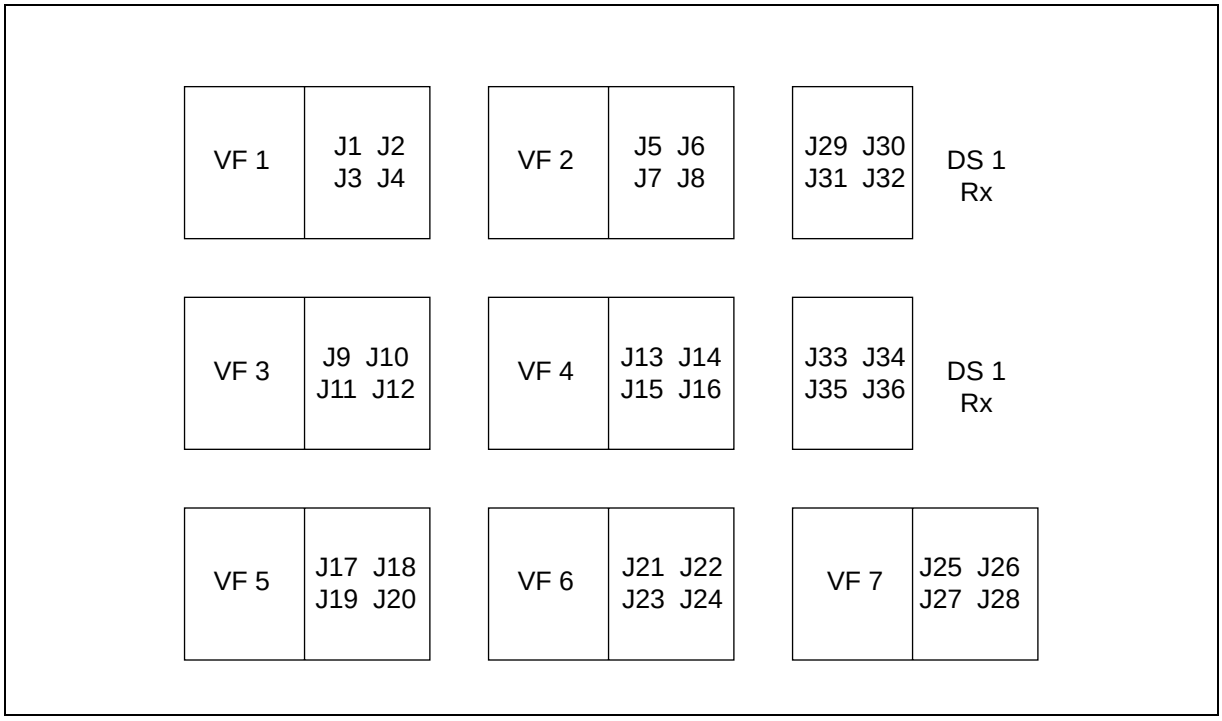
Procedure 5-1
Routing VF cables in B-B configuration

Use this procedure to route and connect the equipment-side voice frequency (VF) cables in the back-to-back (B-B) ModCab configuration.

Figure 5-2 shows the VF protector block layout in the large termination module (LTM).

Figure 5-2
LTM protector block layout

PC-16086



—continued—

Procedure 5-1 (continued)
Routing VF cables in B-B configuration

Before routing VF cable, plan your cabling routes based on the number and sizes of the VF cables and the module configuration. This procedure describes how to install VF cables in a fully-configured B-B configuration. Your ModCab may have fewer copper distribution shelves (CDS) than the maximum of seven.

Remember some cable routing ports are reserved for other types of cable routing. For example, reserve LTM port 8 when routing fiber to the dc power module (DCP) and DCP port 9 when routing fiber to the common equipment module (CEM).

Tools and materials

You need the following tools and materials:

- cable-tie cutter
- 6–8 in. (15.24–20.32 cm) cable ties

—continued—

Procedure 5-1 (continued)
Routing VF cables in B-B configuration

Table 5-1 lists where the VF cables originate and terminate in this configuration. All of the VF cables are coiled up in the LTM. Route the cables according to this table.

Table 5-1
VF cable routing and connection points

VF cable	VF Line number	From LTM protector block/plug	Out hole	To Cabinet module	Out hole	To CDS shelf	P1, P2 Left side	P3, P4 Right side
1	1–25	1/1	2	Through the DCP	4 into the CEM	CDS 1	1–25	
2	26–50	1/2	2				26–50	
3	51–75	1/3	2					51–75
4	76–96	1/4	2					76–96
5	97–121	2/1	2	DCP	–	CDS 2	1–25	
6	122–146	2/2	2				26–50	
7	147–171	2/3	2					51–75
8	172–192	2/4	2					76–96
9	193–217	3/1	3	CDM	–	CDS 3	1–25	
10	218–242	3/2	3				26–50	
11	243–267	3/3	3					51–75
12	268–288	3/4	3					76–96
13	289–313	4/1	4		–	CDS 4	1–25	
14	314–338	4/2	4				26–50	
15	339–363	4/3	4					51–75
16	364–384	4/4	4					76–96
17	385–409	5/1	3		–	CDS 5	1–25	
18	410–434	5/2	3				26–50	
19	435–459	5/3	3					51–75
20	460–480	5/4	3					76–96
21	481–505	6/1	4		–	CDS 6	1–25	
22	506–530	6/2	4				26–50	
23	531–555	6/3	4					51–75
24	556–576	6/4	4					76–96
25	577–601	7/1	4		–	CDS 7	1–25	
26	602–626	7/2	4				26–50	
27	627–651	7/3	4					51–75
28	652–672	7/4	4					76–96

—continued—

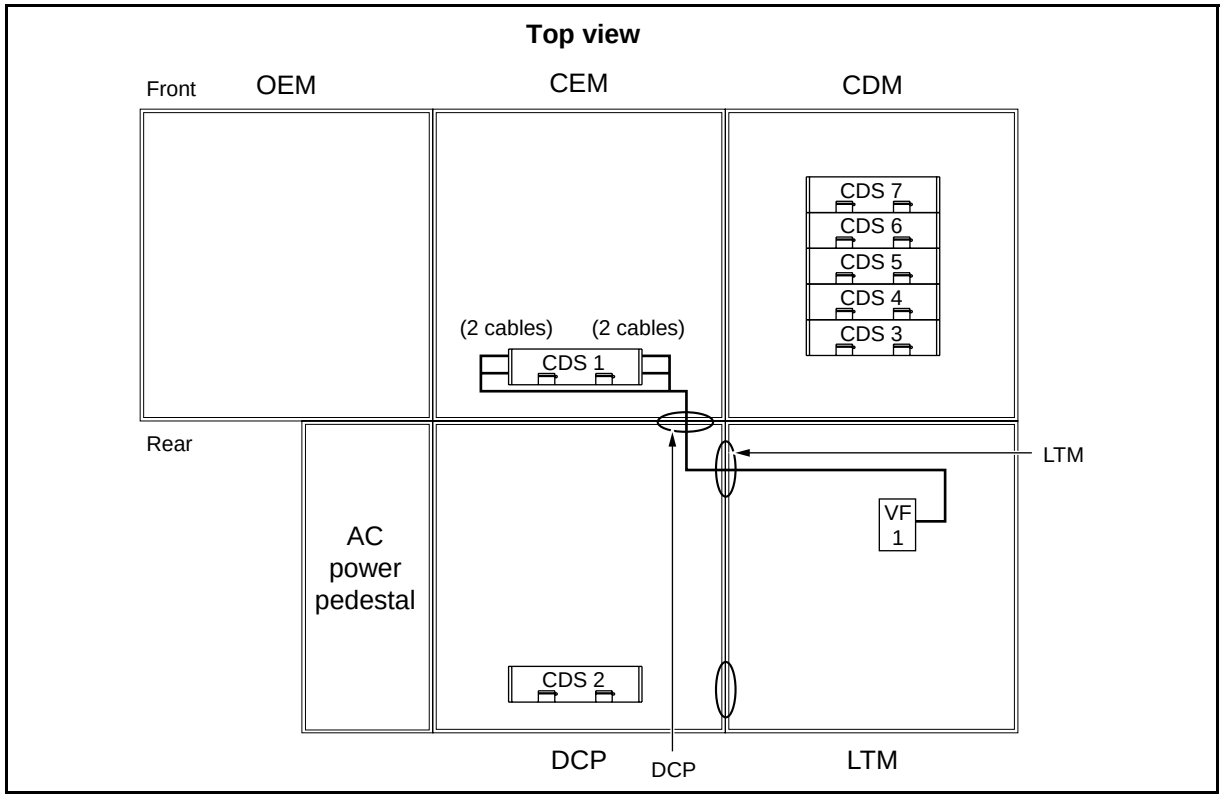
Procedure 5-1 (continued)
Routing VF cables in B-B configuration

Action

Step	Action
1	Open the LTM door and swing frame.
2	Cut the cable ties that secure the VF cables to the rear of the LTM. ***Note:*** The VF cables attached to the protector blocks are coiled and secured to the LTM back wall for shipment.
3	Locate the four 25-pair VF cables for CDS 1 (on block VF-1, J1–J4) and fold the remaining cables out of the way.
4	Route the 4 CDS 1 cables through the LTM cable routing port 8 into the DCP and then out DCP routing port 4 as shown in Figure 5-3.

Figure 5-3
Cable routing from protector block VF 1 to CDS 1

PC-16088



—continued—

Procedure 5-1 (continued)
Routing VF cables in B-B configuration

Step	Action
5	Route the VF cables for pairs 1–25 and 26–50 to the left CEM wall, to the swing frame, and to the left side of the CDS.
6	Route the VF cables for pairs 51–75 and 76–96 using the same route as in step 5 except continue across the back of the swing frame to the right side of the CDS.
7	Secure the cables with cable ties to the side wall of the module.
8	Connect the cables to the CDS VF connectors on the left and right sides of the CDS. ***Note:*** The CDS connectors are numbered to match the cables.
9	Repeat steps 3 through 8 for the remaining VF cables. However, use Table 5-2 and Figure 5-4 for mounting locations.
10	Secure the cables to the swing frame. ***Note:*** Be sure to leave a 25.4–35.6 cm (10–14 in.) service loop in the cables between the left wall and the swing frame.
11	Test the service loop by shutting the swing frame. Verify that the swing frame closes easily and that the cables do not bind or catch on anything.

Table 5-2
VF cable routing

From VF protector block	To shelf	Which is in the	Use LTM cable port
2	CDS 2	DCP	2
3	CDS 3	CDM	3
4	CDS 4	CDM	4
5	CDS 5	CDM	3
6	CDS 6	CDM	4
7	CDS 7	CDM	4

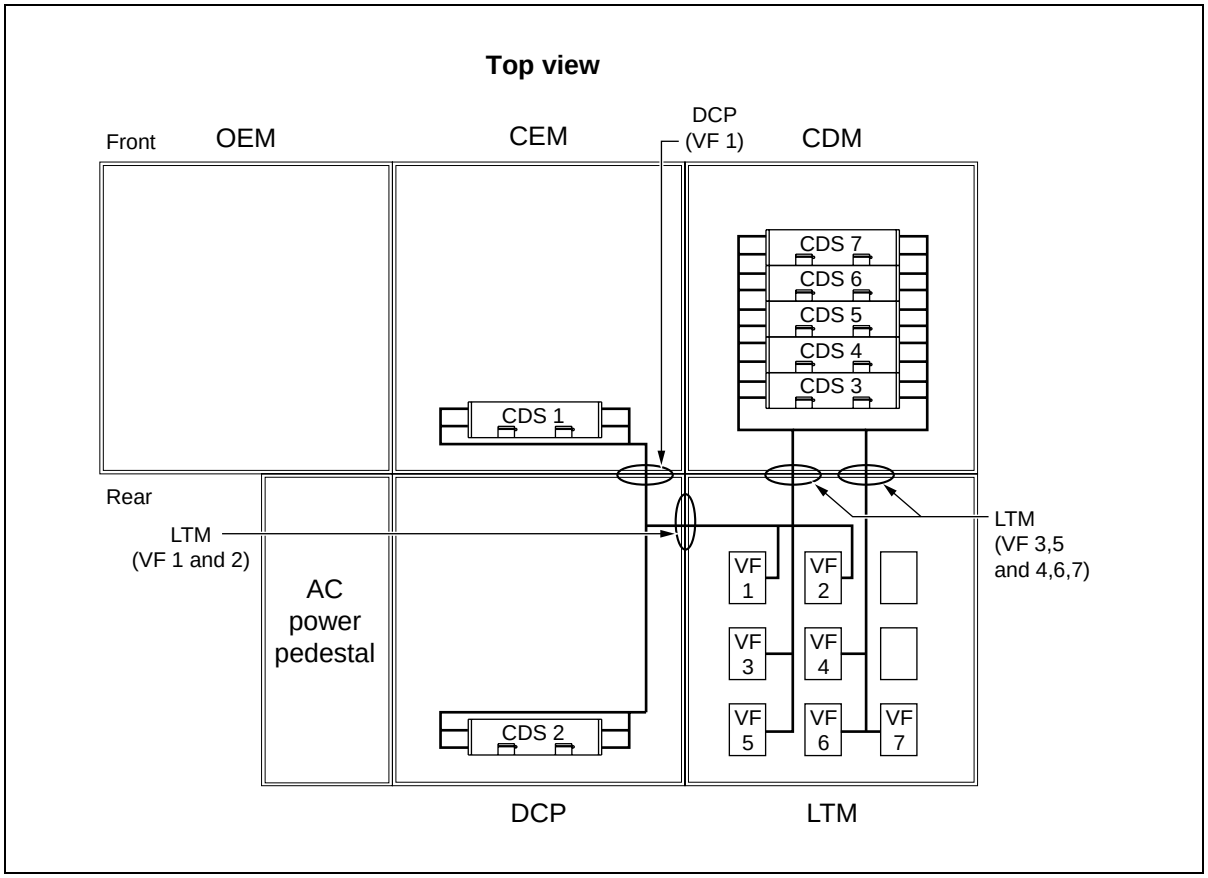
—continued—

Procedure 5-1 (continued)
Routing VF cables in B-B configuration

Step	Action

Figure 5-4
VF cable routing

PC-16089



—end—

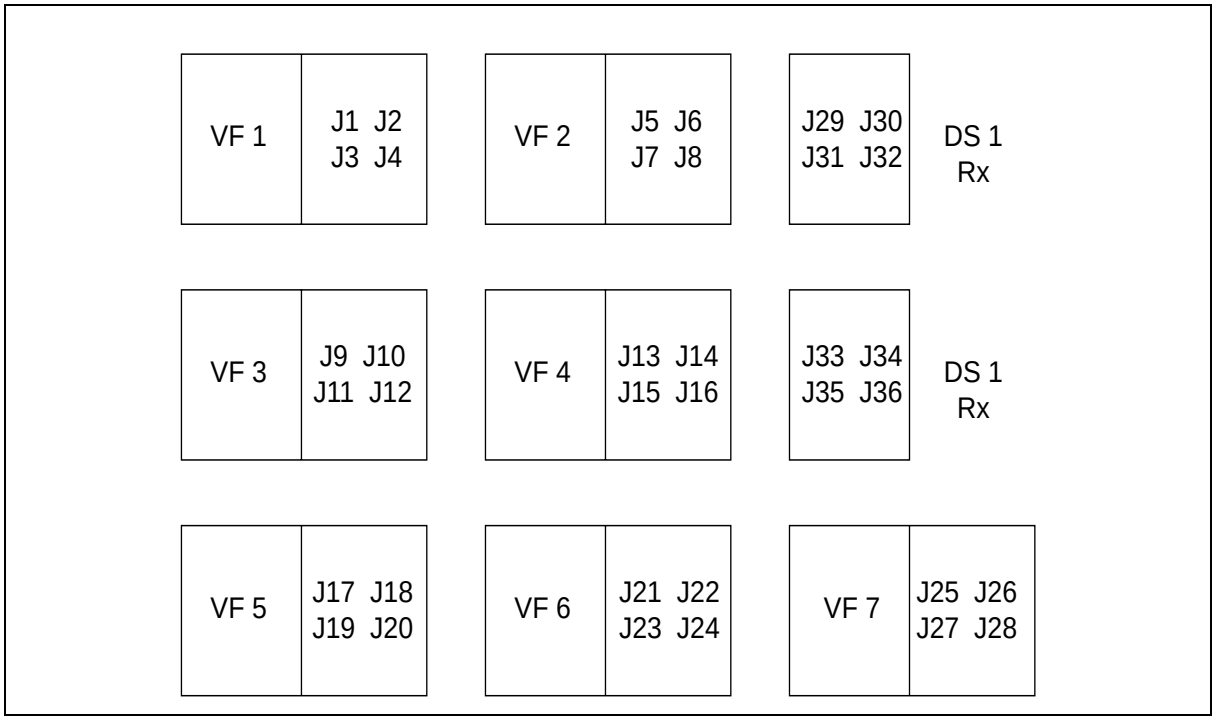
Procedure 5-2
Routing VF cables in SXS configuration

Use this procedure to route and connect the equipment-side voice frequency (VF) cables in the side-by-side (SXS) ModCab configuration.

Figure 5-5 shows the VF protector block layout in the large termination module (LTM).

Figure 5-5
LTM protector block layout

PC-16086



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Procedure 5-2 (continued)
Routing VF cables in SXS configuration

Before routing VF cable, plan your cabling routes based on the number and sizes of the VF cables and the module configuration. This procedure describes how to install VF cables in a fully-configured SXS configuration. Your ModCab may have fewer copper distribution shelves (CDS) than the maximum of seven.

Remember that some cable routing ports are reserved for other types of cable routing. For example, reserve LTM port 2 when routing fiber to the dc power module (DCP) or port 10 when routing fiber to the common equipment module (CEM).

Tools and materials

You need the following tools and materials:

- cable-tie cutter
- 6–8 in. (15.24–20.32 cm) cable ties

—continued—

Procedure 5-2 (continued)
Routing VF cables in SXS configuration

Table 5-3 lists where the VF cables originate and terminate in this configuration. All of the VF cables are coiled up in the LTM. Route the cables according to this table.

Table 5-3
VF cable routing and connection points

VF cable	VF Line number	From LTM protector block/plug	Out hole	To Cabinet module	Out hole	To CDS shelf	P1, P2 Left side	P3, P4 Right side
1	1–25	1/1	5	CEM	–	CDS 1	1–25	
2	26–50	1/2	5				26–50	
3	51–75	1/3	5					51–75
4	76–96	1/4	5					76–96
5	97–121	2/1	2	DCP	–	CDS 2	1–25	
6	122–146	2/2	2				26–50	
7	147–171	2/3	2					51–75
8	172–192	2/4	2					76–96
9	193–217	3/1	6	Through the CEM	5	CDS 3	1–25	
10	218–242	3/2	6		5		26–50	
11	243–267	3/3	6		5			51–75
12	268–288	3/4	6		5			76–96
13	289–313	4/1	5		5	CDS 4	1–25	
14	314–338	4/2	5		5		26–50	
15	339–363	4/3	5		5			51–75
16	364–384	4/4	5		5			76–96
17	385–409	5/1	9		9	CDS 5	1–25	
18	410–434	5/2	9		9		26–50	
19	435–459	5/3	9		9			51–75
20	460–480	5/4	9		9			76–96
21	481–505	6/1	9		9	CDS 6	1–25	
22	506–530	6/2	9		9		26–50	
23	531–555	6/3	9		9			51–75
24	556–576	6/4	9		9			76–96
25	577–601	7/1	9		9	CDS 7	1–25	
26	602–626	7/2	9		9		26–50	
27	627–651	7/3	9		9			51–75
28	652–672	7/4	9		9			76–96

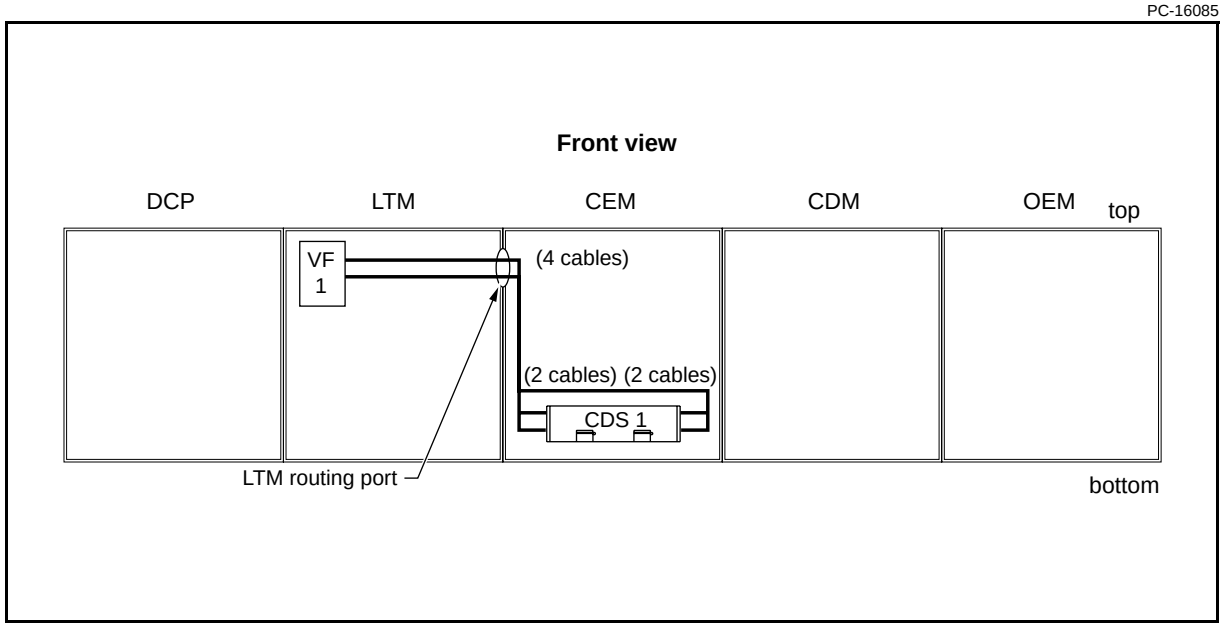
—continued—

Procedure 5-2 (continued)
Routing VF cables in SXS configuration

Action

Step	Action
1	Open the LTM door and swing frame.
2	Cut the cable ties that secure the VF cables to the rear of the LTM. ***Note:*** The VF cables attached to the protector blocks are coiled and secured to the LTM back wall for shipment.
3	Locate the four 25-pair VF cables for CDS 1 (on block VF-1, J1–J4) and fold the remaining cables out of the way.
4	Route the 4 CDS 1 cables through the LTM cable routing port 5 into the adjacent CEM as shown in Figure 5-6.

Figure 5-6
Cable routing from protector block VF 1 to CDS 1



5	Route the VF cables for pairs 1–25 and 26–50 down the module wall, to the swing frame and to the left side of the CDS.
6	Route the VF cables for pairs 51–75 and 76–96 using the same route as in step 5 except continue across the back of the swing frame to the right side of the CDS.

—continued—

Procedure 5-2 (continued)
Routing VF cables in SXS configuration

Step	Action
7	Secure the cables with cable ties to the side wall of the module.
8	Connect the cables to the CDS VF connectors on the left and right sides of the CDS. ***Note:*** The CDS connectors are numbered to match the cables.
9	Repeat steps 3 through 8 for the remaining VF cables. However, use Table 5-4 and Figure 5-7 for mounting locations.
10	Secure the cables to the swing frame. ***Note:*** Be sure to leave a 25.4–35.6 cm (10–14 in.) service loop in the cables between the left wall and the swing frame.
11	Test the service loop by shutting the swing frame. Verify that the swing frame closes easily and that the cables do not bind or catch on anything.

Table 5-4
VF cable routing

From VF protector block	To shelf	Which is in the	Use LTM cable port	Through
2	CDS 2	DCP	2	
3	CDS 3	CDM	5	CEM 5
4	CDS 4	CDM	5	CEM 5
5	CDS 5	CDM	9	CEM 9
6	CDS 6	CDM	9	CEM 9
7	CDS 7	CDM	9	CEM 9

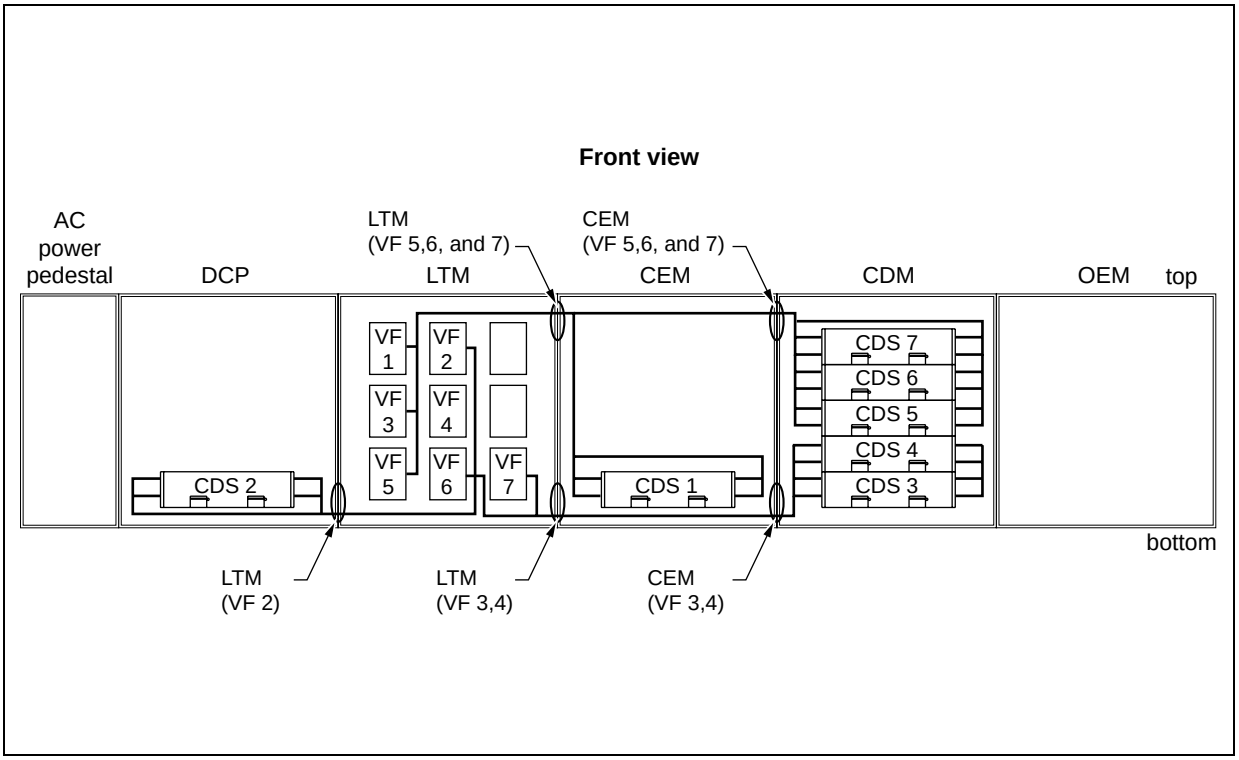
—continued—

Procedure 5-2 (continued)
Routing VF cables in SXS configuration

Step	Action

Figure 5-7
VF cable routing

PC-16087



—end—

Installing the OSP cables

This chapter describes routing and installing the outside plant (OSP) cabling into the modular cabinet (ModCab) large termination module (LTM).

Miscellaneous, voice frequency (VF), DS1, and maintenance cables enter the LTM through the OSP cable conduits in the bottom of the module. Fiber cabling is described in Chapter 7, “Installing the fiber cable.”

You can install various pair-count combinations of OSP line-side VF cable. You can install OSP cables from a minimum 100-pair cable up to a maximum of 1500-pair cable. Nortel Networks recommends that you install one 900-pair cable and one 600-pair cable for the maximum SAI cable-out count of 1400 line-side pairs.

Chapter task list

This chapter includes the following tasks:

Procedure	Task	See
6-1	Pulling the VF, miscellaneous, DS1, and ground cables into the LTM	page 6-3
6-2	Butting and stripping the VF, miscellaneous, DS1, and maintenance cables	page 6-4
6-3	Installing the cable bonding clamps	page 6-6
6-4	Finishing the OSP cable installation	page 6-11

Cable entry

The LTM has cable conduit entry ports in the bottom of the module.

Note: All trade sizes listed are based on Schedule 40 PVC.

Be sure to pull enough cable into the LTM so enough slack is available for splicing, routing, and dressing the VF cables.

Figure 6-1 shows where to pull the OSP cables into the LTM and Table 6-1 lists how much slack to pull for cable routing.

Figure 6-1
Conduit entry ports in the LTM

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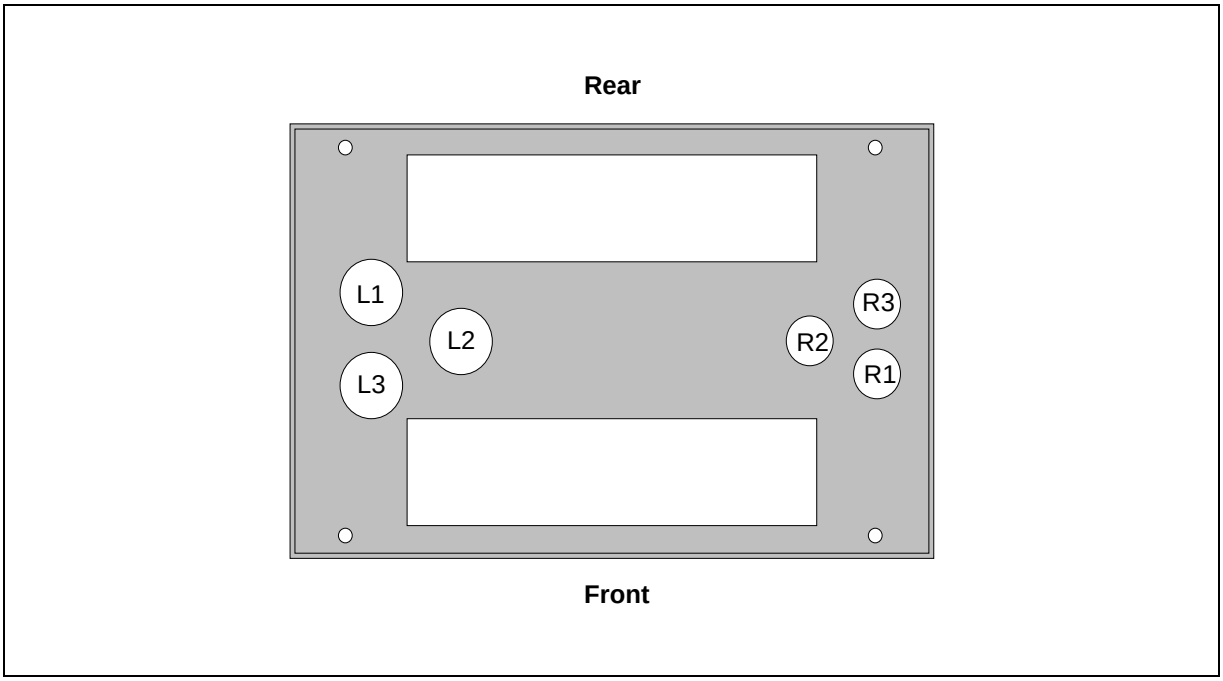


Table 6-1
OSP cable entry locations and lengths

When you pull cable for	Then pull this much slack into the LTM
VF pairs 1–1400	3.7 m (12 ft)
Miscellaneous pairs	7.6 m (25 ft)
DS1 distribution and maintenance pairs	7.6 m (25 ft)
OSP earth ground/grid	1.5 m (5 ft)

Procedure 6-1
Pulling the VF, miscellaneous, DS1, and ground cables into the LTM

Use this procedure to pull the voice frequency (VF), miscellaneous, DS1 and ground cables into the large termination module (LTM).

When pulling VF cables into the left side of the LTM, the number of cables and the conduit used depend on the pair count of the cables.

Be sure to pull enough cable into the LTM so enough slack is available for splicing, routing, and dressing the outside plant (OSP) cables.

Tools

You need a cable knife or cable sheath cutter.

Action

Step	Action
Pulling VF cables into the left side of the LTM	
1	Beginning with conduit L1 as shown in Figure 6-1 on page 6-2, cut the rubber boot at the section that fits the diameter of the VF cable. ***Note:*** Do not cut the boots on unused cable entry conduits.
2	Begin pulling VF cables into the LTM using conduit L1. ***Note:*** Pull at least 12 ft (3.7 m) of slack as shown in Table 6-1 on page 6-2.
3	Continue cutting boots and pulling VF cables into the LTM using cable entry conduits L2 and then L3 as needed.
4	Secure the cables in an out-of-the-way position.
Pulling miscellaneous, DS1 and ground cables into the right side of the LTM	
5	On the right side of the LTM, cut the boots for the cable entry conduits and pull the appropriate cables (except for the fiber cable) into the LTM as shown in Figure 6-1 on page 6-2. ***Note:*** Pull at least 25 ft of slack as shown in Table 6-1 on page 6-2 (5 ft or 1.5 m for the ground cable).
6	Secure the cables in an out-of-the-way position.
7	Go to Procedure 6-2, “Butting and stripping the VF, miscellaneous, DS1, and maintenance cables.”

—end—

Procedure 6-2
Butting and stripping the VF, miscellaneous, DS1, and maintenance cables

Use this procedure explains how to butt and strip outside plant (OSP) cables for installation into the ModCab.

CAUTION
Wire damage
This procedure includes cutting the cables. Be careful not to cut through any of the pairs.

After butting and stripping the cables, always check the cable carefully to verify that none of the pairs have been nicked, stripped, or cut.

Replace the cable if any pairs are damaged.

Tools and materials

You need the following tools and materials:

- standard cable butting, stripping and fanning tools
- cable insulating gel removal material; D-gel or equivalent de-greaser
- cleaning rags
- electrical tape

Action

Step	Action
1	On all of the cables in the large termination module (LTM) except the fiber cable, mark a point that is at least 3 in. (7.62 cm) above the cable-tie cross member. (The cable-tie cross member is located above the cable entry conduits in the bottom of the cabinet.) See Figure 6-2 on page 6-5. ***Note:*** This mark shows where the cable will be butted.

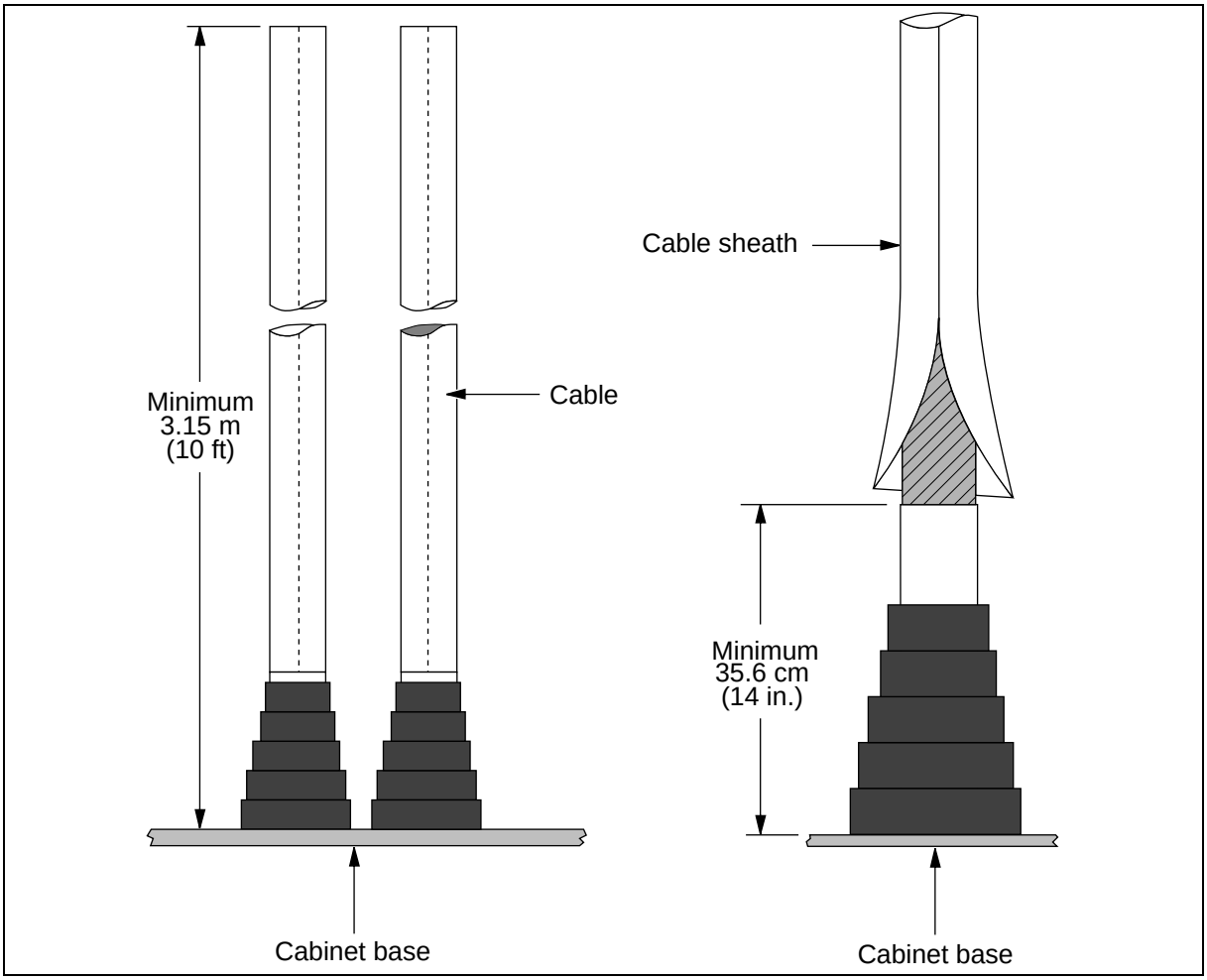
—continued—

Procedure 6-2 (continued)
Butting and stripping the VF, miscellaneous, DS1, and maintenance cables

Step	Action
2	When you pull the plastic wrap off a cable to expose the cable pairs, immediately tie-wrap and mark the end of each 25-pair binder group in the cable to prevent split-pairs and mixed binders.
3	Butt, fan and strip the cables at the mark according to local practices.
	Note: Avoid splitting pairs during the butt, fan, and strip process.
4	If using filled cable, use rags and D-gel to remove as much of the insulating gel from the cables as you can.
5	Go to Procedure 6-3, “Installing the cable bonding clamps.”

Figure 6-2
Sheath height and cable length

PC-15787



—end—

Procedure 6-3
Installing the cable bonding clamps

Use this procedure to install and connect cable bonding clamps for grounding outside plant (OSP) cables inside the large termination module (LTM).

> ***Note:*** This procedure does not apply to cables that are bonded and grounded in an external location.

Tools and materials

You need the following tools and materials:

- one 6-8 in. (15–20 cm) adjustable wrench
- cable knife or cable sheath cutter
- voltmeter
- bonding clamp assemblies as required for each cable installed
- at least one 18 in. (30.48 cm) length of 6 AWG stranded wire for each OSP cable
- two 6 AWG, 1/4 in. (0.635 cm) ring type crimp lugs for each OSP ground wire
- electrical tape

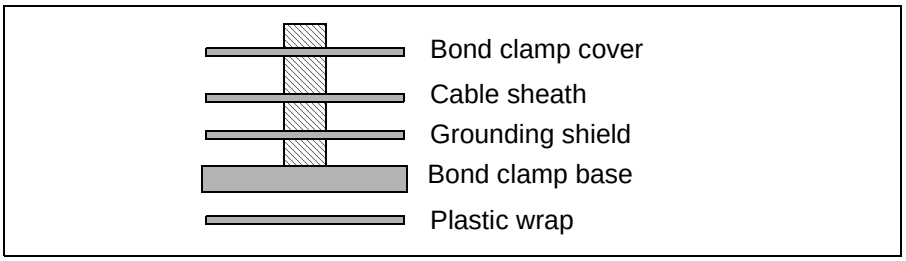
Action

Step	Action
	Preparing the cable for bonding clamps
	Note: Install bonding clamps according to local practices and electrical requirements. Some locations require 2 ground wires per cable. The following steps show how to install one bonding clamp per cable.
1	Cut the outer casing of the cable 5.08 cm (2 in.) down toward the base of the LTM as shown in Figure 6-3 on page 6-8.
2	Cut 2.54 cm (1 in.) to the left, across (perpendicular to) the cable.
	Note: This cut creates the bonding clamp mounting flap on the cable.
3	Slide a paper punch between the plastic wrap and the grounding shield on the bonding clamp mounting flap on the first cable.
4	Punch a hole through the grounding shield and the cable sheath in the center of this area, 2.54 cm (1 in.) down and 1.27 cm (1/2 in.) across.

—continued—

Procedure 6-3 (continued)
Installing the cable bonding clamps

Step	Action
	Installing the bonding clamp
5	Install the threaded end of a bond clamp through the holes in the grounding shield and the sheath as shown in the following diagram and in Figure 6-3 on page 6-8.



6	Place the bond clamp cover plate over the threaded stud and then against the cable.
7	Secure the bond clamp to the cable with one of the threaded nuts.
8	Using electrical tape, tape 5.08 cm (2 in.) above and below the bond clamp.

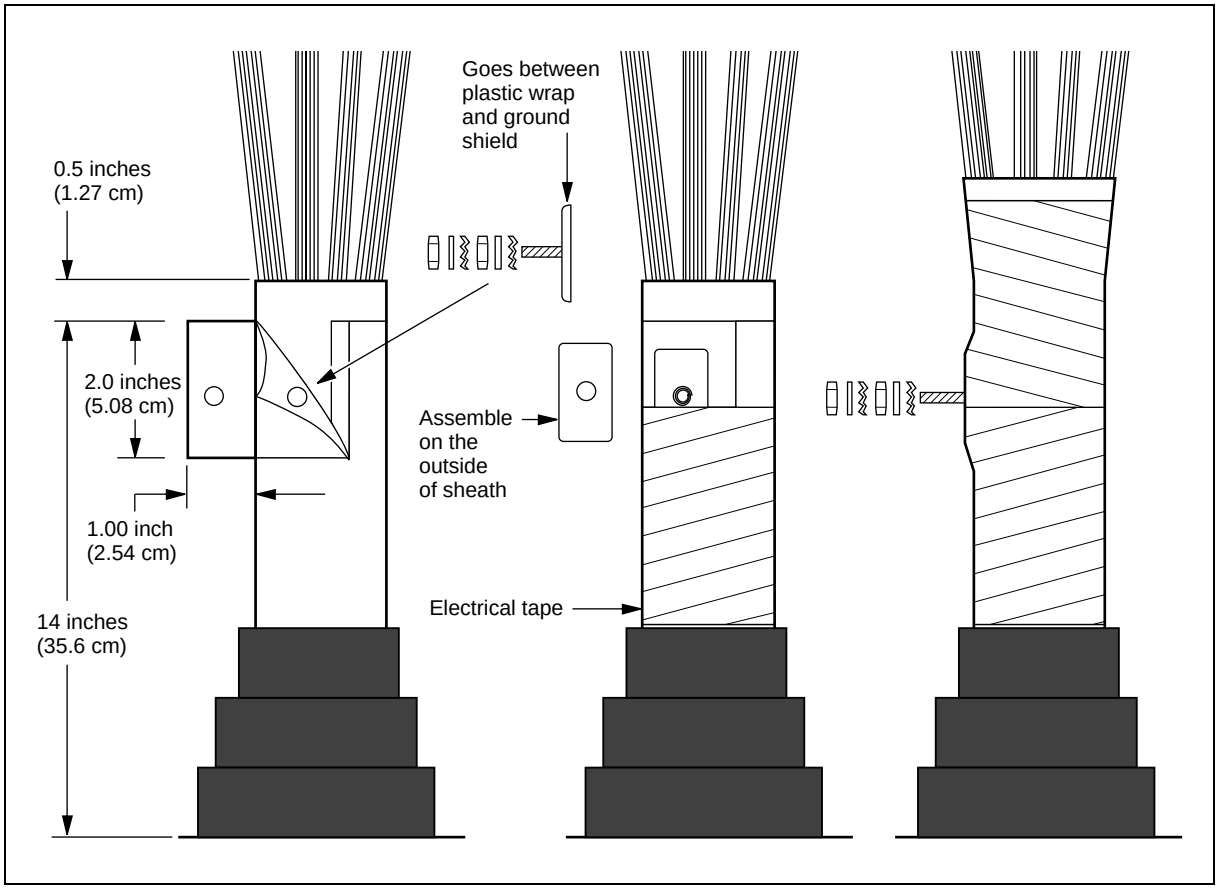
—continued—

Procedure 6-3 (continued)
Installing the cable bonding clamps

Step	Action

Figure 6-3
Installation of bonding clamp

PC-15798



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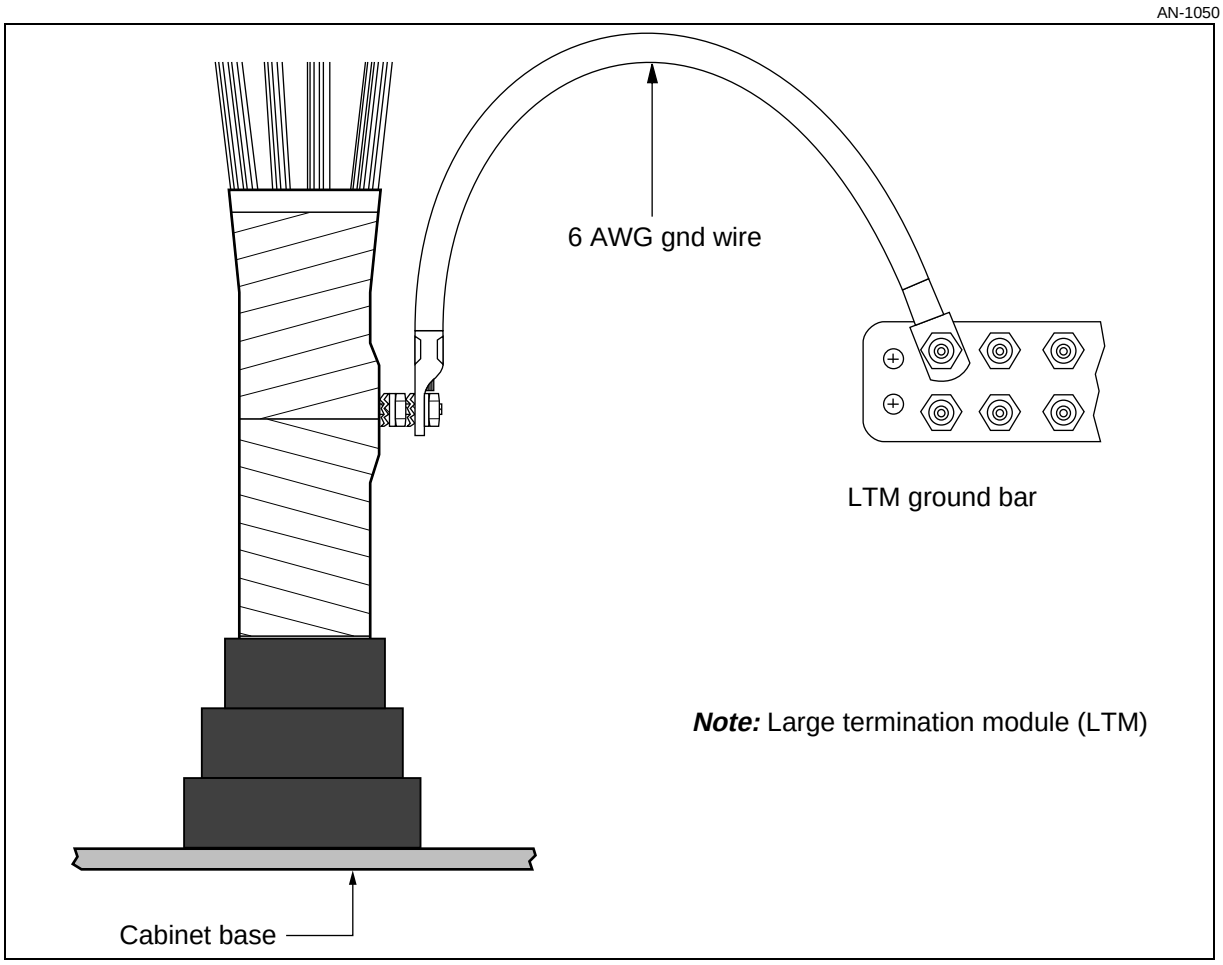
Procedure 6-3 (continued)
Installing the cable bonding clamps

Step	Action

Figure 6-4
Attachment of ground wire to grounding bar



—continued—

Procedure 6-3 (continued)
Installing the cable bonding clamps

Step	Action
9	Cut a 4 ft (1.22 m) piece of 6 AWG stranded wire and attach a ring lug to each end. ***Note:*** The ground wire and the ring lugs are customer-supplied and field-installed.
10	Connect one end of the ground wire to the bond clamp and secure it with one of the threaded nuts as shown in Figure 6-3 on page 6-8.
11	Connect the other end of the ground wire to the LTM grounding bar on the rear or side wall of the LTM as shown in Figure 6-4 on page 6-9.
12	Measure the resistance between the bond clamp and the LTM grounding bar. ***Note:*** The requirement is 0 ohms resistance.
13	Securely tape the bonding clamp and cable sheath at the butt using electrical tape as shown in Figure 6-3 on page 6-8.
14	Repeat steps 1 through 13 for each OSP cable.
15	Go to Procedure 6-4, “Finishing the OSP cable installation.”

—end—

Procedure 6-4
Finishing the OSP cable installation

Use this procedure to finish the outside (OSP) cable installation by securing the OSP cables for splicing, dressing the cable pair bundles, and sealing the cable entry boots.

Tools and materials

You need the following tools and materials:

- cable tie or tape cutting tool as required
- hose clamp tool as required for the hose clamp
- 8 in. cable ties
- 16 in., 600 lb cable ties
- one hose clamp to fit or two rolls of 3M EZ-Wrap for each boot used

Action

Step	Action
	Securing the VF cables for splicing
1	Dress the voice frequency (VF) cables to the cable-tie cross member.
2	Use two 40.6 cm (16 in.), 272 kg (600 lb) cable ties to secure each cable to the cable-tie cross member.
3	Dress all of the VF cable pair bundles to the side wall of the large termination module (LTM) and secure them with tie wraps to the lowest tie lances. ***Note:*** Leave enough lead length for splicing the VF pairs.
4	Dress and secure the ground wires.
	Securing the DS1, maintenance and miscellaneous cables for splicing
5	Dress the DS1, maintenance, and miscellaneous cables to the right side of the LTM.
6	Secure the cables to the cable-tie lances on the side wall. ***Note:*** Leave enough lead length for splicing the pairs.
7	Dress and secure the cable ground wires.

—continued—

Procedure 6-4 (continued)
Finishing the OSP cable installation

Step	Action
	Connecting the OSP ground/grid wire
8	If necessary, connect the external OSP ground/grid wire to the grounding bus in the LTM using a 2-hole 6 AWG ground lug.
	Sealing the cable boots
	Note: Nortel Networks recommends using either 3M EZ-Wrap tape or a hose clamp to seal the rubber boots. If an unused boot is cut, use local procedures and standards to close the unused boot.
9	If using the hose clamp, install one on each rubber boot that has cable routed through it. If using tape, tape at least 20.3 cm (8 in.) on either side of the top of the boot.
	—end—

Installing the fiber cable

This chapter describes routing and splicing the fiber cables in the ModCab.

When the outstanding plant (OSP) fiber cable is spliced at an external location, bond and ground the cable at that location so only protected fiber patch cords enter the cabinet.

When the OSP fiber cable is spliced in an internal location, the OSP fiber cable enters the cabinet directly. Bond and ground the OSP fiber cable in either the large termination module (LTM) or at the fiber management shelf.

Chapter task list

This chapter includes the following tasks:

Warnings and cautions

Always observe the following warnings and cautions when routing and splicing fiber cables:

- Wear safety glasses when installing optical fibers.
- Use tweezers and the sticky side of a piece of vinyl tape to handle loose fiber ends.
- Protect single fiber optical connectors with dust caps.
- Place any discarded fiber cuttings in a plastic bottle specifically used for disposal.

DANGER
Laser radiation hazard
Avoid direct exposure to fiber or optical connector ends. Laser radiation may be present and can cause serious eye damage.

DANGER
Glass particle hazard
Get immediate medical attention if you get a glass chip lodged in or near your eyes.

CAUTION
Risk of damage to fiber optic patch cords
Handle the fibers with extreme care. Never bend the cables into a curve with a radius smaller than 3.0 inches (76 mm). Tighten connections to the optical units finger tight only.

CAUTION
Clean all optical connectors
Dust can adversely affect optical connector performance. Clean all connectors before inserting the connectors into the mating sleeves. Use clean dust caps when connectors are not in use.

CAUTION
Fiber damage hazard
Do not exceed the bend radius of the cable or the optical fibers for the cable you are installing. If a fiber is damaged, replace the entire OSP fiber cable.

How to use this chapter

The procedures you perform and the order in which you perform them depends on the following:

- the fiber cable bonding and grounding location
- the type of fiber management system installed, if any

Before you begin these procedures, check your job specifications. Then use Table 7-1 to determine which procedures to perform.

Table 7-1
How to use this chapter

If the internal fiber management system is	And the bonding and grounding is in	Then perform	See
Installed	the fiber management system	Procedure 7-1 Procedure 7-2 Procedure 7-10	page 7-6 page 7-7 page 7-32
Installed	an external location	Procedure 7-1 Procedure 7-4 Procedure 7-10	page 7-6 page 7-16 page 7-32
Installed	the LTM	Procedure 7-1 Procedure 7-5 Procedure 7-6 Procedure 7-7 Procedure 7-9 Procedure 7-10	page 7-6 page 7-18 page 7-20 page 7-23 page 7-30 page 7-32
None	an external location	Procedure 7-1 Procedure 7-3 Procedure 7-10	page 7-6 page 7-10 page 7-32
None	the LTM	Procedure 7-1 Procedure 7-5 Procedure 7-6 Procedure 7-7 Procedure 7-8 Procedure 7-10	page 7-6 page 7-18 page 7-20 page 7-23 page 7-24 page 7-32

Cable entry

The LTM has cable routing ports in the side and rear panels and cable conduit entry ports located in the bottom.

Note: All trade sizes listed are based on Schedule 40 PVC.

Figure 7-1 shows the cable routing port numbering in the ModCab modules.

Figure 7-1
Cable routing ports in the ModCab

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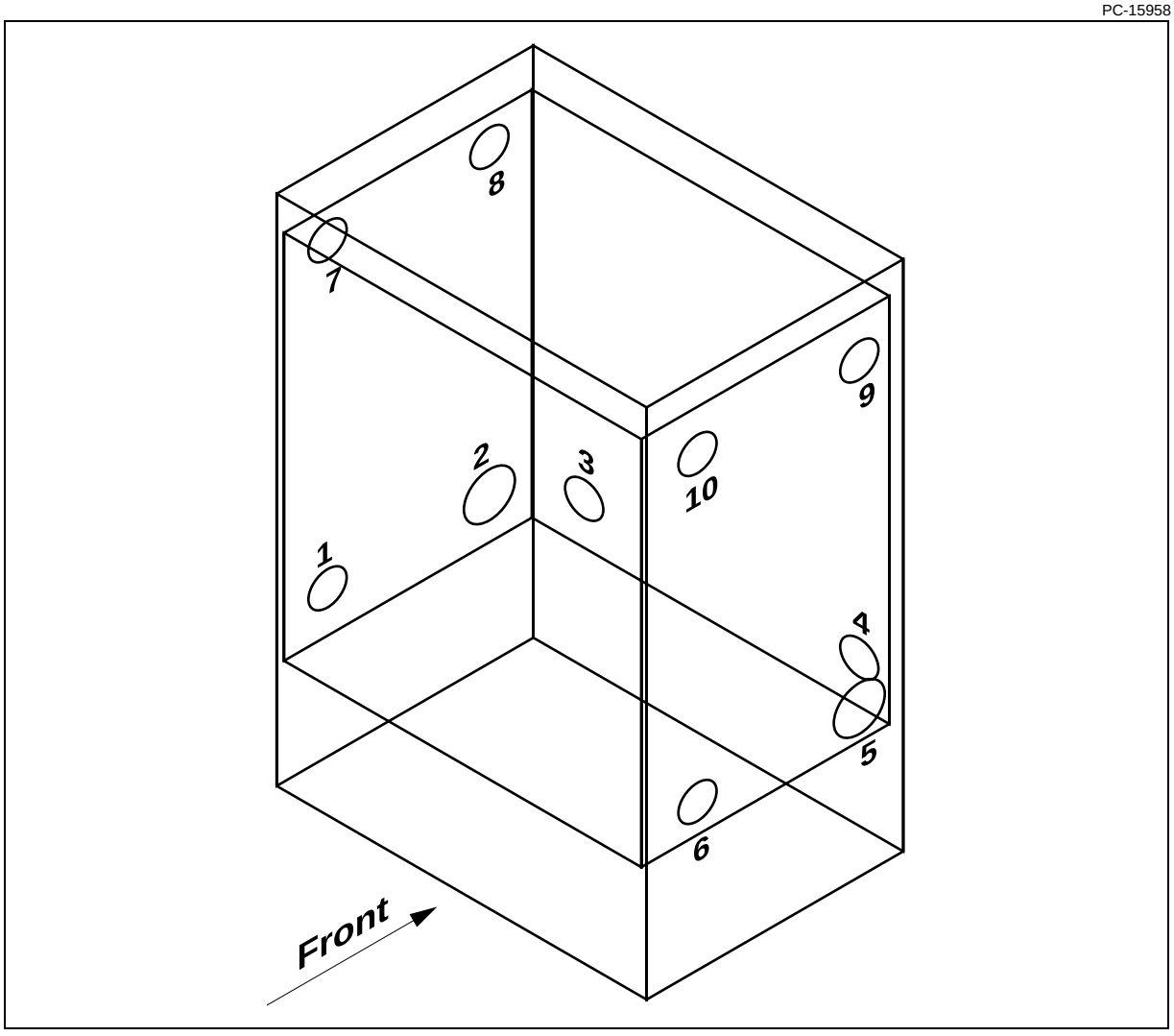
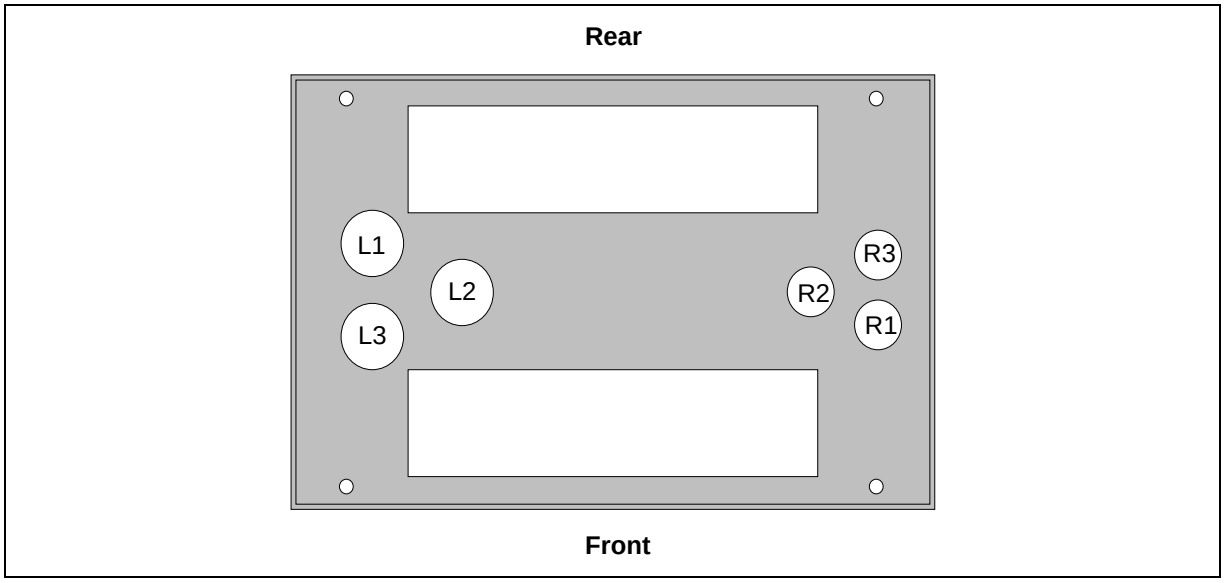


Figure 7-2 shows where to pull the outside plant (OSP) cables into the LTM.

Figure 7-2
Conduit entry ports in the LTM

PC-16081



Procedure 7-1
Pulling fiber cables into the LTM

Use this procedure to pull the outside plant (OSP) fibers or cables into the large termination module (LTM).

If the fiber cable has been bonded and grounded in an external location, you will be pulling protected fibers into the LTM. Be extremely cautious in order to prevent damaging the fibers.

If the fiber cable is to be bonded and grounded in the LTM or at an internal fiber management system, you will be pulling raw OSP fiber cable into the LTM.

Use the front-most conduit entry for pulling fiber into the LTM.

Be sure to pull enough cable into the LTM so you have enough slack available for splicing, routing, and dressing the fiber cables.

Tools and materials

You need the following tools and materials:

- cable-tie cutting tool as required
- 20.32 cm (8 in.) cable ties

Action

Step	Action

Pulling fiber cables into the right side of the LTM

Note: The type of fiber cabling that you pull into the cabinet depends on the fiber cable bonding and grounding location.

If the bonding and grounding is	Then pull
External	patch cords or pigtails (protected by split-flex tubing or other fiber protection specified by local practices)
Internal	jacketed OSP fiber cable

1 On the right side of the LTM, cut the boot (R1 as shown in Figure 7-2 on page 7-5) for the fiber cable entry hole and pull the fiber cable into the LTM.

Note: Pull at least 63.50 cm (25 ft) of slack into the LTM.

2 Secure the cable or protected fibers in an out-of-the-way position.

3 See Table 7-1 on page 7-3 for next procedure.

—end—

Procedure 7-2
Routing fiber cables to the fiber manager shelf

Use this procedure to route the outside plant (OSP) fiber cable into the ModCab when the cable is spliced, bonded, and grounded at an internal fiber management system.

Tools and materials

You need the following tools and materials:

- cable-tie cutting tool as required
- 20.32 cm (8 in.) cable ties

Action

Step	Action
1	Route the fiber cable up the right wall in the large termination module (LTM), across the top of the module, through cable routing hole number 7 in the LTM and into the dc power module (DCP) as shown in Figure 7-3 on page 7-8.
2	Route the fiber cable across the top of the DCP, down the left side, and across the back of the swing frame to the fiber manager shelf.
3	In the LTM, secure the cable with cable ties.
4	Verify that the swing frame in the LTM can close without touching the fiber cable.
5	In the DCP, mark the cable at the point of entry into the fiber manager shelf.
6	Butt, strip, and ground the cable in the fiber manager shelf according to the manufacturer's instructions (see Figure 7-4 on page 7-9).
7	Splice the fibers according to local fiber splicing procedures.
8	Route, dress, and connect the fiber pigtails or patch cords in the fiber manager shelf according to the manufacturer's instructions.
9	In the DCP, secure the cable with cable ties. ***Note:*** Maintain at least the minimum bend radius (76 mm [3.0 in.]) for the fiber cable.
10	See Table 7-1 on page 7-3 for next procedure.

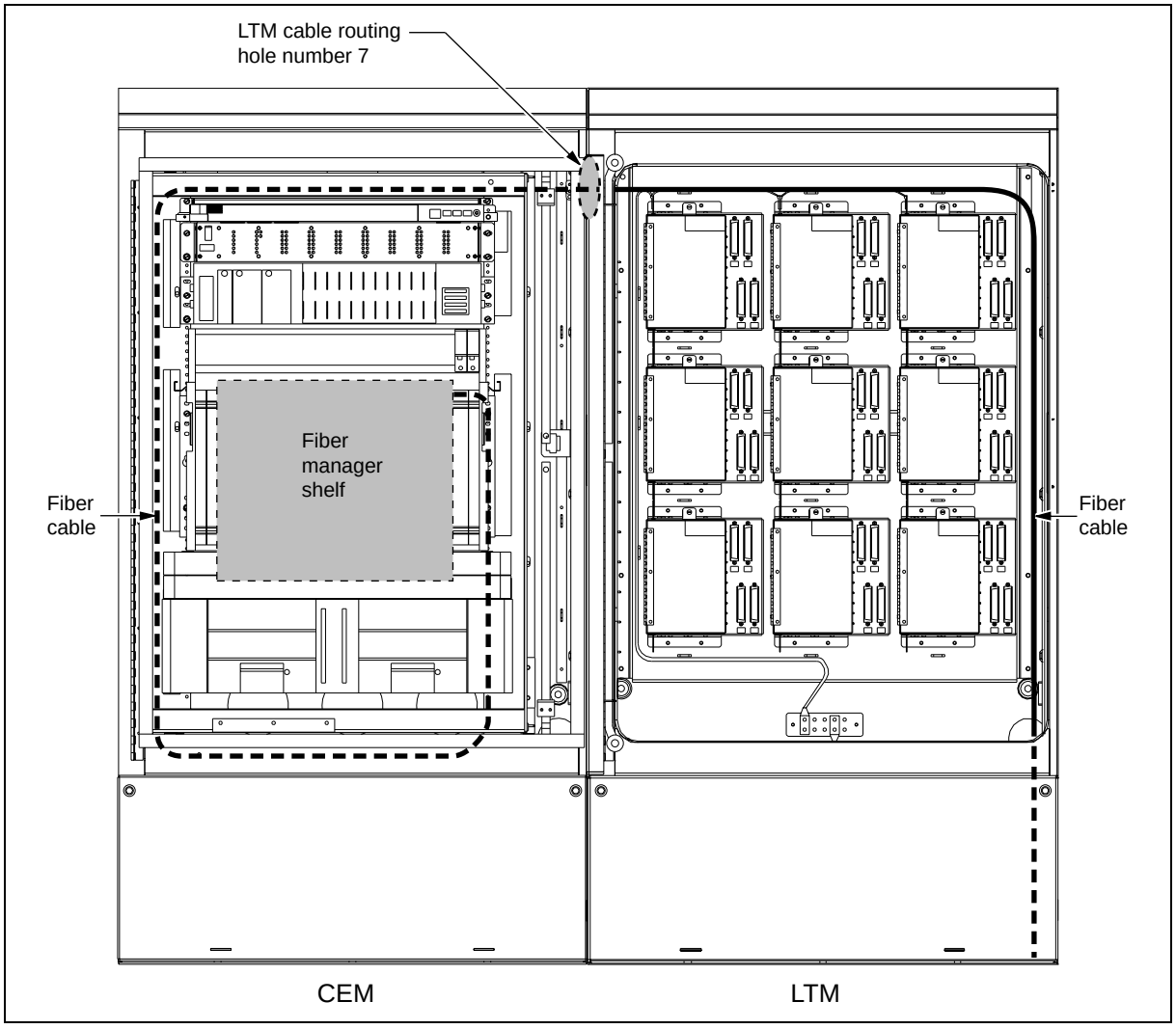
—continued—

Procedure 7-2 (continued)
Routing fiber cables to the fiber manager shelf

Step	Action

Figure 7-3
Fiber cable routing to the fiber manager

PC-16123



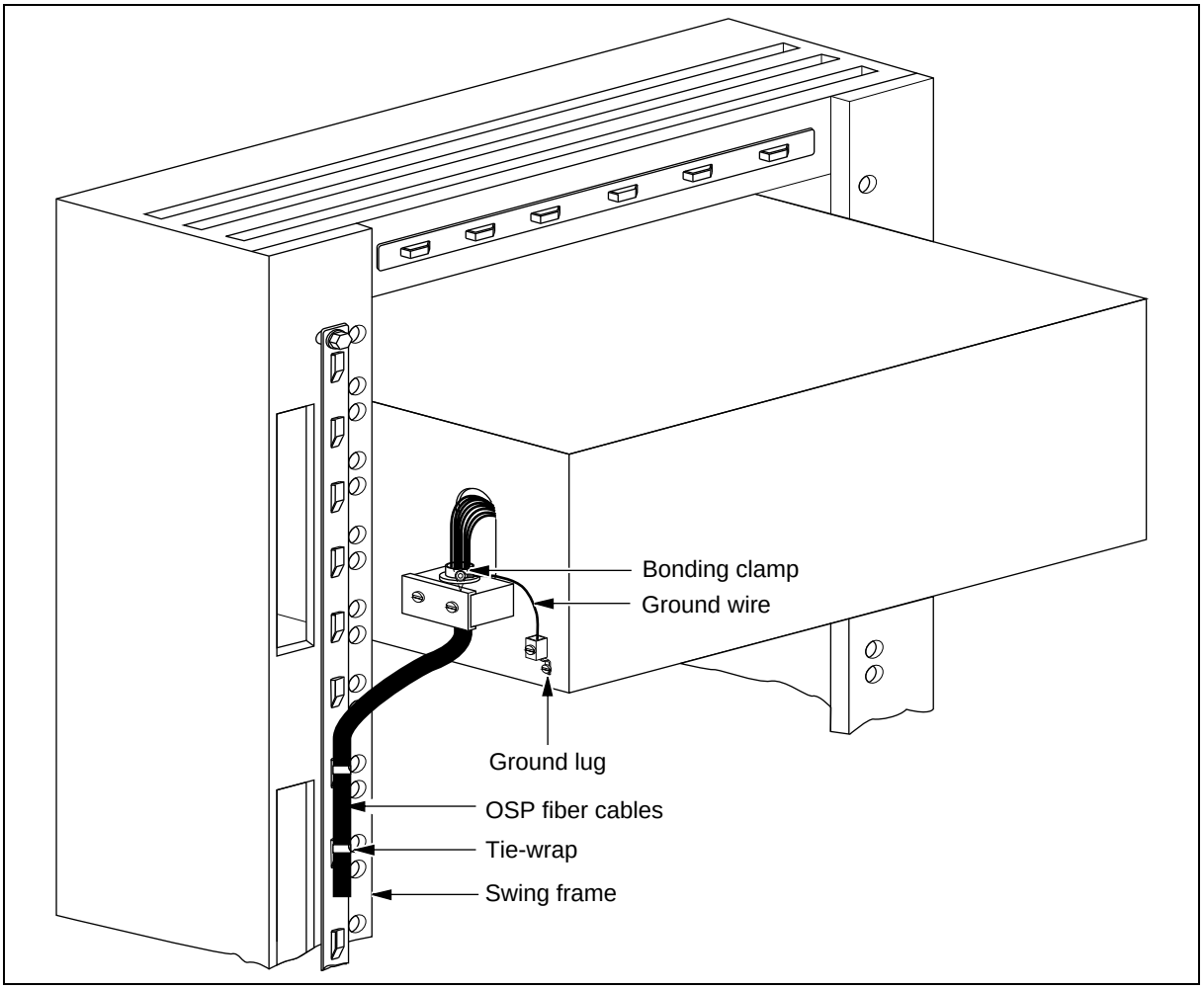
—continued—

Procedure 7-2 (continued)
Routing fiber cables to the fiber manager shelf

Step	Action

Figure 7-4
Butt and ground the fiber cable at the fiber manager (left rear view)

PC-15131



—end—

Procedure 7-3
Routing external fiber cables to the ABM shelf

Use this procedure to route protected fiber patch cords or pigtails through the large termination module (LTM) to the access bandwidth manager (ABM) shelf in the common equipment module (CEM). This procedure applies to applications that have the outside plant (OSP) fiber cable bonded, grounded, and spliced in an external location.

Tools and materials

You need the following tools and materials:

- cable-tie cutting tool as required
- 1.27 cm (1/2 in.) split-flex tubing
- 20.32 cm (8 in.) cable ties

Action

Step	Action
1	Label each end of the optical patch cords or pigtails with the following information: • the slot number in the ABM shelf for the OC-3 or OC-12 optical interface card • the direction of signal, Tx (transmit) or Rx (receive)
2	Encase the fibers in protective 1.27 cm (1/2 in.) split-flex tubing.
3	Route the tubing up the right wall of the LTM, across the top, down the left wall through cable routing port 6, into the CEM (see Figure 7-5 on page 7-11).

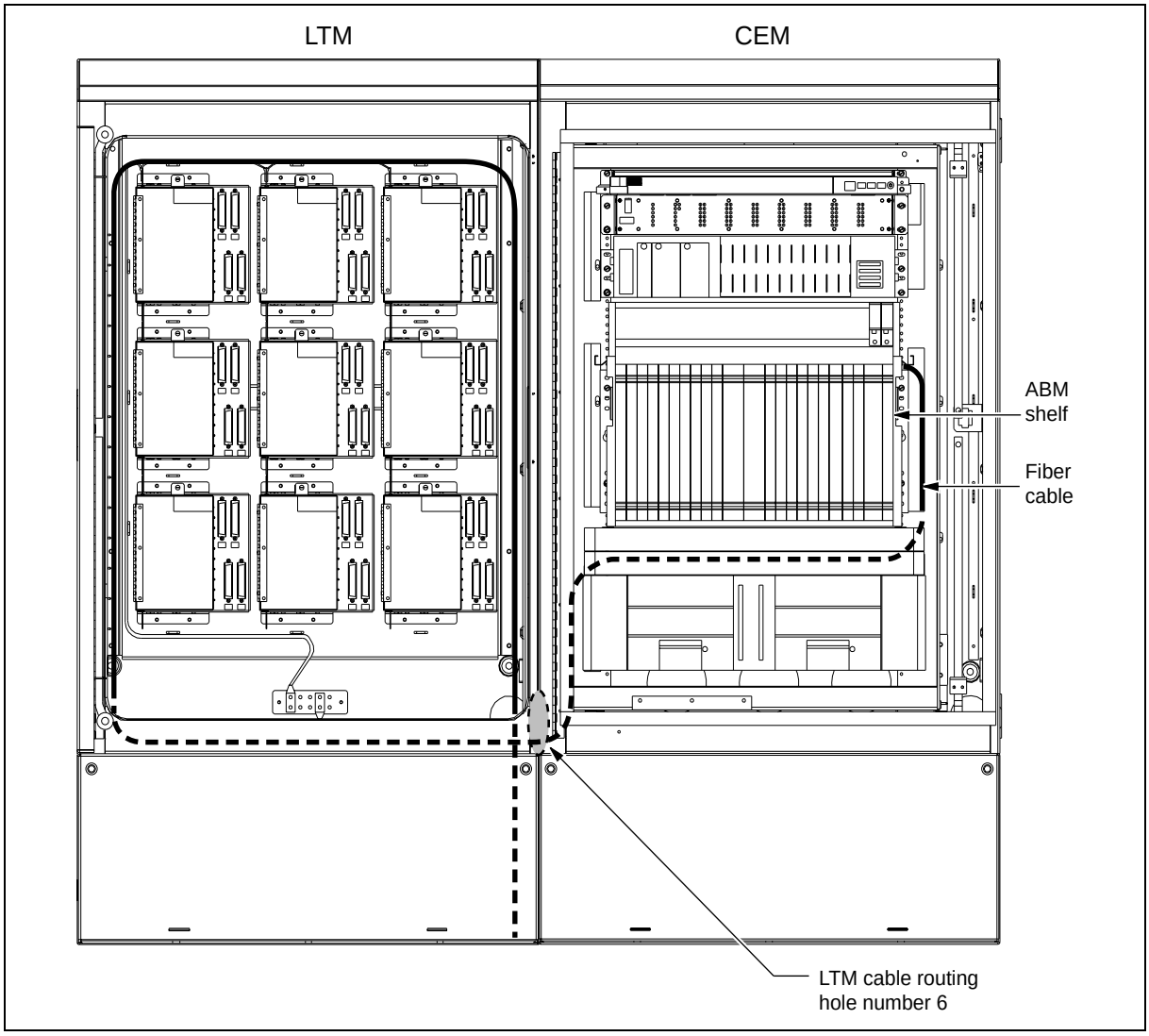
—continued—

Procedure 7-3 (continued)
Routing external fiber cables to the ABM shelf

Step	Action

Figure 7-5
Fiber routing to the ABM shelf

PC-16119



Secure the tubing in the ABM shelf

4 Route the tubing up the left side of the CEM on the swing frame and across the back of the swing frame to the right side of the ABM shelf.

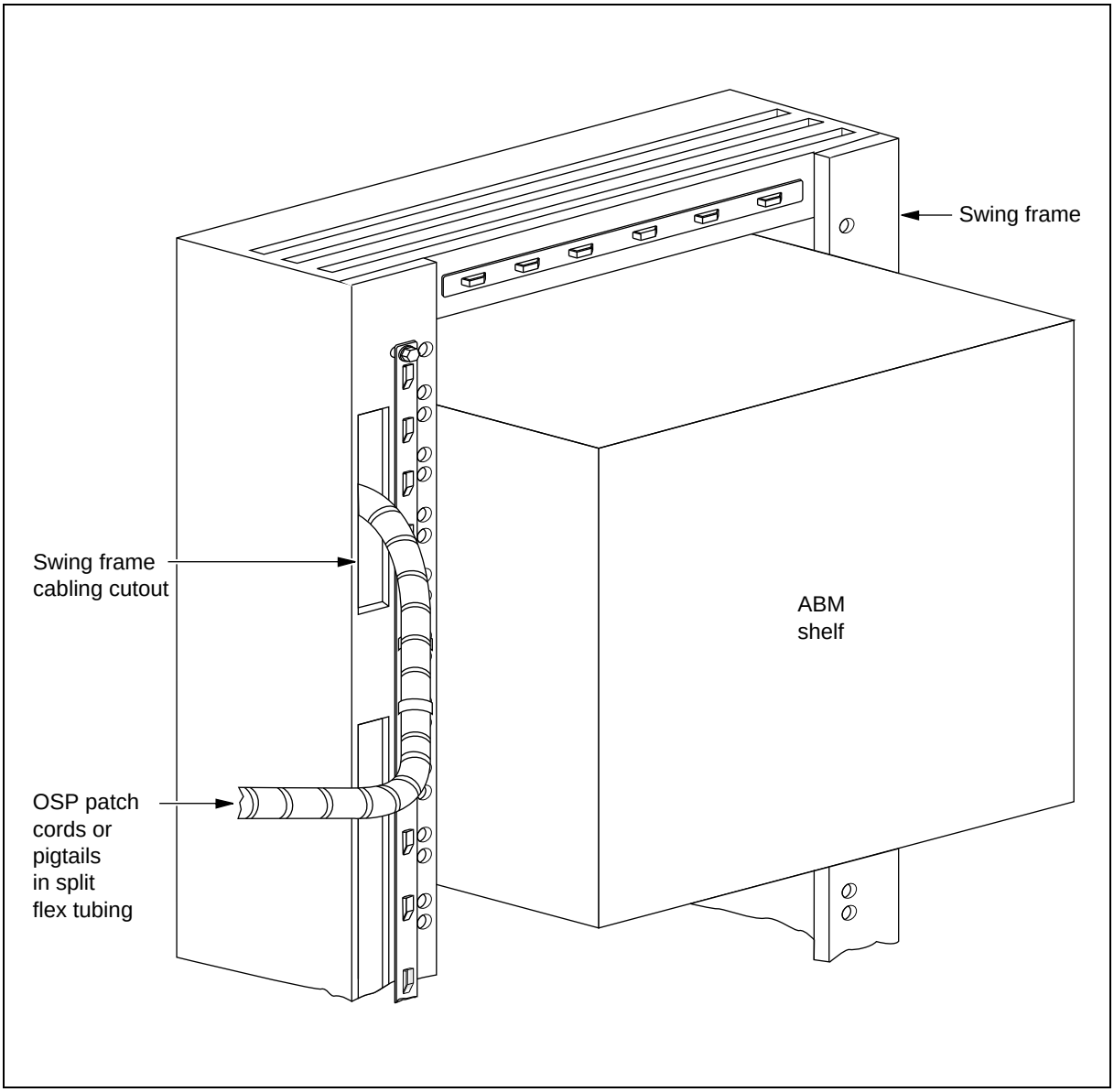
—continued—

Procedure 7-3 (continued)
Routing external fiber cables to the ABM shelf

Step	Action
5	Route the tubing through the swing frame cabling cutout to the front of the ABM shelf as shown in Figure 7-6. ***Note:*** Leave a sufficient service loop in the routing to accommodate opening and closing the swing frame without putting pressure or tension on the tubing.

Figure 7-6
Routing the fibers into the ABM shelf swing frame

PC-15147



—continued—

Procedure 7-3 (continued)
Routing external fiber cables to the ABM shelf

Step	Action
6	In the LTM, secure the cable with cable ties.
7	Verify that the swing frame in the LTM can close without touching the fiber cable.
8	In the CEM, secure the tubing with cable ties.
9	Verify that the swing frame in the CEM can close without stressing the split-flex tubing.
10	Route the tubing across the top of the ABM shelf (see Figure 7-7 on page 7-14). ***Note:*** Maintain at least the minimum bend radius (76 mm [3.0 in]) for the fiber pigtails or patch cords.
11	Butt the tubing at 2.54 cm (1 in.) inside the ABM cable trough.
12	Insert 13 mm (1/2 in.) of the tubing into the cable trough on the top of the ABM shelf.
13	Extend the fiber patch cords along the cable trough at the top edge of the ABM shelf as shown in Figure 7-7 on page 7-14.

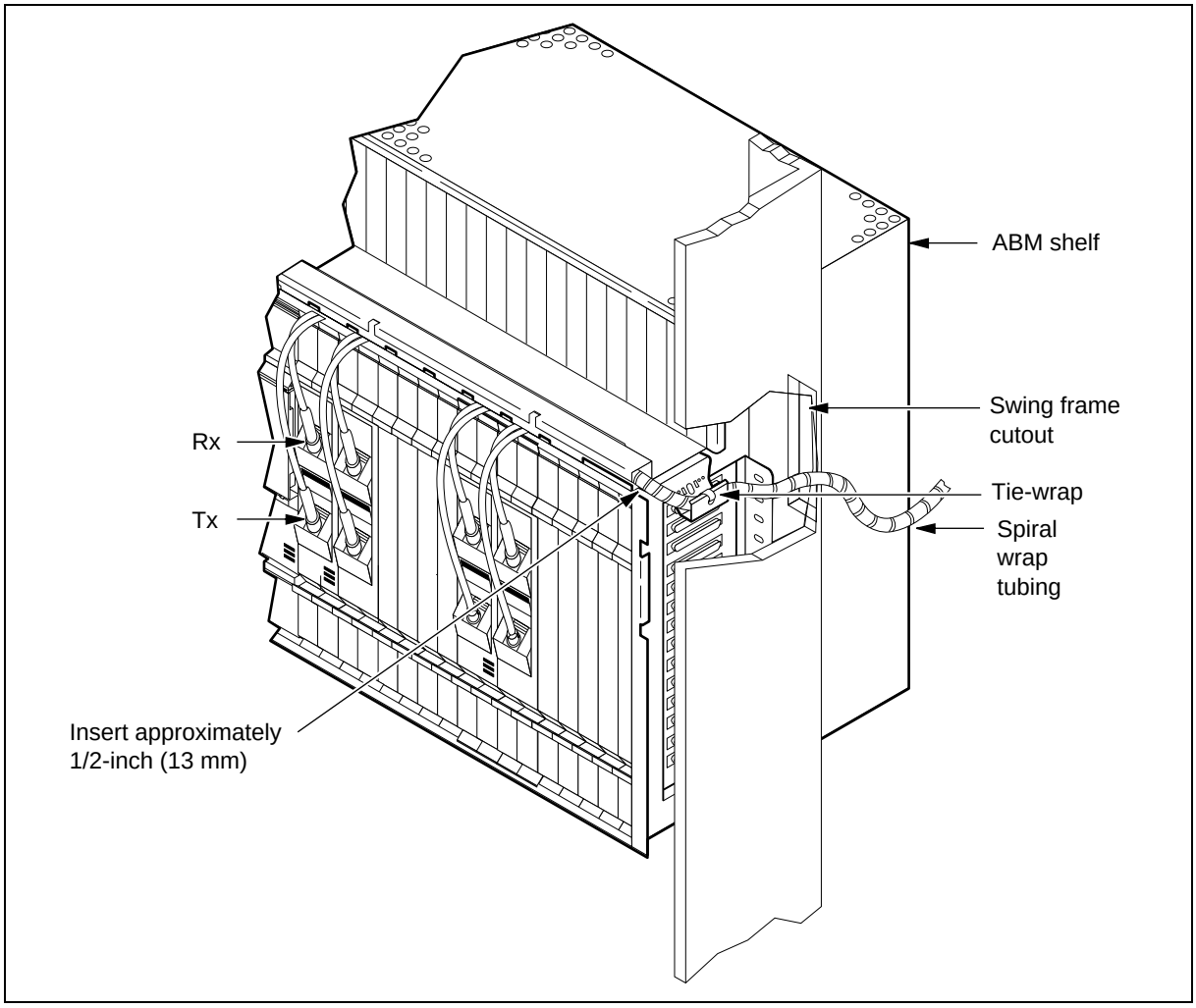
—continued—

Procedure 7-3 (continued)
Routing external fiber cables to the ABM shelf

Step	Action

Figure 7-7
Routing the fibers into the ABM shelf to the OC-3 or OC-12 card slot

PC-15310



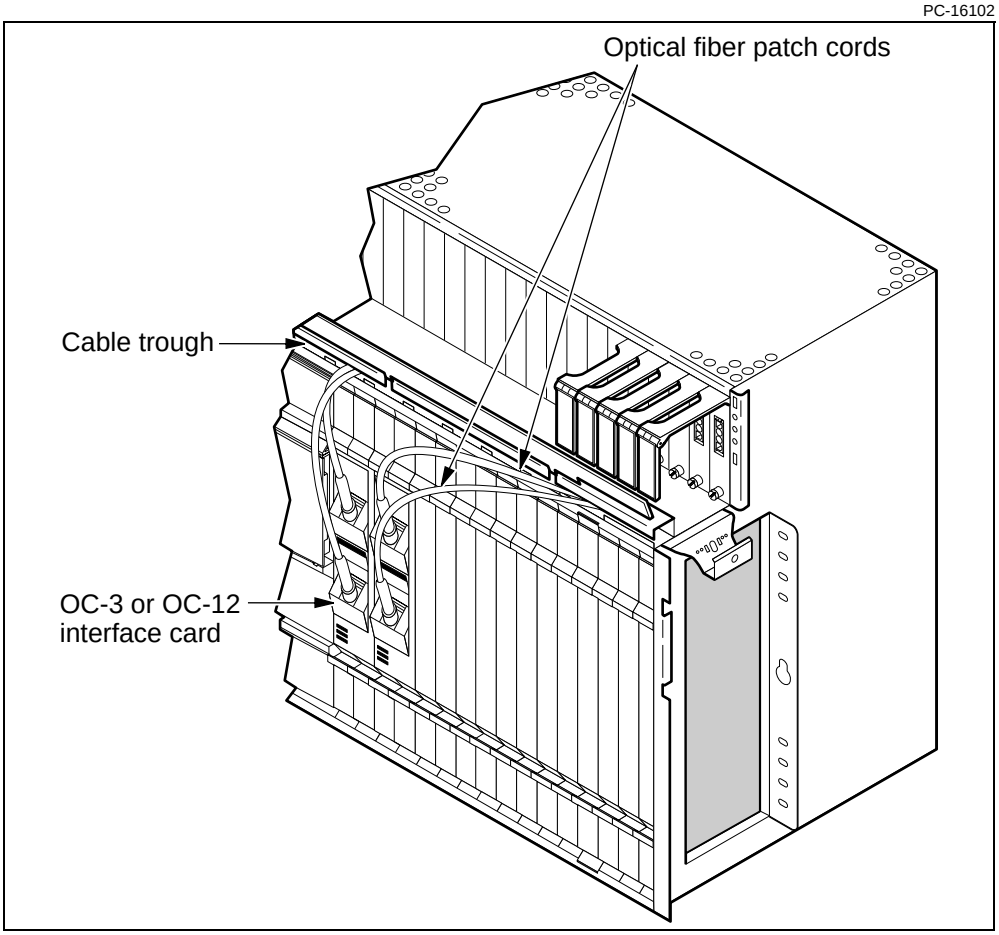
—continued—

Procedure 7-3 (continued)
Routing external fiber cables to the ABM shelf

Step	Action
14	Hang the connector end of the patch cords out of the cable trough to the left of the tab that is above the card where the patch cord is connected (see Figure 7-8).
15	Verify that each fiber patch cord exits the cable trough to the left of the tab that is immediately above the OC-3 or OC-12 interface card where the patch cord or pigtail connect is connected. ***Note:*** If a cord exits the trough to the right of the tab, it may snag and become damaged when an adjacent card is removed.

Figure 7-8
Routing fiber patch cords to the OC-3 or OC-12 cards

PC-16102



16	In the CEM, secure the cables using cable ties.
17	See Table 7-1 on page 7-3 for next procedure.

—end—

Procedure 7-4
Routing external fiber cables to the fiber manager shelf

Use this procedure to route the fiber optic patch cords or pigtails protected with split-flex tubing into the ModCab when the cable is bonded and grounded in an external location and spliced at an internal fiber management system.

Tools and materials

You need the following tools and materials:

- cable-tie cutting tool as required
- 1.27 cm (1/2 in.) split-flex tubing
- 20.32 cm (8 in.) cable ties

Warnings and cautions

Read the following warnings and cautions:

DANGER
Laser radiation hazard
Avoid direct exposure to fiber or optical connector ends. Laser radiation is present and can cause serious eye damage.

DANGER
Glass particle hazard
Get immediate medical attention if you get a glass chip in or near your eyes.

CAUTION
Clean all optical connectors
Dust can adversely affect optical connector performance. Clean all connectors before inserting the connectors into the mating sleeves. Use clean dust caps when connectors are not in use.

CAUTION
Risk of damage to fiber optic patch cords
Handle the fibers with extreme care. Never bend the cables into a curve with a radius smaller than 3.0 in. (76 mm). Tighten connections to the optical units finger tight only.

—continued—

Procedure 7-4 (continued)
Routing external fiber cables to the fiber manager shelf

Action

Step	Action
1	Encase the outside plant (OSP) fiber patch cords or pigtails in protective 1.27 cm (1/2 in.) split-flex tubing.
2	Route the split-flex tubing up the left side of the large termination module (LTM) and across the top through cable routing hole number 7 into the dc power module (DCP). ***Note:*** Maintain at least the minimum bend radius (3.0 in. [76 mm]) for the fiber pigtails or patch cords.
3	Route the tubing across the top of the DCP and down the left wall to the swing frame.
4	Route the tubing across the swing frame to the right side of the fiber manager shelf. ***Note:*** Leave a sufficient service loop in the routing to accommodate opening and closing the swing frame without putting pressure or tension on the tubing.
5	Route the tubing into the fiber manager shelf.
6	In the LTM, secure the tubing to the wall and to the top of the module.
7	In the DCP, secure the cable across the top and down the wall to the swing frame.
8	Verify that the tubing has enough slack for a service loop that allows the DCP swing frame to close without stressing the tubing.
9	On the swing frame, secure the tubing with cable ties to the fiber manager shelf.
10	Butt the tubing at the fiber manager shelf. ***Note:*** Do not cut the fibers inside the tubing.
11	Splice the fiber pigtails in the fiber manager shelf according to the manufacturer's instructions. ***Note:*** Verify that the pigtails are equipped with the proper connectors for the fiber management system you are using.
12	Dress the fibers in the fiber manager shelf according to the manufacturer's instructions.
13	See Table 7-1 on page 7-3 for next procedure.

—end—

Procedure 7-5
Butting and stripping the fiber cable

Use this procedure to butt and strip the outside plant (OSP) fiber cable when the fiber is bonded or grounded inside the large termination module (LTM).

Requirements

Read and adhere to all of the cautions and warnings in "Warnings and cautions" in Chapter 1.

Tools and materials

You need the following tools and materials:

- 6-8 in. (15–20 cm) adjustable wrench
- cable knife or cable sheath cutter
- standard cable butting, stripping, and fanning tools for fiber cable
- voltmeter
- 1/2-in. trade size split-flex tubing or equivalent
- fiber optic protective buffer tubing or equivalent
- bonding clamp assemblies as required
- one or more 18 in. (30.48 cm) length of 6 AWG stranded ground wire for each OSP cable
- two 6 AWG, 1/4 in. (0.635 cm) ring type crimp lugs for each ground wire
- electrical tape

Action

Step	Action
1	On the fiber cable in the LTM, mark a point 35.6 cm (14 in.) above the base of the LTM (see Figure 7-9 on page 7-19).
2	Butt, fan, and strip the cable at the mark according to local practices.

CAUTION
Fiber insulation damage
Check the cable carefully and verify that none of the fibers have been accidentally nicked, stripped, or cut.

If any fibers are damaged, replace the fiber cable.

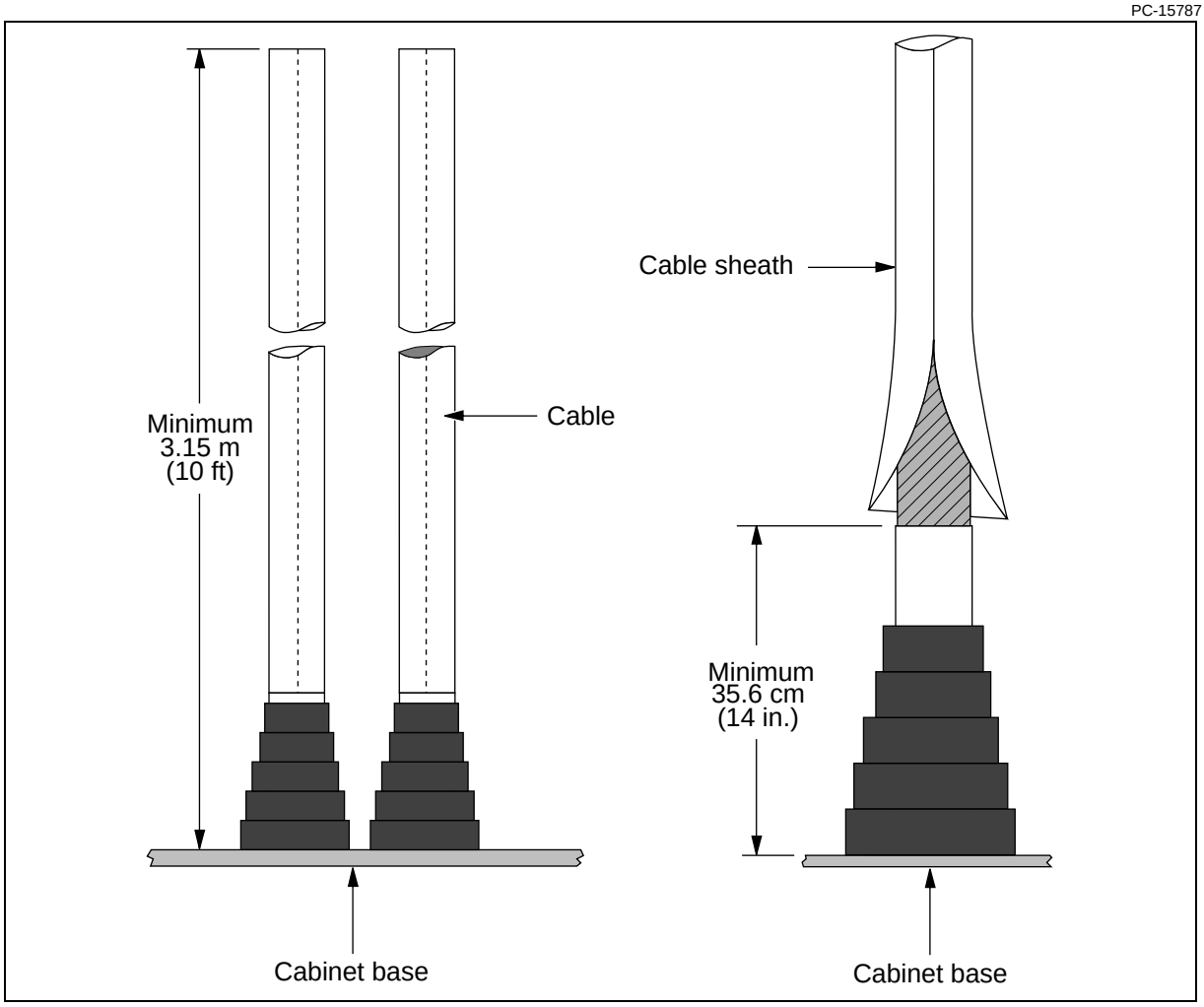
—continued—

Procedure 7-5 (continued)
Butting and stripping the fiber cable

Step	Action
3	When you expose the fibers in the cable, immediately install protective buffer tubing on each fiber to protect them. ***Note:*** Local practices may call for other means of protecting the fibers. Verify the practices with the local customer representative or your job specifications.
4	Install protective split-flex tubing around all of the buffer tubing.
5	Secure the tubing in an out-of-the-way position.
6	See Table 7-1 on page 7-3 for the next procedure.

Figure 7-9
Sheath height and cable length

PC-15787



—end—

Procedure 7-6
Installing the cable bonding clamps

Use this procedure to install and connect cable bonding clamps for grounding fiber cables inside the large termination module (LTM).

> ***Note:*** This procedure does not apply to cables that are bonded and grounded in an external location.

Tools and materials

You need the following tools and materials:

- 6-8 in. (15–20 cm) adjustable wrench
- cable knife or cable sheath cutter
- voltmeter
- bonding clamp assemblies as required
- one or more 18 in. (30.48 cm) length of 6 AWG stranded ground wire for each fiber cable
- 1/2 in. split-flex tubing
- two 6 AWG, 1/4 in. (0.635 cm) ring type crimp lugs for each outside plant (OSP) ground wire
- electrical tape

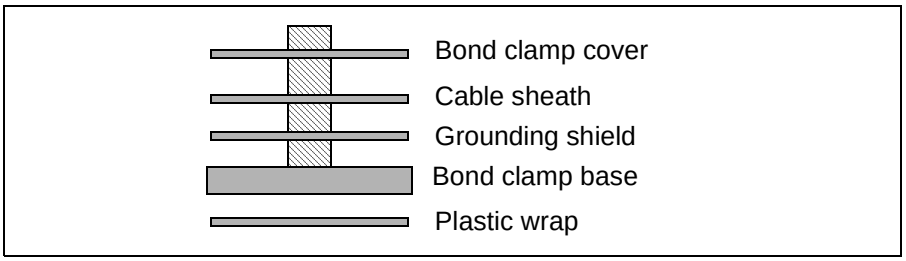
Action

Step	Action
	Preparing the cable for bonding clamps
	Note: Install bonding clamps according to local practices and electrical requirements. Some locations may require two ground wires per cable. The following steps show how to install one bonding clamp per cable.
1	Cut the outer casing of the cable 5.08 cm (2 in.) down toward the base of the LTM as shown in Figure 7-10 on page 7-22.
2	Cut 1 in. (2.54 cm) to the left, across the cable.
	Note: This cut creates the bonding clamp mounting flap on the cable.
3	Slide a paper punch between the plastic wrap and the grounding shield on the bonding clamp mounting flap on the first cable.
4	Punch a hole through the grounding shield and the cable sheath in the center of this area, 2.54 cm (1 in.) down and 1.27 cm (1/2 in.) across.

—continued—

Procedure 7-6 (continued)
Installing the cable bonding clamps

Step	Action
	Installing the bonding clamp
5	Install the threaded end of a bond clamp through the holes in the grounding shield and the sheath as shown in the following diagram and in Figure 7-10 on page 7-22.



6	Place the bond clamp cover plate over the threaded stud and then against the cable.
7	Secure the bond clamp to the cable with one of the threaded nuts.
8	Using electrical tape, tape 5.08 cm (2 in.) above and below the bond clamp.
	Connecting the ground wire
9	Cut a 4 ft (1.22 m) piece of 6 AWG stranded wire and attach a ring lug to each end. ***Note:*** The ground wire and the ring lugs are customer-supplied and field-installed.
10	Connect one end of the ground wire to the bond clamp and secure it with one of the threaded nuts as shown in Figure 7-10 on page 7-22.
11	Connect the other end of the ground wire to the LTM grounding bar on the rear or side wall of the LTM as shown in Figure 7-10 on page 7-22.
12	Measure the resistance between the bond clamp and the LTM grounding bar. ***Note:*** The requirement is 0 ohms resistance.
13	Securely tape the bonding clamp and cable sheath at the butt using electrical tape as shown in Figure 7-10 on page 7-22.
	Securing the fiber cable to the LTM
14	Secure the fiber cable to the right wall with cable ties.
15	Secure the split flex tubing part way up the wall. ***Note:*** Do not exceed the bend radius of the fibers.
16	Go to Procedure 7-7, “Splicing internal fiber cables” on page 7-23.

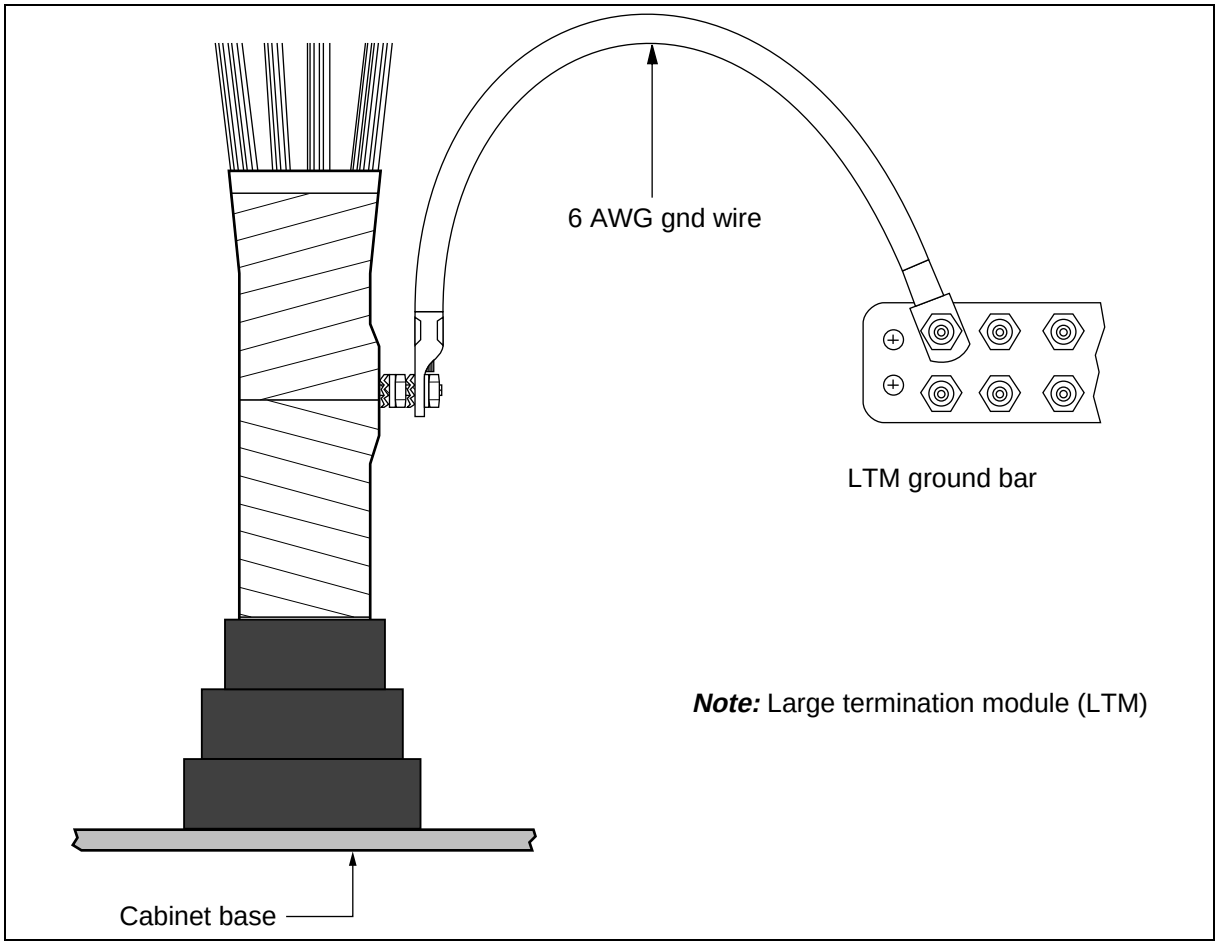
—continued—

Procedure 7-6 (continued)
Installing the cable bonding clamps

Step	Action

Figure 7-10
Attachment of ground wire to grounding bar

AN-1050



—end—

Procedure 7-7
Splicing internal fiber cables

Use this procedure to splice fiber patch cords or pigtails in the large termination module (LTM) when the outside plant (OSP) fiber cable is bonded, grounded, and spliced in the LTM.

Tools and materials

You need the following tools and materials:

- 6-8 in. (15–20 cm) adjustable wrench
- cable knife or cable sheath cutter
- voltmeter
- bonding clamp assemblies as required
- one or more 18 in. (30.48 cm) length of 6 AWG stranded ground wire for each fiber cable
- 1/2 in. split-flex tubing
- two 6 AWG, 1/4 in. (0.635 cm) ring type crimp lugs for each outside plant (OSP) ground wire
- electrical tape
- 1/2 in. split-flex tubing

Action

Step	Action
1	Label each end of the optical patch cords or pigtails with the following information: • the slot number in the access bandwidth manager (ABM) shelf for the intended OC-3 or OC-12 optical interface card • the direction of signal, Tx (transmit) or Rx (receive)
2	Use standard or local fiber splicing procedures to splice the pigtails or patch cords to the OSP fibers. ***Note:*** Verify that the pigtails or patch cords are long enough to route to the end location for your installation.
3	Encase the pigtails or patch cords in split-flex tubing.
4	See Table 7-1 on page 7-3 for the next procedure.

—end—

Procedure 7-8
Routing internal fiber cables to the ABM shelf

Use this procedure to route protected fiber patch cords or pigtails through the large termination module (LTM) to the access bandwidth manager (ABM) shelf in the common equipment module (CEM). This procedure applies to applications that have the outside plant (OSP) fiber cable bonded, grounded, and spliced in the LTM.

Tools and materials

You need the following tools and materials:

- cable tie cutting tool as required
- 20.32 cm (8 in.) cable ties

Action

Step	Action
1	Route the tubing up the right wall of the LTM, across the top, down the left wall through cable routing port 6 and into the CEM (see Figure 7-11 on page 7-25).
2	Route the tubing up the left side of the CEM on the swing frame and across the back of the swing frame to the right side of the ABM shelf.

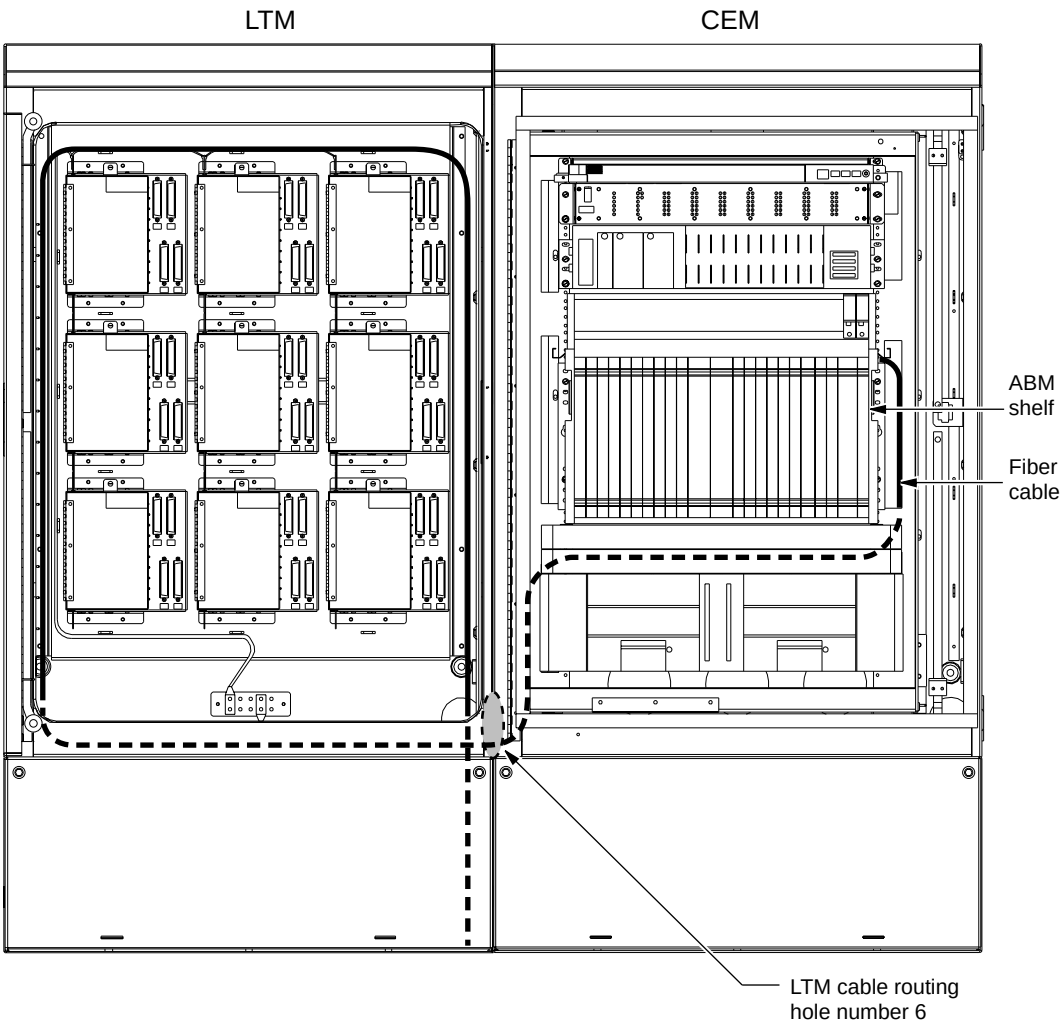
—continued—

Procedure 7-8 (continued)
Routing internal fiber cables to the ABM shelf

Step	Action

Figure 7-11
Fiber routing to the ABM shelf

PC-16119



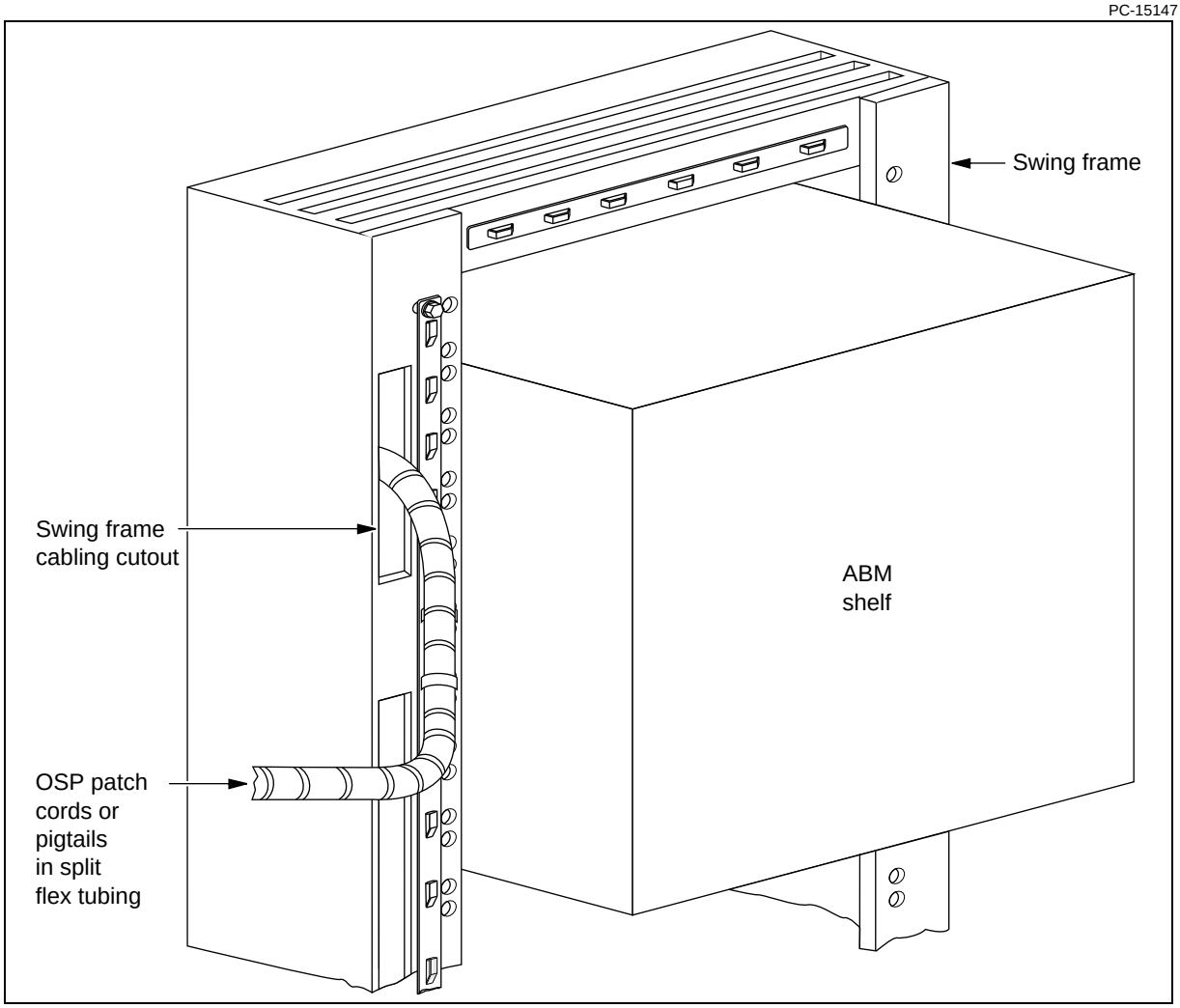
—continued—

Procedure 7-8 (continued)
Routing internal fiber cables to the ABM shelf

Step	Action
3	Route the tubing through the swing frame cabling cutout to the front of the ABM shelf as shown in Figure 7-12. ***Note:*** Leave a sufficient service loop in the routing to accommodate opening and closing the swing frame without putting pressure or tension on the tubing.

Figure 7-12
Routing the fibers into the ABM shelf swing frame

PC-15147



4	In the LTM, secure the cable with cable ties.
5	Verify that the swing frame in the LTM can close without touching the fiber cable.
6	In the CEM, secure the tubing with cable ties.

—continued—

Procedure 7-8 (continued)
Routing internal fiber cables to the ABM shelf

Step	Action
7	Verify that the swing frame in the CEM can close without stressing the split-flex tubing.
8	Route the tubing across the top of the ABM shelf (see Figure 7-13 on page 7-28). ***Note:*** Maintain at least the minimum bend radius (76 mm [3 in.]) for the fiber patch cords or pigtails installed.
9	Butt the tubing 2.54 cm (1 in.) inside the ABM cable trough.
10	Insert 13 mm (1/2 in.) of the tubing into the cable trough on the top of the ABM shelf.
11	Extend the fiber patch cords along the cable trough at the top edge of the ABM shelf as shown in Figure 7-13 on page 7-28.

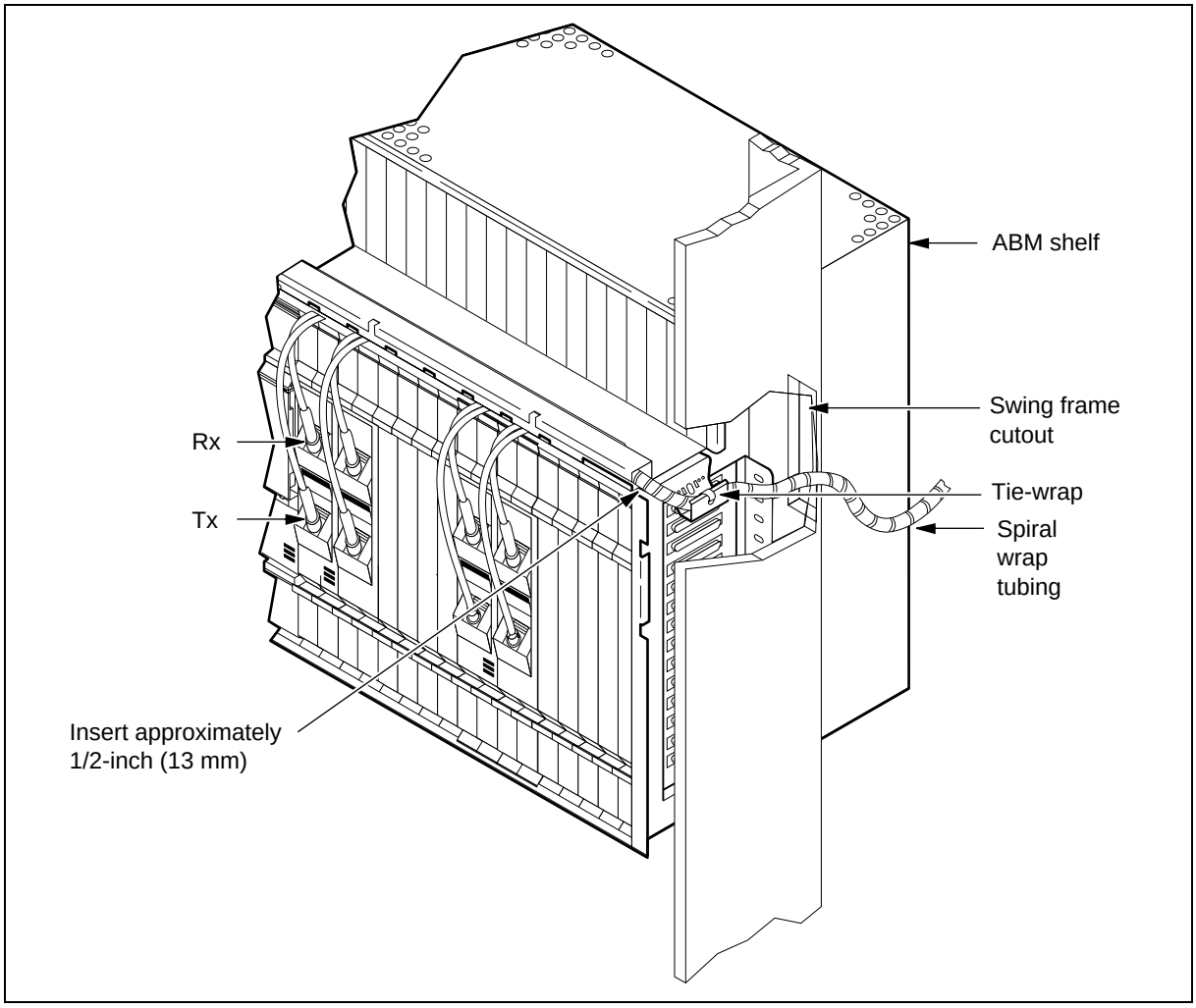
—continued—

Procedure 7-8 (continued)
Routing internal fiber cables to the ABM shelf

Step	Action

Figure 7-13
Routing the fibers into the ABM shelf to the OC-3 or OC-12 card slot

PC-15310



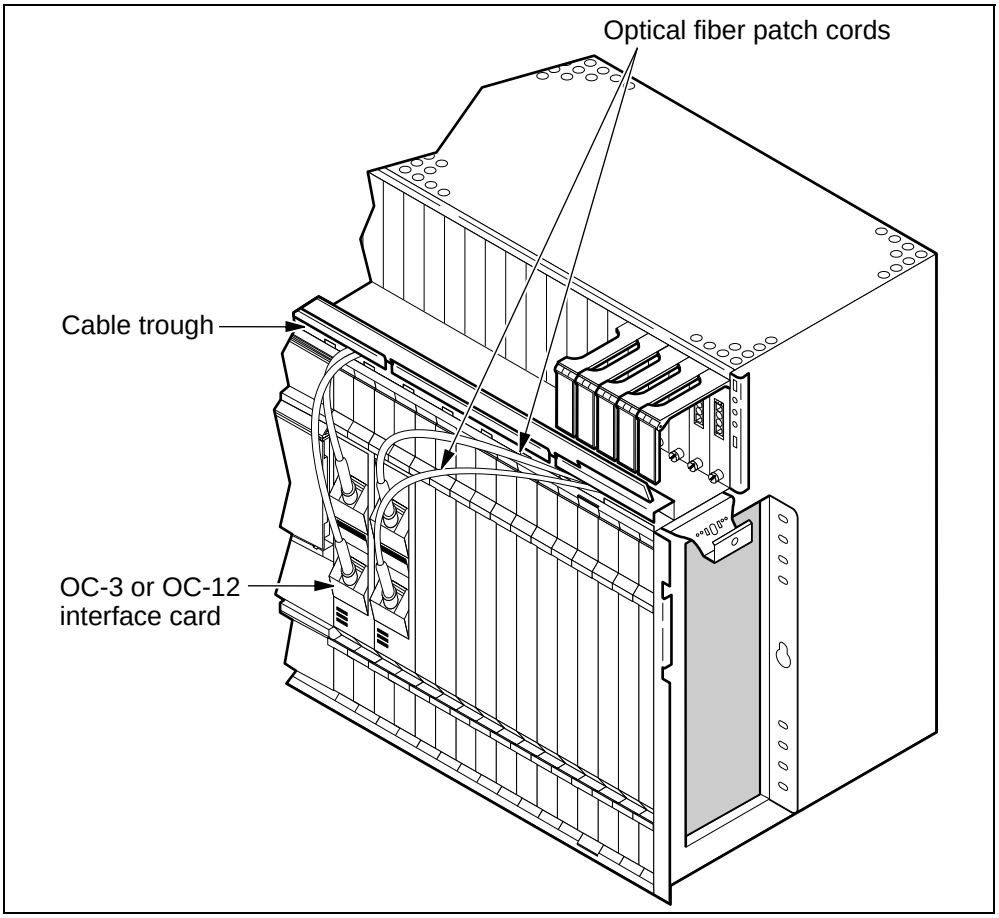
—continued—

Procedure 7-8 (continued)
Routing internal fiber cables to the ABM shelf

Step	Action
12	Hang the connector end of the patch cords out of the cable trough to the left of the tab that is above the card where the patch cord is connected (see Figure 7-14).
13	Verify that each fiber patch cord exits the cable trough to the left of the tab that is located immediately above the OC-3 or OC-12 interface card where the patch cord or pigtail connect is connected. ***Note:*** If a cord exits the trough to the right of the tab, it may snag and become damaged when an adjacent card is removed.

Figure 7-14
Routing fiber patch cords to the OC-3 or OC-12 cards

PC-16102



14 In the CEM, secure the cables using cable ties.

15 See Table 7-1 on page 7-3 for next procedure.

—end—

Procedure 7-9
Routing internal patch cords to the fiber manager shelf

Use this procedure to route the fiber optic patch cords or pigtails protected with split-flex tubing to the fiber manager shelf when the outside plant (OSP) fiber cable is bonded and grounded in the large termination module (LTM).

Tools and materials

You need the following tools and materials:

- cable tie cutting tool as required
- 20.32 cm (8 in.) cable ties

Action

Step	Action
1	Route the split-flex tubing fibers up the left side of the LTM and across the top through cable routing hole number 7 into the dc power module (DCP). ***Note:*** Maintain at least the minimum bend radius 76 mm (3 in.) for the fiber patch cords or pigtails.
2	Route the tubing across the top of the DCP, down the left wall to the swing frame and then across the swing frame to the right side of the fiber manager shelf. ***Note:*** Leave a sufficient service loop in the routing to accommodate opening and closing the swing fame without putting pressure or tension on the tubing.
3	In the LTM, secure the tubing to the wall and to the top of the module.
4	In the DCP, secure the cable across the top and down the wall to the swing frame.
5	Verify that the tubing has enough slack for a service loop that allows the DCP swing frame to close without stressing the tubing.
6	On the swing frame, secure the tubing with cable ties.
7	Butt the tubing at the fiber manager shelf. ***Note:*** Do not cut the fibers inside the tubing.

—continued—

Procedure 7-9 (continued)
Routing internal patch cords to the fiber manager shelf

Step	Action
8	Splice the fiber pigtails in the fiber manager shelf according to the manufacturer's instructions. ***Note:*** Verify that the pigtails are equipped with the proper connectors for the fiber management system you are using.
9	Dress the fibers in the fiber manager shelf according to the manufacturer's instructions.
10	See Table 7-1 on page 7-3 for the next procedure.

—end—

Procedure 7-10
Routing the fiber patch cords from the fiber manager to the ABM

Use this procedure to route protected fiber optic patch cords from the fiber management system to the access bandwidth manager (ABM) shelf in the common equipment manager (CEM).

Tools and materials

You need the following tools and materials:

- cable-tie cutting tool as required
- 20.32 cm (8 in.) cable ties
- 1.27 cm (1/2 in.) split-flex tubing
- fiber patch cords

Note: Verify that the patch cord connector is compatible with the connectors on the OC-3 or OC-12 card in the ABM shelf and with the connectors in the fiber manager system.

Action

Step	Action
1	Label each end of the optical patchcords with the following information: • the slot number in the ABM shelf for the OC-3 or OC-12 optical interface card • the direction of signal, Tx (transmit) or Rx (receive)
2	Encase the fiber patch cords in protective 1/2 in. split-flex tubing.
3	Open the CEM swing frame.
4	Route the protective tubing through the cabling cutout on the right side of the swing frame to the front of the ABM shelf as shown in Figure 7-15 on page 7-33. ***Note:*** Maintain at least the minimum bend radius (76 mm [3 in.]) for the fiber patch cords or pigtails installed.

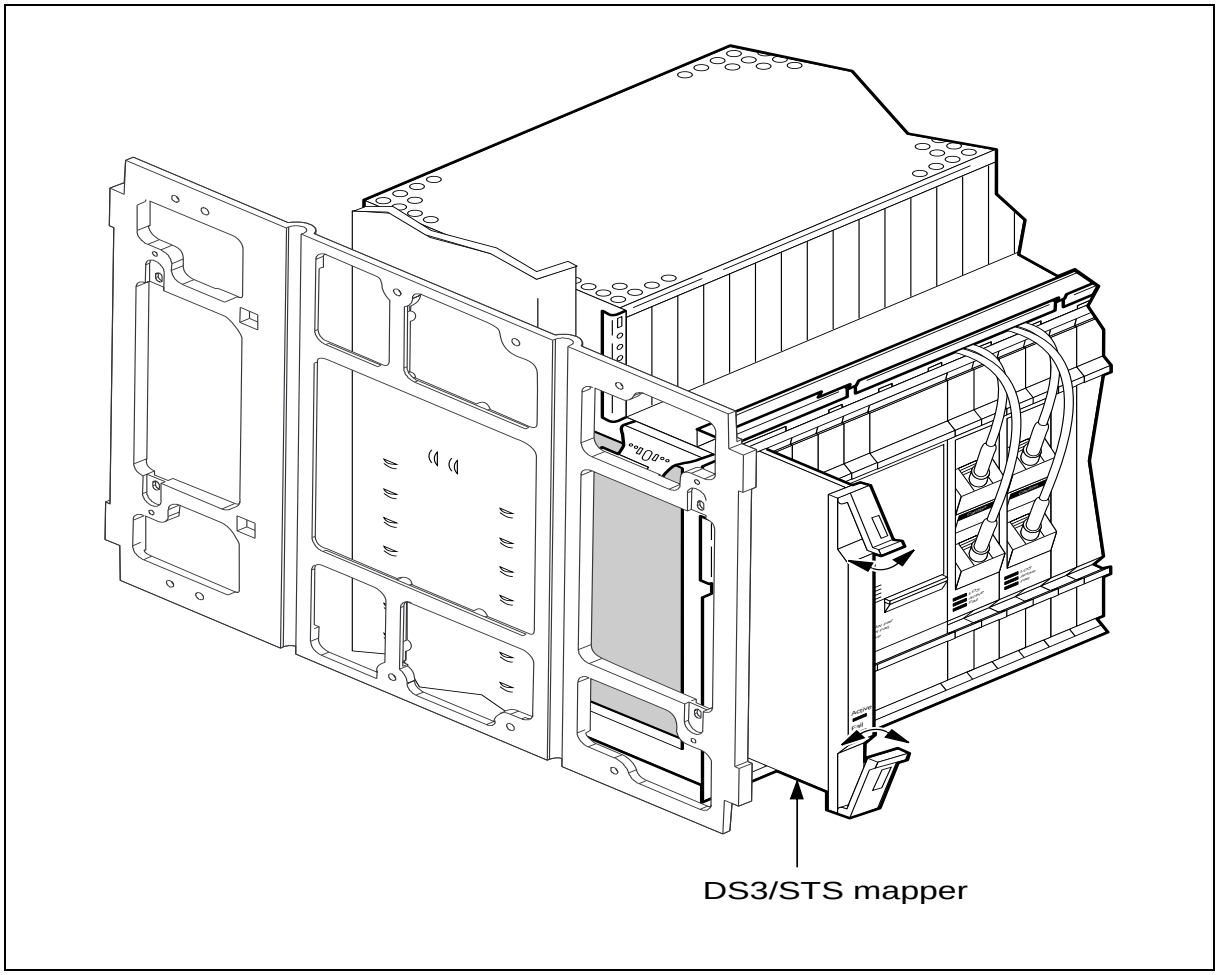
—continued—

Procedure 7-10 (continued)
Routing the fiber patch cords from the fiber manager to the ABM

Step	Action

Figure 7-15
Routing the fiber patch cords to the front of the ABM

PC-15135



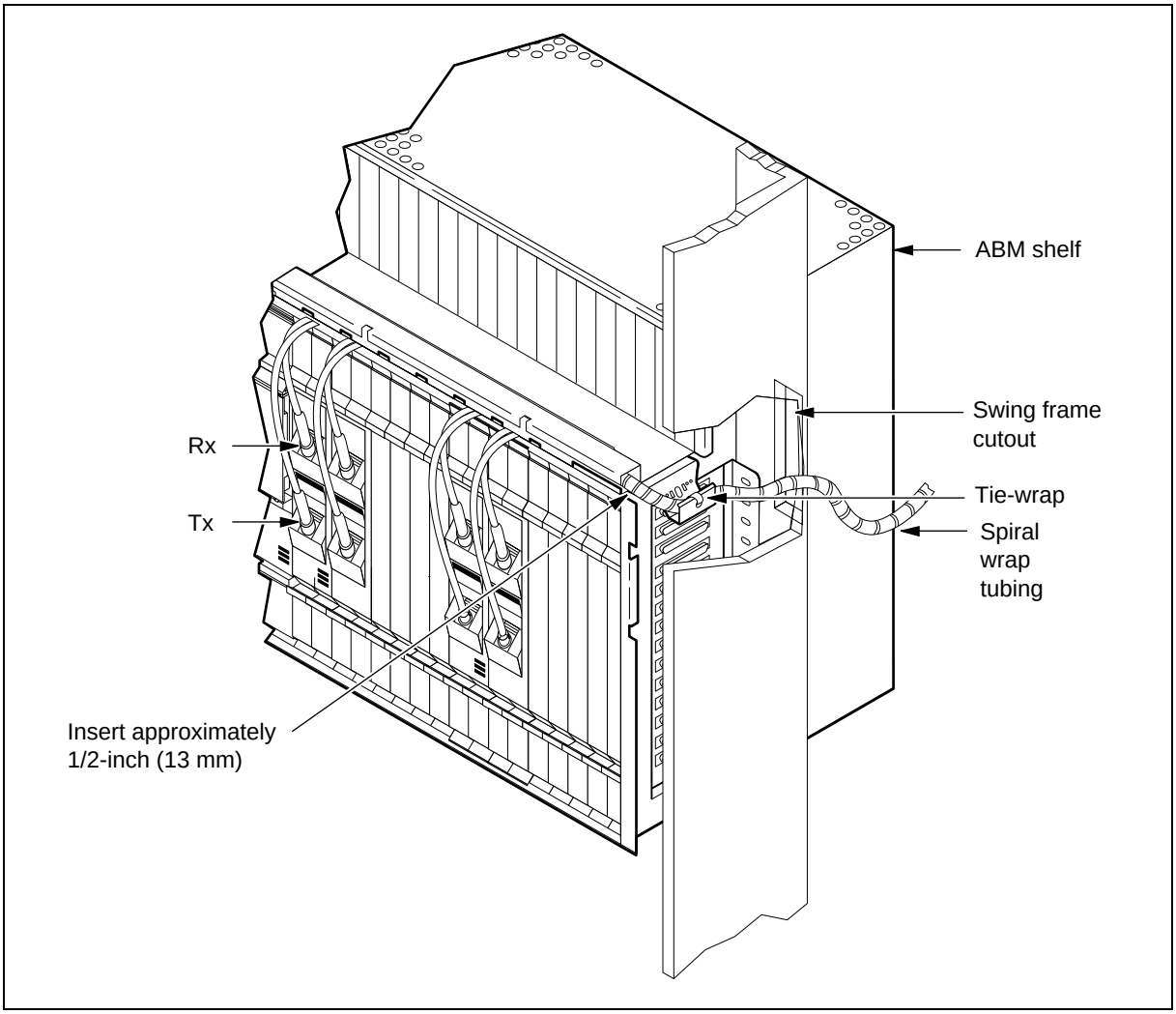
—continued—

Procedure 7-10 (continued)
Routing the fiber patch cords from the fiber manager to the ABM

Step	Action
5	Route the tubing to the front of the ABM shelf (see Figure 7-16). ***Note:*** Maintain at least the minimum bend radius [76 mm] [3 in.) for the fiber pigtails or patch cords.
6	Insert 13 mm (1/2 in.) of the tubing into the cable trough on the top of the ABM shelf.
7	Extend the fiber patch cords along the cable trough at the top edge of the ABM shelf as shown in Figure 7-16.

Figure 7-16
Routing patch cords to the ABM OC-3 or OC-12 cards

PC-15310



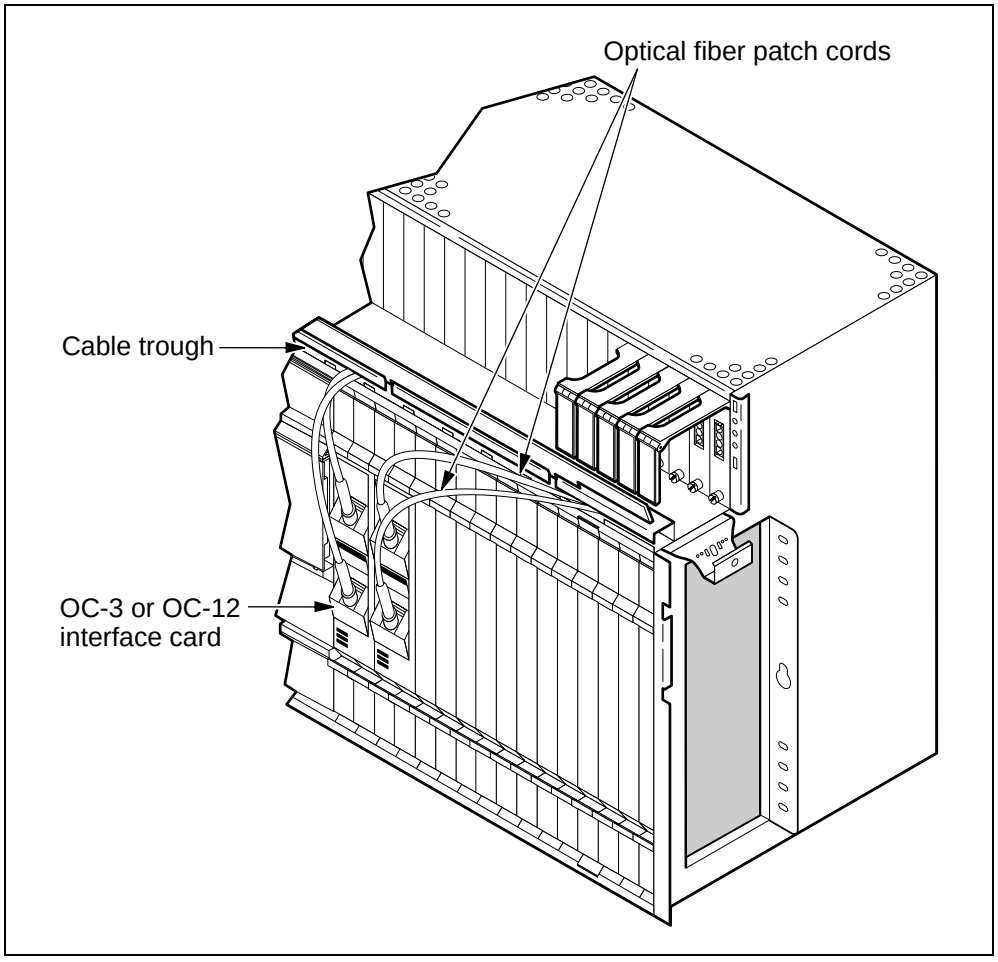
—continued—

Procedure 7-10 (continued)
Routing the fiber patch cords from the fiber manager to the ABM

Step	Action
8	Hang the connector end of the patch cords out of the cable trough to the left of the tab that is immediately above the card where the patch cord is connected (see Figure 7-17).

Figure 7-17
Routing fiber patch cords to the OC-12 cards

PC-16102



—continued—

Procedure 7-10 (continued)
Routing external fiber cables to the ABM shelf

Step	Action
9	Dress the tubing back toward the right side of the swing frame.
10	Secure the tubing to the swing frame.
11	Route the tubing across the back of the ABM shelf to the left side of the swing frame and then to the left wall of the CEM. ***Note:*** Leave a sufficient service loop in the routing to accommodate opening and closing the swing frame without putting pressure or tension on the tubing.
12	Dress and secure the tubing on the swing frame and to the wall of the CEM.
13	Route the tubing through the CEM cable routing hole number 1 into the large termination module (LTM). ***Note:*** Maintain at least the minimum bend radius (76 mm [3 in.]) for the fiber pigtails or patch cords.
14	Route the tubing through the LTM and out LTM cable routing hole number 6 into the dc power (DCP) module.
15	Route the tubing up the left side of the swing frame, across the back of the swing frame to the right side, and up to the fiber manager shelf.
16	Secure the tubing in the LTM and the DCP. ***Note:*** Leave a sufficient service loop in the routing to accommodate opening and closing the swing frame without putting pressure or tension on the tubing.
17	On the swing frame, secure the tubing with cable ties.
18	Butt the tubing as necessary at the fiber manager shelf. ***Note:*** Do not cut the fibers inside the tubing.
19	Route the patch cords and the tubing into the access hole in the fiber manager shelf according to the manufacturer's instructions.
20	Connect the patch cords to the fiber manager shelf according to the manufacturer's instructions and your job specifications. ***Note:*** Maintain at least the minimum bend radius (76 mm [3 in.]) for the fiber pigtails or patch cords.

—end—

Terminating the OSP VF cables to BIX connectors

This chapter describes terminating voice frequency (VF) cables in a large termination module (LTM) equipped with BIX connectors.

Chapter task list

This chapter includes the following tasks:

Procedure	Task	See
8-1	Terminating the OSP VF cable pairs to the SAI cross-connect facilities using BIX connectors	page 8-6
8-2	Terminating the OSP VF cable pairs to BIX connectors without the SAI cross-connect option	page 8-8
8-3	Punching down the binder groups on BIX connectors	page 8-10
8-4	Applying a moisture barrier to the air-core cable	page 8-11

How to use this chapter

Which procedures you perform is determined by whether the cross-connect facility is installed. Begin at the first procedure listed for the type of connector and cross-connect option you have.

Connector options

The following connector options are available in the LTM:

- BIX
- 710-SC1-25 (capless female)
- 3M MS^2 4000D Super-Mini

The LTM can have only one of these connector options installed.

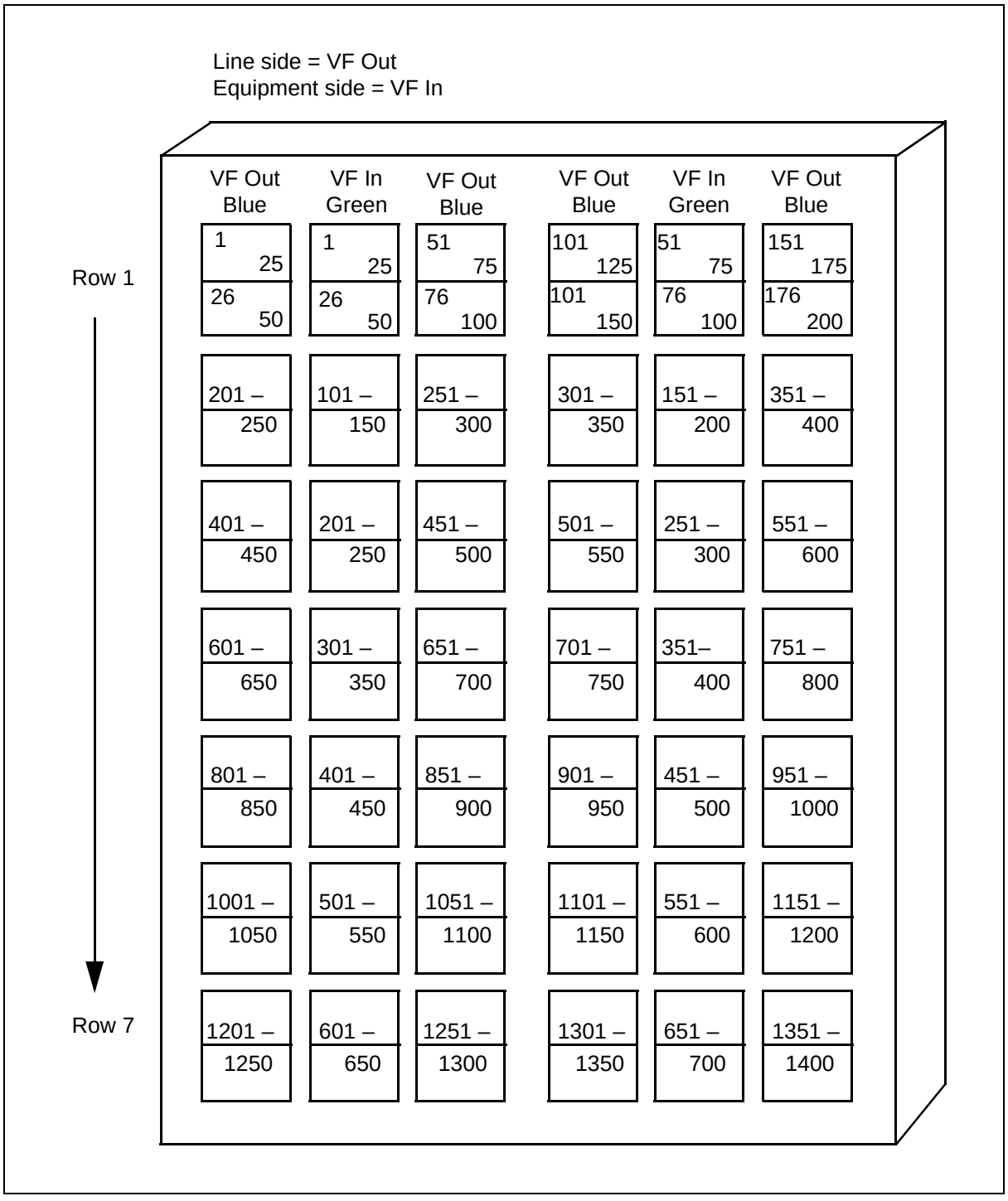
Cross-connect options

The LTM can also have an optional cross-connect facility factory-installed. The serving area interface (SAI) cross-connect blocks are typically BIX connectors or 25-pair binding-post terminal blocks. The voice frequency (VF) In and VF Out connector/block positions are numbered and color-coded on the front of the swing frame as shown in Figure 8-1 on page 8-3.

VF connector blocks

Figure 8-1 shows the VF connector block layout on the SAI swing frame.

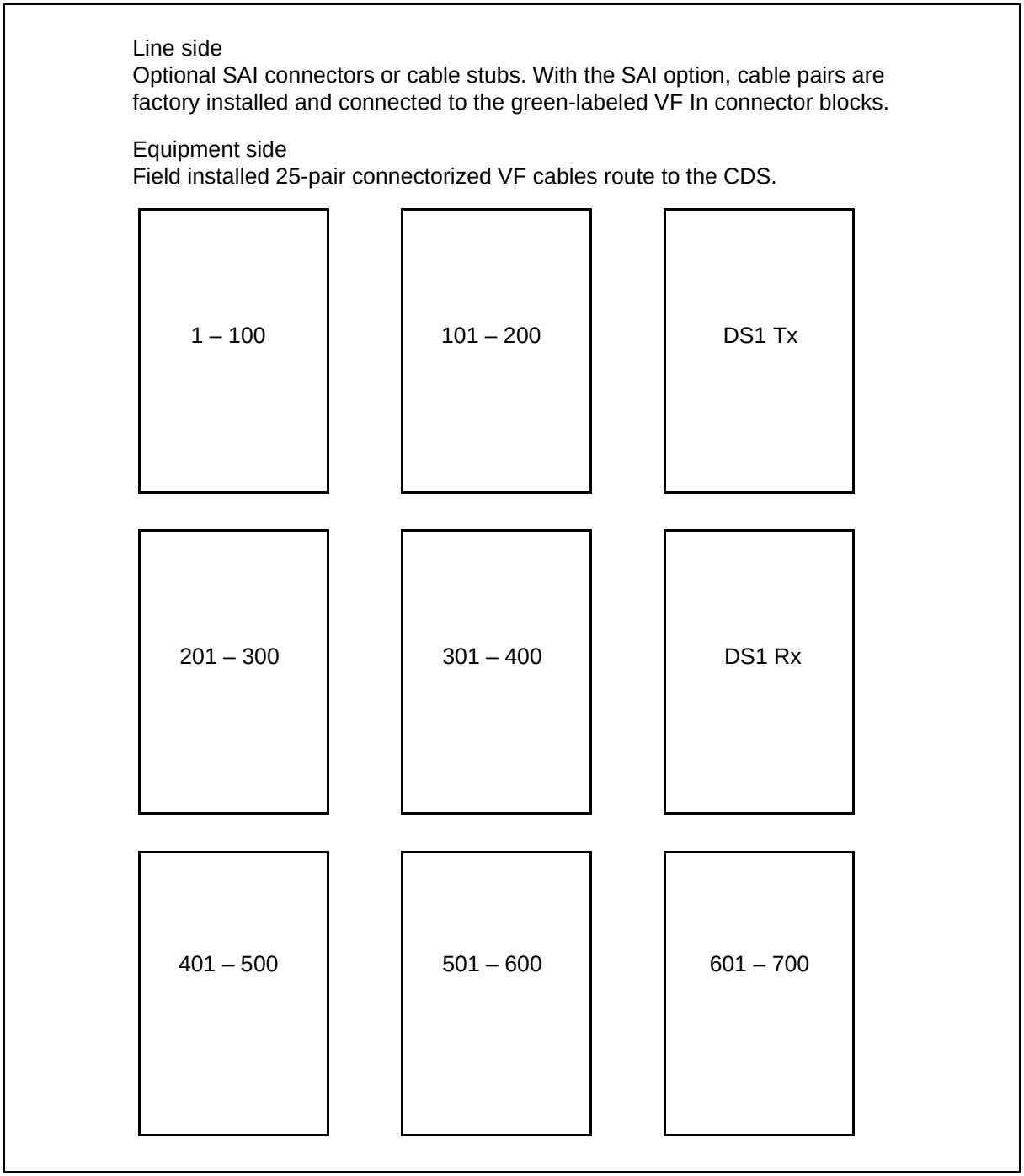
Figure 8-1
VF connector block pair count on the SAI swing frame



VF protector blocks

Figure 8-2 shows the VF protector block layout on the LTM rear wall.

Figure 8-2
VF protector block pair count on the rear of the LTM



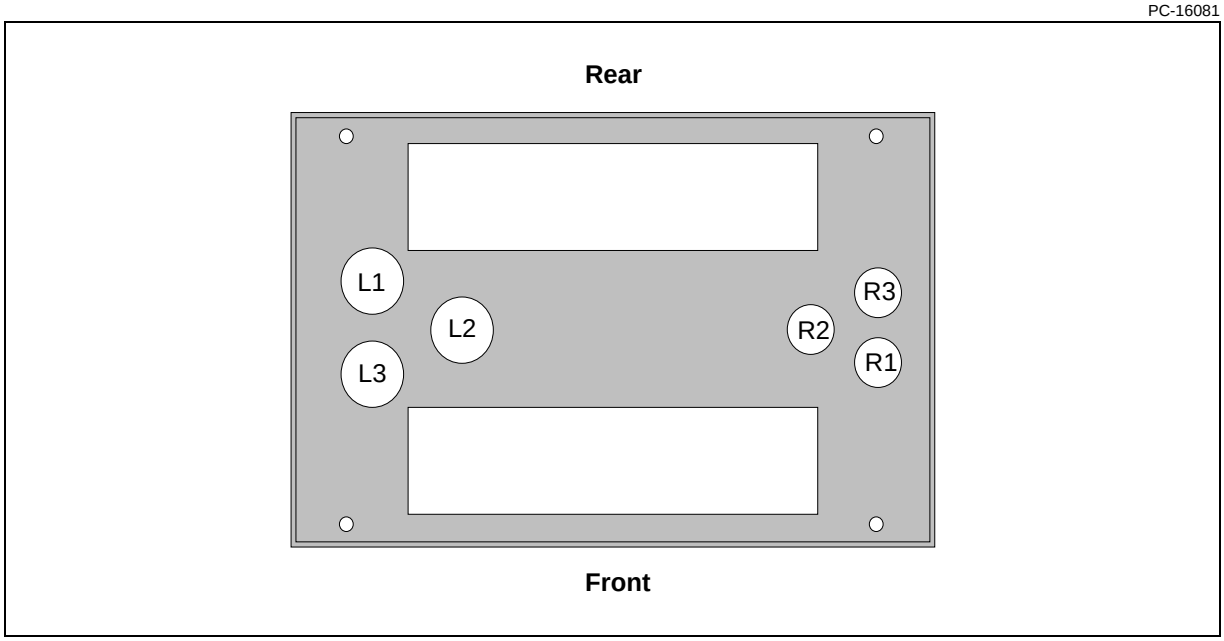
Cable entry

The outside plant (OSP) cable (line side) pair count starts with the first pair in the first cable that is routed into conduit entry port L1. The cable pair count continues, in order, in conduit L2 and then L3.

Figure 8-3 shows where the OSP VF cabling has been pulled into the LTM.

Figure 8-3
Conduit entry ports in the LTM

PC-16081



Procedure 8-1
Terminating the OSP VF cable pairs to the SAI cross-connect facilities using BIX connectors

Use this procedure to connect outside plant (OSP) cable voice frequency (VF) Out pairs to the line-side BIX connectors. These connectors are on the serving area interface (SAI) swing frame cross-connect facility in the large termination module (LTM).

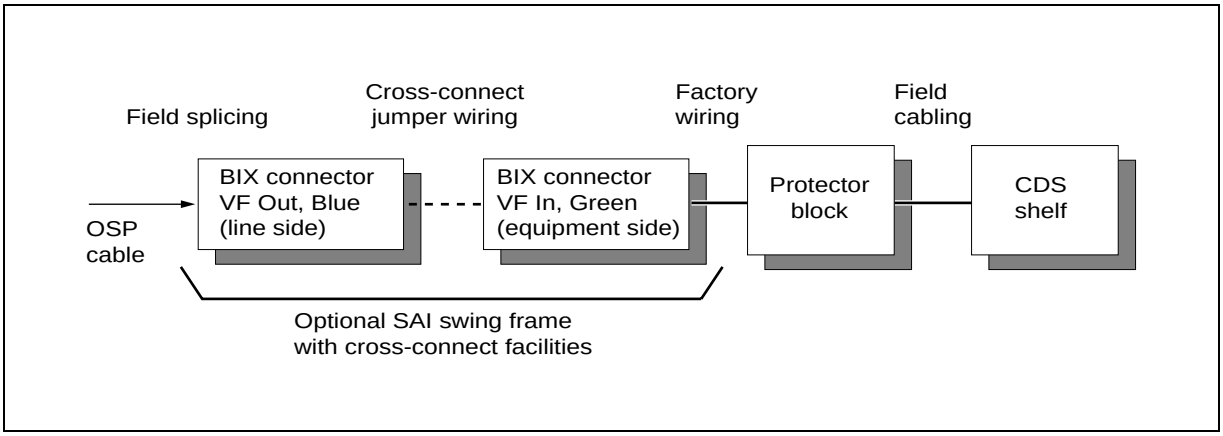
This procedure outlines suggested installation steps. Operating companies can complete the steps based on their own cross-connect practices.

The field installer splices OSP VF cable pairs to the blue color-coded line-side VF Out BIX connectors on the swing frame as shown in Figure 8-4.

The connections between the green color-coded equipment-side VF In BIX connectors and the VF protector blocks are factory installed. Electronic equipment is connected to the equipment side of the VF protector blocks by field-installed connectorized cable assemblies.

Figure 8-4
Cable connections to BIX connectors on the swing frame (with cross-connect)

PC-16082



Tools and materials

You need the following tools and materials:

- cable-tie cutter to fit the cable tie materials needed
- splicing tools normally used for terminating BIX connectors
- 6–8 in. (15.24–20.32 cm) cable ties

—continued—

Procedure 8-1 (continued)
Terminating the OSP VF cable pairs to the SAI cross-connect facilities using BIX connectors

Action

Step	Action
1	Remove the connectors and retainers (color-coded blue) from their cartons.
2	Beginning at the top left position on the front of the swing frame (connector position 1), attach connectors and retainers to the top row. ***Note:*** The top row is for VF Out pairs 1–200. You will attach two 25-pair connectors and retainers on each position that is color-coded blue as shown in Figure 8-1 on page 8-3.
3	Continue installing connectors and retainers, row by row, until all of the connectors and retainers are installed. ***Note:*** Verify that all of the connectors and retainers are installed and plugged in.
4	Open the swing frame.
5	Route the 25-pair bundle for pairs 1–25 up the left side of the LTM to the height of the top row of connectors.
6	Neatly dress and secure the bundle to the left wall of the LTM with tie-wraps.
7	Route the bundle to the back of the first connector color-coded blue on the top row, hinge-side of the swing frame. Run the bundle through the framework to the front of the frame.
8	Form a 25.4– 35.6 cm (10-14 in.) service loop in the bundle between the swing frame and the inside wall of the LTM. Neatly dress and secure the bundle to the rear of the swing frame with tie-wraps.
9	Test the service loop by closing the swing frame. If the swing frame does not open and close easily without putting pressure or stress on the VF bundle, adjust the service loop as needed.
10	Tie wrap the bundle to its connector.
11	Repeat steps 1 through 10 for each 25-pair BIX connector installed on the swing frame. Verify that the each bundle is routed to its corresponding connector. ***Note:*** The maximum OSP VF Out pairs is 1400, which is fifty-six 25-pair bundles.
12	Tie down unused bundles for future use.
13	Verify that all of the bundles are dressed neatly in the LTM.
14	Go to Procedure 8-3, “Punching down the binder groups on BIX connectors,” on page 8-10

—end—

Procedure 8-2
Terminating the OSP VF cable pairs to BIX connectors without the SAI cross-connect option

Use this procedure to connect outside (OSP) voice frequency (VF) cable pairs to the line-side BIX connectors in the large termination module (LTM) when there is no serving area interface (SAI) swing frame cross-connect option.

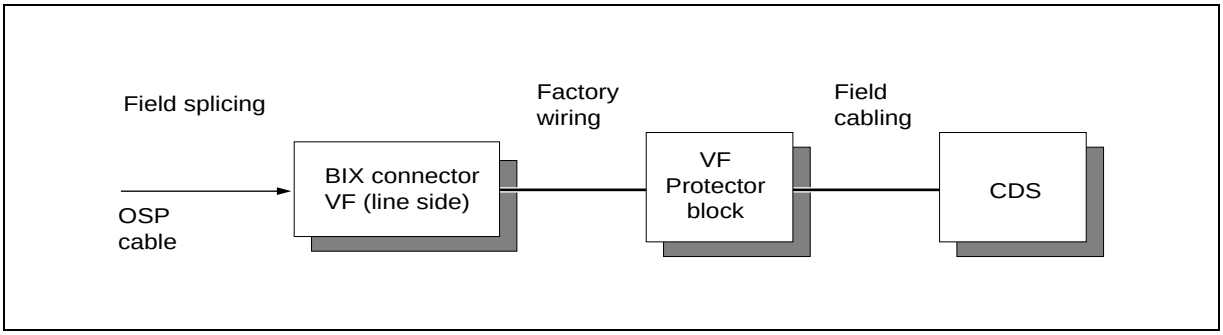
This procedure outlines suggested installation steps. Operating companies can complete the steps based on their own cross-connect practices.

The field installer splices the OSP VF cable pairs to the line-side cable stubs from the VF protector blocks as shown in Figure 8-5.

Electronic equipment is connected to the equipment side of the VF protector blocks by field-installed connectorized cable assemblies.

Figure 8-5
Cable connections to BIX connectors on the swing frame (no cross-connect)

PC-16083



Tools

You need the following tools:

- splicing tools normally used for terminating BIX connectors
- QTBIX16A wire termination tool to terminate cable pairs to the BIX connectors

—continued—

Procedure 8-2 (continued)
Terminating the OSP VF cable pairs to BIX connectors without the SAI cross-connect option

Action

Step	Action
1	Open the LTM door.
2	Route the 25-pair bundle for pairs 1 through 25 up the left side of the LTM to the height of the top row of connectors.
3	Dress and secure the bundle to the left wall of the LTM with tie-wraps.
4	Route the bundle to the first connector (color-coded green) on the top row, hinge-side of the swing frame, and run it through the framework to the front of the frame.
5	Form a 25.4–35.6 cm (10–14 in.) service loop in the bundle between the swing frame and the inside wall of the LTM. Neatly dress and secure the bundle to the rear of the swing frame with tie-wraps.
6	Test the service loop by closing the swing frame. If the swing frame does not open and close easily without putting pressure or stress on the VF bundle, adjust the service loop as needed.
7	Tie wrap the bundle to its connector.
8	Repeat steps 1 through 7 for each 25-pair BIX connector installed on the swing frame. Verify that the each bundle is routed to its corresponding connector. ***Note:*** The maximum OSP VF Out pairs is 700, which is 28 bundles of 25 pairs each.
9	Tie down unused bundles for future use.
10	Verify that all of the bundles are dressed neatly in the LTM.
11	Go to Procedure 8-3, “Punching down the binder groups on BIX connectors” on page 8-10.

—end—

Procedure 8-3
Punching down the binder groups on BIX connectors

Use this procedure to connect binder groups for outside plant (OSP) voice frequency (VF) cable pairs 1–1400 in installations using BIX connectors.

This procedure outlines suggested installation steps. Operating companies can complete the steps based on their own cross-connect practices.

Tools

You need the following tools:

- splicing tools normally used for terminating BIX connectors
- QTBIX16A wire termination tool to terminate cable pairs

Action

Step	Action
1	Remove the color-coded connector assemblies from the retainers. ***Note:*** The connector assemblies are blue if you have cross-connect facilities. They are green if you do not.
2	Rotate the connector assemblies so that the OSP VF cabling exits through the rear of the connector retainer.
3	Push the connector into the retainer so the front side of the connector faces outward.
4	Use a QTBIX16A tool (black blade down) to terminate the cable pairs, based on your job specifications, to each BIX connector on the front of the swing frame.

CAUTION
Use the proper QTBIX16A cutting edge
The QTBIX16A tool connects each wire to the BIX connector and trims off the excess. Make sure that the cutting edge is on the correct side. A button on the handle selects either the “Cut” or “No Cut” position.

5	Neatly dress and secure all cable pairs.
6	Go to Procedure 8-4, “Applying a moisture barrier to the air-core cable” on page 8-11.

—end—

Procedure 8-4
Applying a moisture barrier to the air-core cable

Use this procedure to apply a moisture barrier to air-core cables pulled into the large termination module (LTM).

> ***Note:*** Apply a moisture barrier only to air-core cable. Skip this procedure if you are using filled cable.

Materials

You need the following materials:

- encapsulating material as per Bell System Practices Section 631-600-305 Issue 1, November 1972 or the procedure enclosed in the 8962 Multi-mold package
- electrical tape
- bonded mesh

Action

Step	Action
	Note: Cables must be secured to minimize cable movement while the barrier encapsulating compound is drying.
1	Cut pieces of bonded mesh large enough to wrap around each cable.
2	Make a mold by wrapping each piece of bonded mesh approximately 2 in. (5.08 cm) above the sheath. ***Note:*** Allow 10 in. (25.4 cm) between the top of the bonded mesh and the base of cable conduit.
3	Wrap electrical tape around the base of the bonded mesh on all cables to secure it to the cable and form a seal.
4	Mix both parts of the encapsulate in a disposable plastic container no more than 10 minutes before using.
5	Pour the encapsulate mixture into the mold, filling the mold to the top.
6	Wait at least 20 minutes to allow the encapsulate to set.

—end—

Terminating the OSP VF cables to 710 or MS2 connectors

This chapter describes terminating voice frequency (VF) cables for a large termination module (LTM) equipped with 710 or MS2 connectors.

Chapter task list

This chapter includes the following tasks:

Procedure	Task	See
9-1	Terminating the OSP VF cable pairs to the SAI cross-connect facilities using 710 or 3M MS2 DPM connectors	page 9-6
9-2	Terminating the OSP VF cable pairs to 710 or 3M MS2 DPM connectors without the swing frame	page 9-9
9-3	Applying a moisture barrier to the air-core cable	page 9-11

How to use this chapter

Which procedures you perform is determined by whether the cross-connect facility is installed. Begin at the first procedure listed for the type of connectors and cross-connect option you have.

Connector options

The following connector options are available in the LTM:

- BIX
- 710-SC1-25 (capless female)
- 3M MS^2 4000D Super-Mini

The LTM can have only one of these connector options installed.

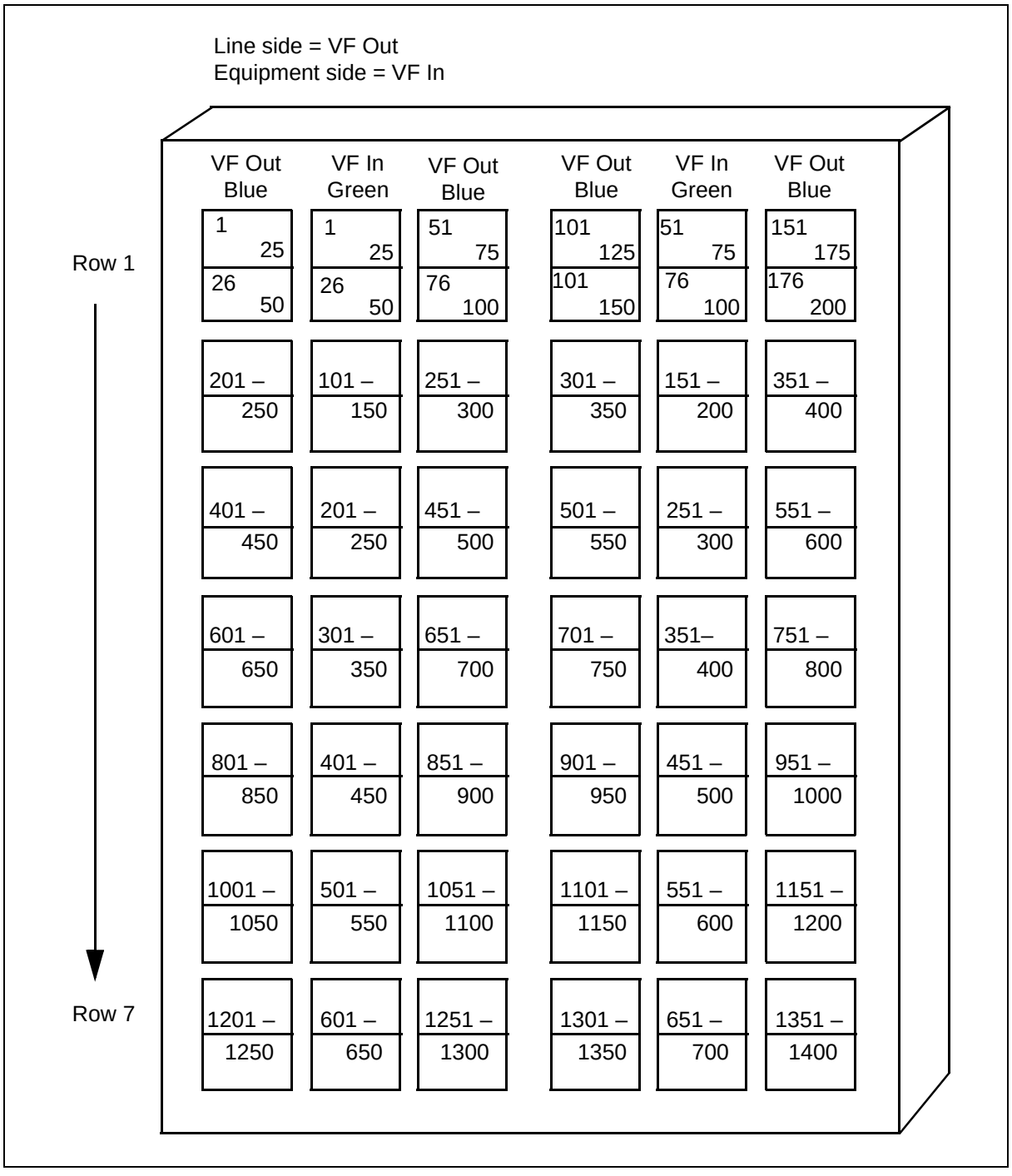
Cross-connect options

The LTM can also have an optional cross-connect facility factory-installed. The serving area interface (SAI) cross-connect blocks are typically 25-pair binding-post terminal blocks. The VF In and VF Out connector/block positions are numbered and color-coded on the front of the swing frame as shown in Figure 9-1 on page 9-3.

VF connector blocks

Figure 9-1 shows the VF connector block layout on the SAI swing frame.

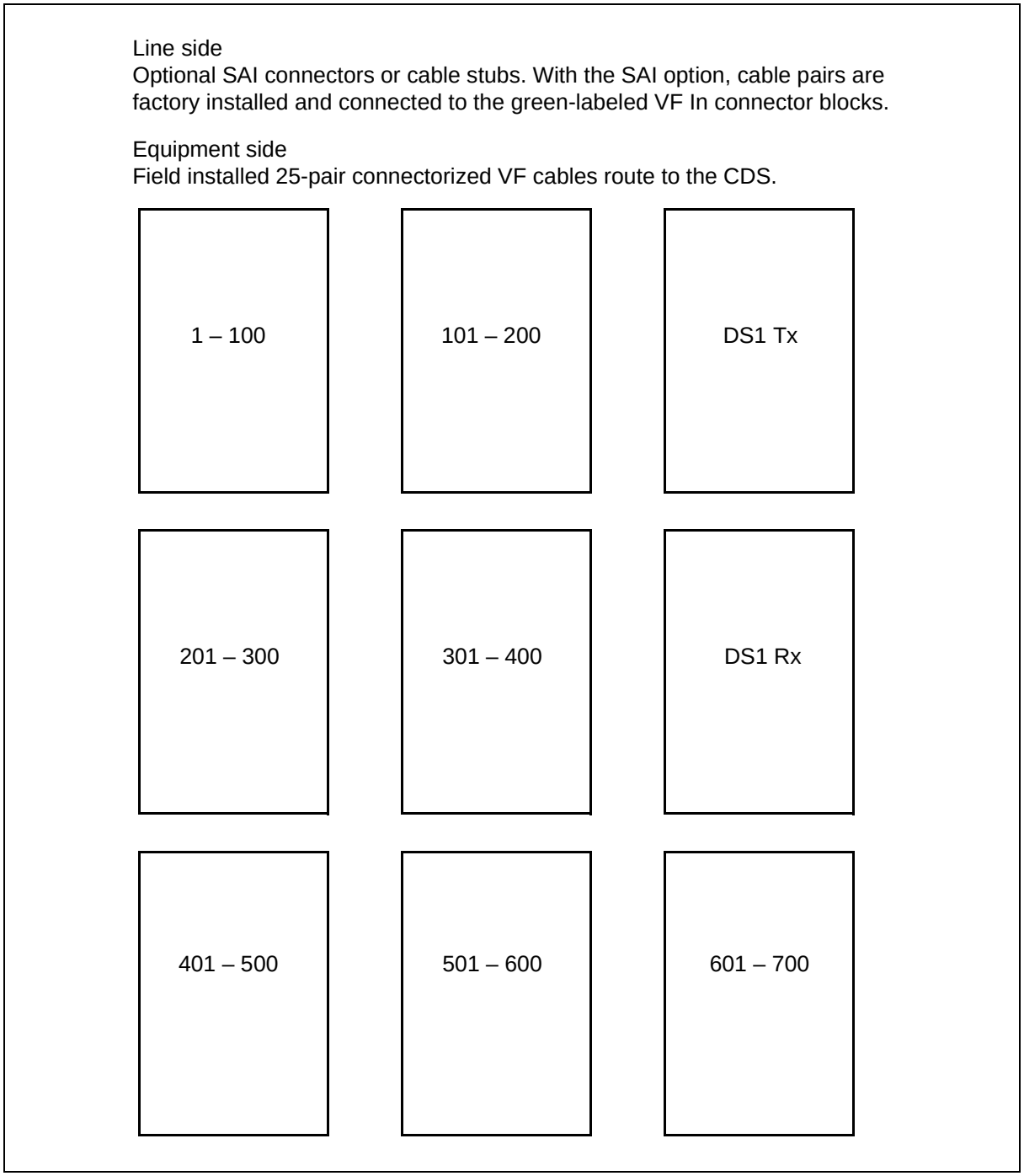
Figure 9-1
VF connector block pair count on the SAI swing frame



VF protector blocks

Figure 9-2 shows the VF protector block layout on the LTM rear wall.

Figure 9-2
VF protector block pair count on the rear of the LTM



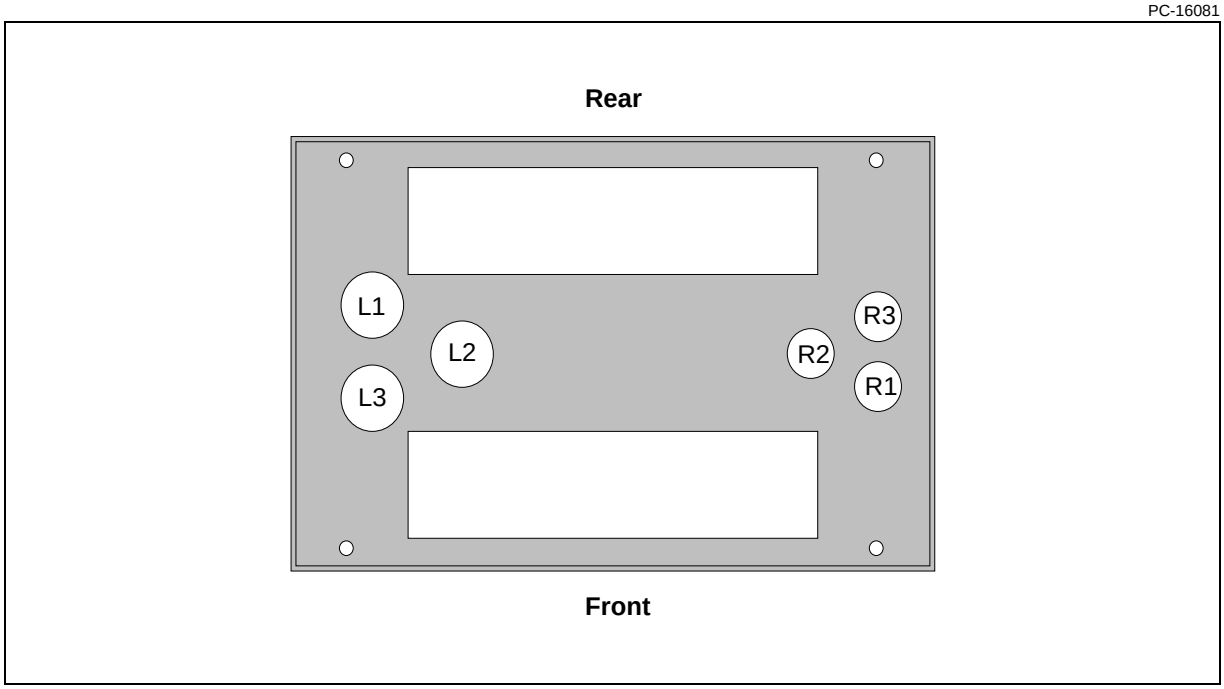
Cable entry

The outside plant (OSP) VF cable (line side) pair count starts with the first pair in the first cable that is routed into conduit entry port L1. The cable pair count continues, in order, in conduit L2 and then L3.

Figure 9-3 shows where the OSP VF cabling has been pulled into the LTM.

Figure 9-3
Conduit entry ports in the LTM

PC-16081



Procedure 9-1
Terminating the OSP VF cable pairs to the SAI cross-connect facilities using 710 or 3M MS^2 DPM connectors

Use this procedure to install and splice outside plant (OSP) voice frequency (VF) cables to the serving area interface (SAI) cross-connect option in the large termination module (LTM). The following connector options are available with the binding-post cross-connect:

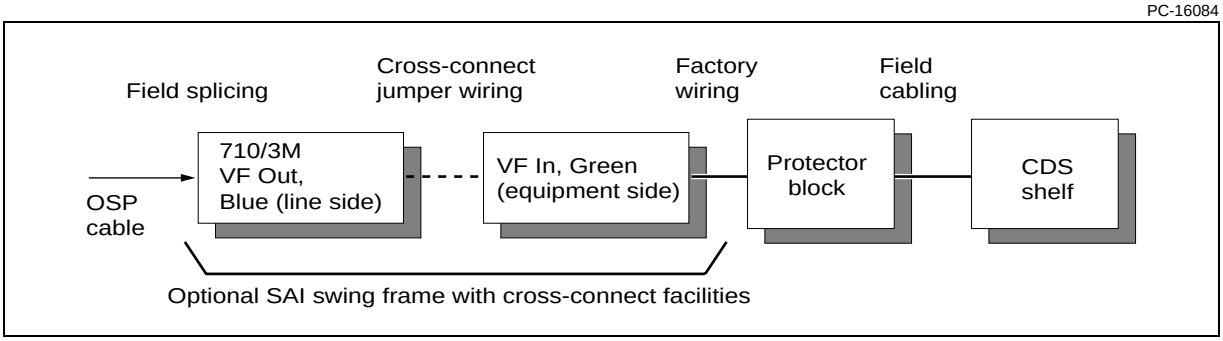
- 710-SC1-25 (capless female)
- 3M MS^2 4000D Super-Mini connector

The field installer splices OSP VF cable pairs to the blue color-coded cross-connect blocks on the swing frame as shown in Figure 9-4.

The connections between the green color-coded cross-connect blocks and the VF protector blocks are factory installed.

Figure 9-4
Cable connections to 710/3M connectors on the swing frame (with cross-connect)

PC-16084



Tools and materials

You need the following tools and materials:

- cable-tie cutter to fit the cable tie materials needed
- Western Electric 945A Splicing Tool Kit for 710 connectors
- 4045K Universal Splicing Rig (or equivalent splicing kit for 3M MS^2 connectors)
- 6–8 in. (15.24–20.32 cm) cable ties

—continued—

Procedure 9-1 (continued)
Terminating the OSP VF cable pairs to the SAI cross-connect facilities using 710 or 3M MS2 DPM connectors

Before you begin

Before you begin splicing, plan the cable routing and dressing on the left interior wall. Nortel Networks recommends the following:

- Begin splicing with the highest-numbered pair count on the blue color-coded connector blocks (see Figure 9-1 on page 9-3).
- Continue splicing block by block in reverse pair count.
- Plan for the spliced cable lengths to route up the left side of the LTM, to the height of the connector block, and across to the connector block with a 10–12 in. service loop.7

Following this process allows the left wall of the LTM to remain clear for cable routing and dressing.

Action

Step	Action
	Preparing to splice
1	Open the swing frame.
2	Move the OSP VF cable bundles out of the way so you have ample working space for splicing, routing, and dressing the 25-pair bundles.
3	Mount the splicing tool to the vertical splice-tool mounting bar located on the right side in the LTM.
4	Cut the cable ties that secure the blue color-coded VF Out cable stubs from the connector blocks and move them out of the way. ***Note:*** The cables for the blue color-coded VF Out blocks are coiled at the factory and attached to the rear of the swing frame for shipment. The VF In cables are factory wired to the VF protector blocks on the rear wall.
5	Locate the VF Out connector block cable stub for the blue color-coded block that contains the highest-numbered pair count. Move the other cable stubs out of the way.
6	Locate the matching 25-pair OSP VF cable bundle. Move the other OSP VF cable bundles out of the way.

—continued—

Procedure 9-1 (continued)
Terminating the OSP VF cable pairs to the SAI cross-connect facilities using 710 or 3M MS2 DPM connectors

Step	Action
	Splicing the cables
7	Install a 710 or 3M connector (to match the factory-installed connector on the VF Out block) on the 25-pair bundle in the OSP VF Out cable.
8	Press the two connectors together.
9	Label the connector with the pair count range.
10	Route the bundle up the left side of the LTM to the height of the connector block.
11	Neatly dress and secure the bundle to the left wall of the LTM with tie-wraps.
12	Route the bundle from the back of the connector block to the left side of the LTM.
13	Form a 10–14 in. (25.4– 35.6 cm) service loop in the bundle between the swing frame and the inside wall of the LTM.
14	Neatly dress and secure the bundle to the rear of the swing frame and to the LTM wall with tie-wraps.
15	Test the service loop by carefully closing the swing frame. If the swing frame does not open and close easily without putting pressure or stress on the VF bundle, adjust the service loop as needed.
16	Repeat steps 4 through 13 for each 25-pair VF Out connector block installed.
17	Dress and secure unused bundles for future use.
18	Verify that all of the bundles are dressed neatly in the LTM.

—end—

Procedure 9-2
Terminating the OSP VF cable pairs to 710 or 3M MS^2 DPM connectors without the swing frame

Use this procedure to connect outside plant (OSP) cable voice frequency (VF) Out pairs to the line-side connectors in the large termination module (LTM) when no serving area interface (SAI) swing frame cross-connect option is installed. The following connector options are available:

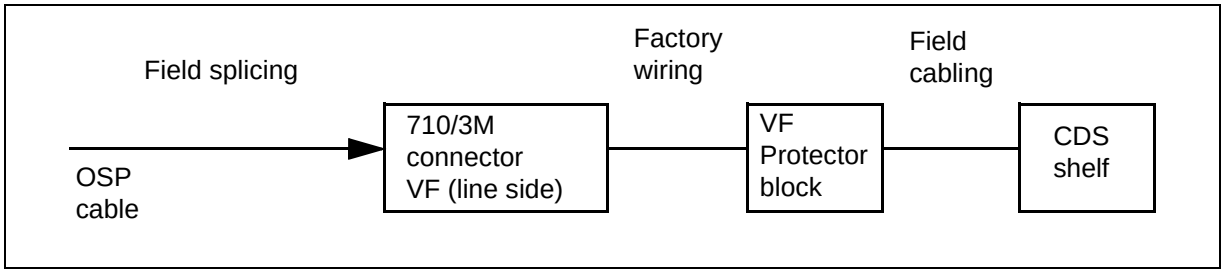
- 710-SC1-25 (capless female)
- 3M MS^2 4000D Super-Mini connector.

This procedure outlines suggested installation steps. Operating companies can complete the steps based on their own cross-connect practices.

The field installer splices the OSP VF cable pairs to the line-side cable stubs from the VF protector blocks as shown in Figure 9-5.

Electronic equipment is connected to the equipment side of the VF protector blocks by field-installed connectorized cable assemblies.

Figure 9-5
Cable connections to 710 or 3M connectors (no cross-connect)



Tools and materials

You need the following tools and materials:

- cable-tie cutter to fit the cable tie materials needed
- Western Electric 945A Splicing Tool Kit for 710 connectors
- 4045K Universal Splicing Rig (or equivalent splicing kit for 3M MS^2 connectors)
- 6–8 in. (15.24–20.32 cm) cable ties

—continued—

Procedure 9-2 (continued)
Terminating the OSP VF cable pairs to 710 or 3M MS2 DPM connectors without the swing frame

Action

Step	Action
1	Move the OSP VF cable bundles out of the way so you have ample working space for splicing, routing, and dressing the 25-pair bundles.
2	Mount the splicing tool to the vertical splice-tool mounting bar located on the right side in the LTM.
3	On the left side of the LTM, cut the cable ties that secure the VF Out cable stubs from the protector blocks and move them out of the way. ***Note:*** The cable stubs for the VF Out pairs are coiled at the factory and attached to the left side of the LTM for shipment.
4	Locate and separate the VF Out 25-pair cable stub for pairs 1–25. Move the other connectorized bundles out of the way.
5	Locate the matching 25-pair OSP cable bundle. Move the others out of the way.
6	Install a 710 or 3M connector (to match the factory-installed connector on the protector block stub) on the 25-pair bundle in the OSP VF Out cable.
7	Press the two connectors together.
8	Label the connector with the pair count range.
9	Route the bundle up the left side of the LTM to the height of the protector block on the rear wall.
10	Form a 25.4– 35.6 cm (10-14 in.) service loop in the bundle between the protector block and the inside wall of the LTM.
11	Neatly dress and secure the bundle to the left wall of the LTM with tie-wraps.
12	Repeat steps 4 through 11 for each 25-pair VF Out protector block installed.
13	Dress and secure unused bundles for future use.
14	Verify that all of the bundles are dressed neatly in the LTM.

—end—

Procedure 9-3
Applying a moisture barrier to the air-core cable

Use this procedure to apply a moisture barrier to air-core cables pulled into the large termination module (LTM).

Note: Apply a moisture barrier only to air-core cable. Skip this procedure if you are using filled cable.

Materials

You need the following materials:

- encapsulating material as per Bell System Practices Section 631-600-305 Issue 1, November 1972 or the procedure enclosed in the 8962 Multi-mold package
- electrical tape
- bonded mesh

Action

Step	Action
	Note: Cables must be secured to minimize cable movement while the barrier encapsulating compound is drying.
1	Cut pieces of bonded mesh large enough to wrap around each cable.
2	Make a mold by wrapping each piece of bonded mesh approximately 2 in. (5.08 cm) above the sheath. ***Note:*** Allow 25.4 cm (10 in.) between the top of the bonded mesh and the base of the cable conduit.
3	Wrap electrical tape around the base of the bonded mesh on all cables to secure it to the cable and form a seal.
4	Mix both parts of the encapsulate in a disposable plastic container no more than 10 minutes before using.
5	Pour the encapsulate mixture into the mold, filling the mold to the top.
6	Wait at least 20 minutes to allow the encapsulate to set.

—end—

Routing and terminating DS1 and maintenance cables

This chapter describes routing and terminating the DS1 and maintenance cable pairs in the ModCab.

> ***Note:*** Miscellaneous cable routing and termination is site-specific and customer-defined. Route and terminate miscellaneous cable pairs based on your job specifications.

The cables were routed into the large termination module (LTM) in Chapter 6, “Installing the OSP cables.”

Chapter task list

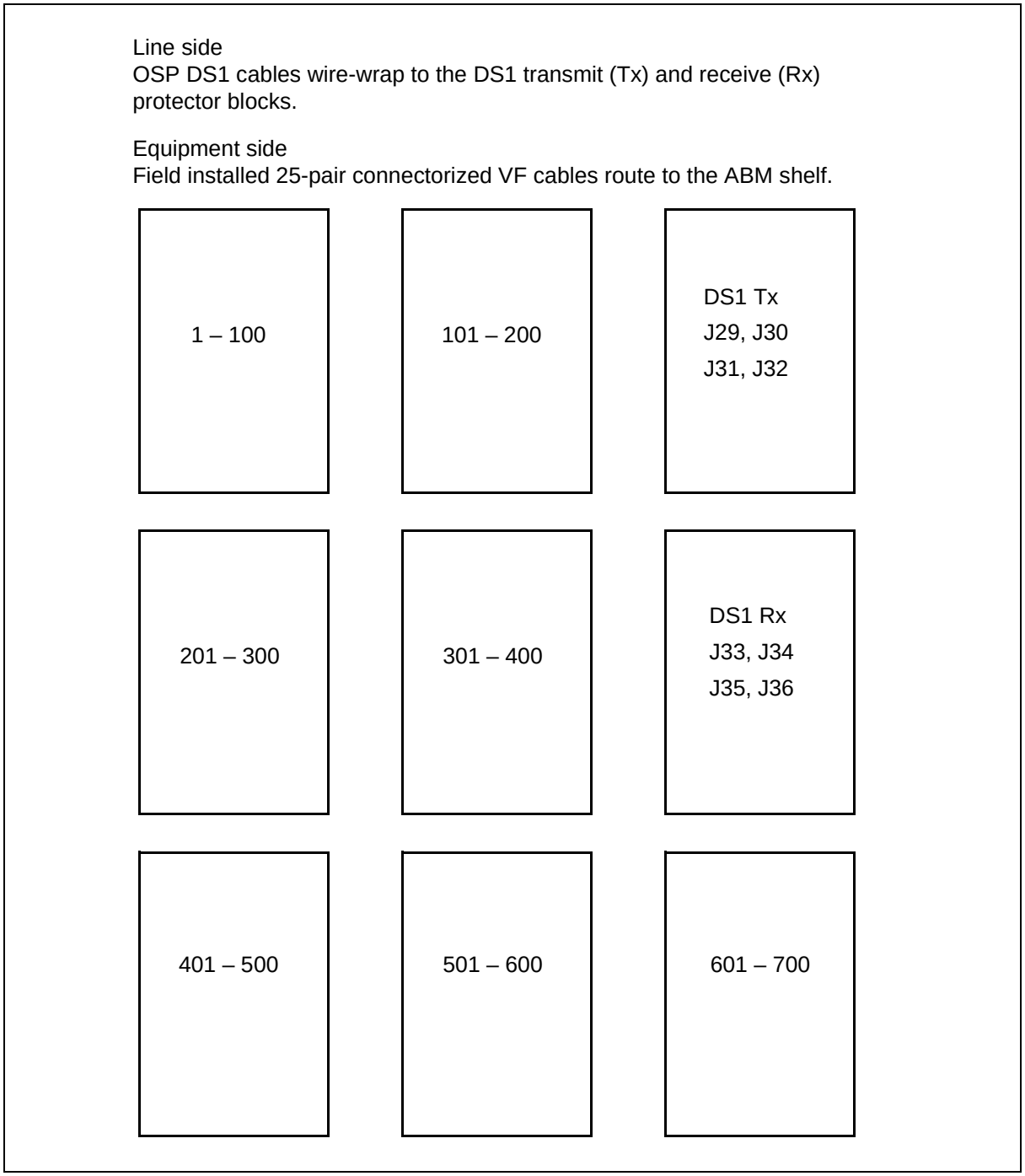
This chapter includes the following task:

Procedure	Task	See
10-1	Terminating OSP DS1 cables to BIX connectors	page 10-4

DS1 protector blocks

Figure 10-1 shows the DS1 protector block layout on the LTM rear wall.

Figure 10-1
DS1 protector block pair count on the rear of the LTM



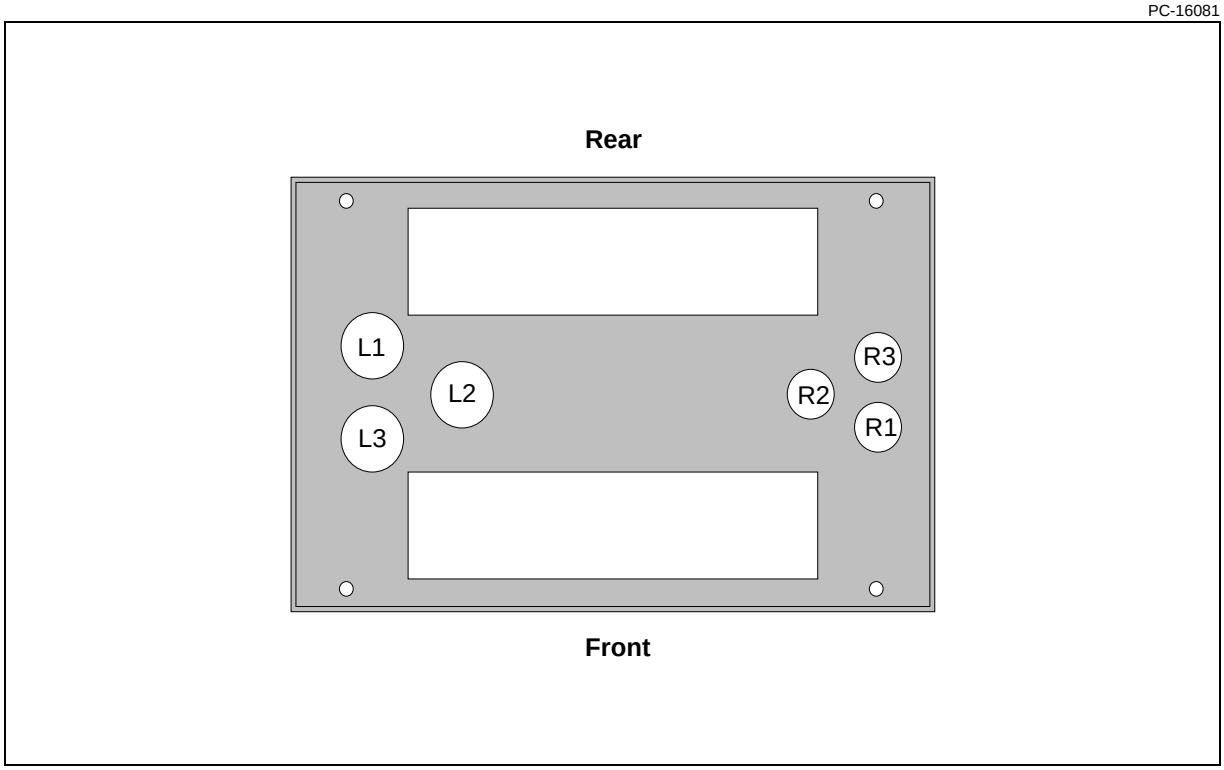
Cable entry

The DS1 cable (line side) pair count starts with the first pair in the first cable that is routed into conduit entry port R3. Additional DS1 cables may be installed, if needed, in cable entry port R2.

Figure 10-2 shows where the outside plant (OSP) DS1 cabling has been pulled into the LTM.

Figure 10-2
Conduit entry ports in the LTM

PC-16081



Procedure 10-1
Terminating OSP DS1 cables to BIX connectors

Use this procedure to route and terminate the DS1cables to BIX connectors in the large termination module (LTM). DS1 cable pairs should be separated based on the direction of transmission. Do not route transmit (Tx) pairs and receive (Rx) pairs in the same cable.

A customer-supplied fuse link should be spliced into the T1 and maintenance pairs outside of the cabinet.

Verify that a QCM2A or equivalent bond clamp(s) is installed on the outside cable. Cable pairs should have been butted, stripped and bonded in Chapter 6, "Installing the OSP cables."

Tools and materials

You need the following tools and materials:

- cable-tie cutter to fit the cable tie materials
- cable splicing tools for 22–24 AWG
- 6–8 in. (15.24–20.32 cm) cable ties

Action

Step	Action
	Terminating Transmit DS1 pairs
1	Locate the 25-pair bundle that contains DS1 Tx pair 1.
2	Splice the BIX connector to the 25-pair bundle.
3	Route the bundle up the right wall of the LTM to the DS1 Tx protector block on the back wall (see Figure 10-1 on page 10-2).
4	Neatly dress and secure the bundle to the LTM right wall with cable ties.
5	Form a 25.4– 35.6 cm (10-14 in.) service loop in the bundle between the side wall of the LTM and the protector block.
6	Connect the bundle to the transmit protector block connector position J29.
7	Neatly dress the service loop with cable ties.
8	Repeat steps 1 through 7 for each 25-pair DS1 Tx pair. ***Note:*** Pair count on the protector block runs sequentially from 1 to 100 and the connector sequence runs J29, J30, J31 and J32.

—continued—

Procedure 10-1 (continued)
Terminating OSP DS1 cables to BIX connectors

Step	Action
	Terminating Receive DS1 pairs
9	Locate the 25-pair bundle that contains DS1 Rx pair 1.
10	Splice the BIX connector to the 25-pair bundle.
11	Route the bundle up the right wall of the LTM to the DS1 Rx protector block located on the back wall (see Figure 10-1 on page 10-2).
12	Neatly dress and secure the bundle to the LTM right wall with cable ties. Secure the bundle to the right wall.
13	Form a 10–14 in. (25.4– 35.6 cm) service loop in the bundle between the side wall of the LTM and the protector block.
14	Connect the bundle to the receive protector block connector position J33.
15	Neatly dress the service loop with cable ties.
16	Repeat steps 9 through 15 for each 25-pair DS1 Rx pair. ***Note:*** Pair count on the protector block runs sequentially from 1 to 100 and the connector sequence runs J33, J34, J35 and J36.

—end—

Routing internal cables

This chapter describes routing and terminating the internal cabling in the modular cabinet (ModCab).

The cables are routed and terminated at the factory in the modules that are shipped as a bolted-together pod.

Chapter task list

This chapter includes the following tasks:

Procedure	Task	See
11-1	Routing and terminating DS1 cables	page 11-3
11-2	Routing and terminating MTA cables	page 11-8

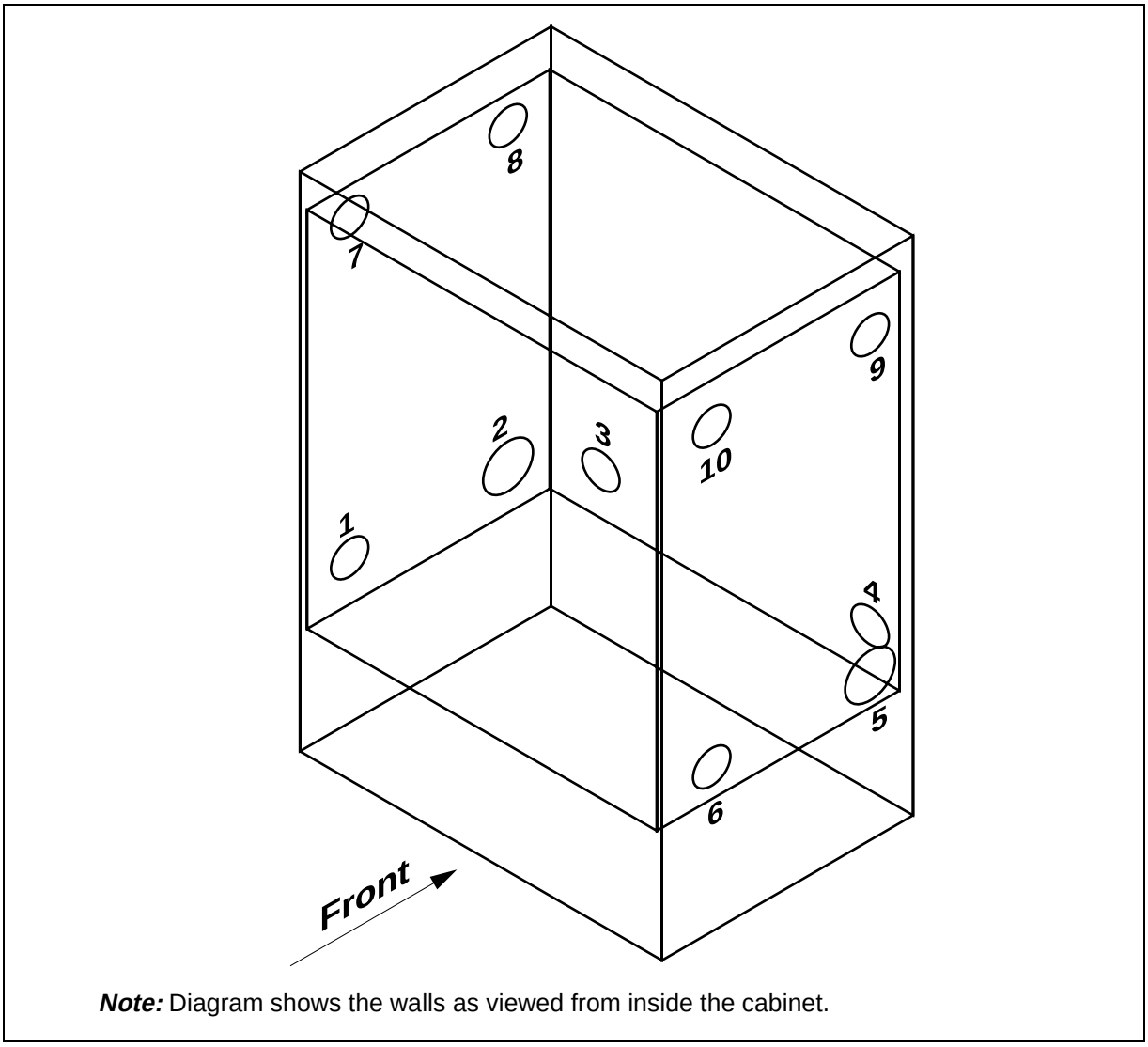
Cabling ports

The ModCab has cable routing ports on the left, right, and back wall of the modules. Ports 1, 3, 4, and 6 to 10 are 7.62 cm (3 in.) in diameter. Ports 2 and 5 are 10.16 cm (4 in.) in diameter.

Figure 11-1 shows where the cabling ports are located on the cabinet module walls. These ports are used throughout the cabling process and the port designations signify which port to use for routing the cables.

Internal cabling is routed through these ports from one module to the next. How the cables are routed depends on the module configuration.

Figure 11-1
Cabling ports in the ModCab modules



Note: Diagram shows the walls as viewed from inside the cabinet.

Procedure 11-1
Routing and terminating DS1 cables

Use this procedure to route and terminate the DS1cables in the ModCab. DS1 cables route from the access bandwidth manager (ABM) shelf I/O cards to the DS1 transmit (Tx) and receive (Rx) protector blocks in the large termination module (LTM). See Figure 11-2.

Plan your cable routing before beginning this procedure. Cable routes depend on the configuration you are installing.

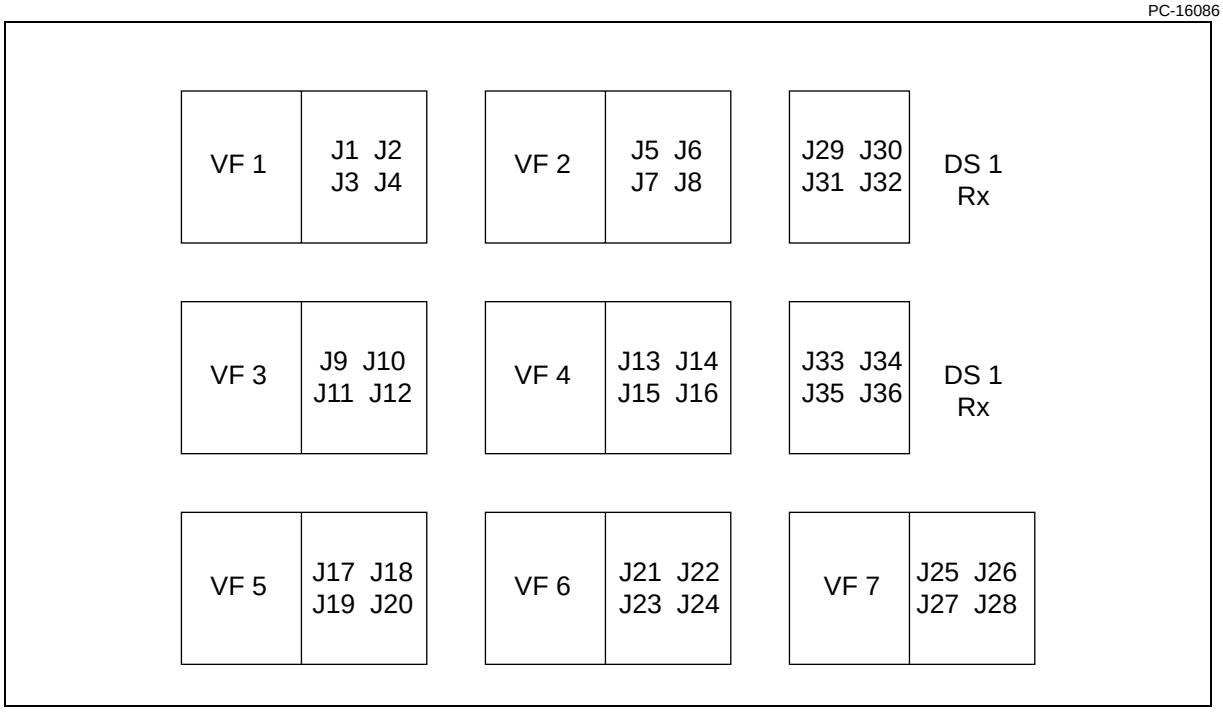
Tools and materials

You need the following tools and materials:

- cable-tie cutter to fit the cable tie materials
- wire stripper for 22–24 AWG
- wire-wrap tool for 22–24 AWG
- 6–8 in. (15.24–20.32 cm) cable ties

Figure 11-2
LTM protector block layout

PC-16086



—continued—

Procedure 11-1 (continued)
Routing and terminating DS1 cables

Mapper and I/O slots

DS1 cables connect to DS1 I/O cards mounted in upper ABM shelf slots. One DS1 In (Tx) and one DS1 Out (Rx) card are installed for each DS1 signal. The two I/O cards connect to a DS1 mapper card installed in a corresponding lower ABM shelf slot.

I/O card to mapper card relationships are defined. You must install I/O cards in the proper slots that correspond to the mapper card positions installed based on job specifications.

Table 11-1 lists the slots where the DS1 mapper circuit packs can be installed in the ABM shelf as well as the I/O card slots that correspond to each of the mapper card slots.

Table 11-1
Relationship between ABM mapper slots and I/O card slots

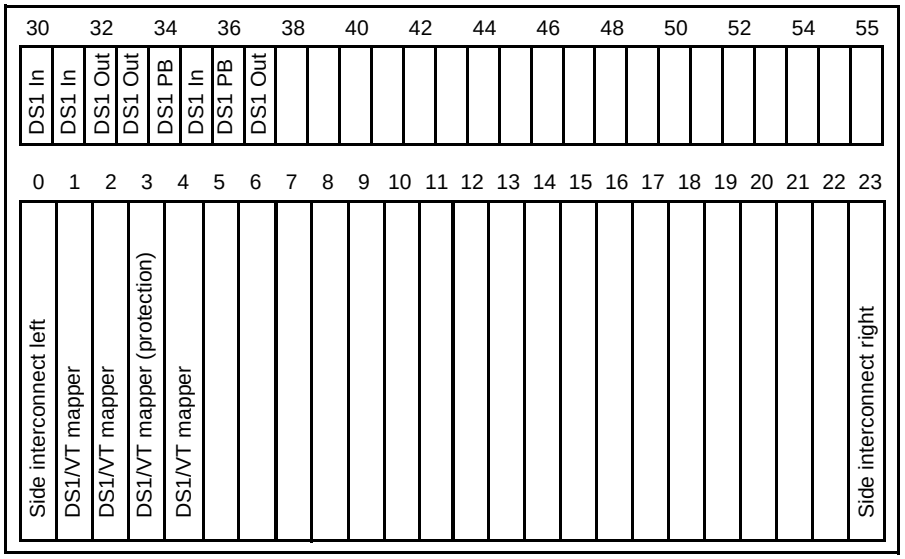
Mapper slot	Input card slot	Output card slot
1	30	32
2	31	33
3 (protection)	34 (protection bridge card)	36 (protection bridge card)
4	35	37

—continued—

Procedure 11-1 (continued)
Routing and terminating DS1 cables

Figure 11-3 shows the locations of the ABM mapper circuit packs and the I/O card circuit packs installed in the ABM shelf at each remote fiber terminal (RFT).

Figure 11-3
Installing ABM I/O cards



Mappers		I/O cards			
DS1	1	DS1 In	30	DS1 Out	32
DS1	2	DS1 In	31	Ds1 Out	33
DS1 P	3	DS1 PB	34	DS1 PB	36
DS1	4	DS1 In	35	DS1 Out	37

DS1 In DS1 input card (NT4K32AA)
DS1 Out DS1 output card (NT4K33AA)
DS1 PB DS1 protection bridge card (NT4K31AA)
P protection

—continued—

Procedure 11-1 (continued)
Routing and terminating DS1 cables

Action

Step	Action

Routing DS1 cables

Note: See your job specifications to determine how many DS1 Tx and DS1 Rx cables route from the ABM I/O cards to the DS1 protector blocks. Your job specifications also indicate where to insert the I/O cards the I/O section of the ABM.

1 Insert the I/O cards into the assigned slots on the ABM shelf as shown in your job specifications.

2 Route the 25-pair D-sub connector end of the first DS1 Tx cable into the common equipment module (CEM) through the cable routing holes listed in Table 11-2.

Note: Leave about 1.8–2.4 m (6-8 ft) of the cable in the CEM.

Table 11-2
DS1 cable routing table

Into CEM routing hole	To Module	Through routing hole	To Module
Side-by-side configuration			
1	LTM		
Back-to-back, basic configuration			
3	DCP	R8	LTM

3 In the CEM, route the cable up the back of the swing frame on the hinge side.

4 Route the 44-pin connectors through the swing frame to the front of the ABM shelf.

5 Route the cable across the front of the ABM shelf I/O section, in the cable organizer panel (COP), to the location of the DS1 I/O card slots.

6 Connect the cable to the I/O cards as shown in Figure 11-4.

Note: The DS1 cable has two 44-pin connectors on the end. P1 connects to the leftmost I/O card and P2 connects to the rightmost card in the 2-card group.

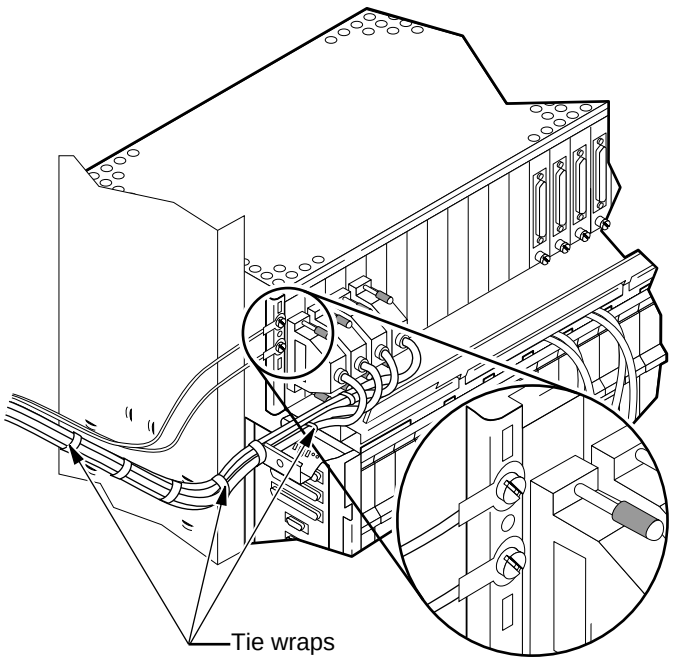
—continued—

Procedure 11-1 (continued)
Routing and terminating DS1 cables

Step	Action
7	Connect the ground lead as shown in Figure 11-4.
8	Dress the DS1 cable in the COP.
9	Secure the DS1 cable with cable ties to the cable-tie bracket on the left side of the ABM and to the swing frame.
10	In the LTM, route the cable up the right side wall to the DS1 Tx protector block.
11	Connect the connector P3 to J29 and P4 to J30 on the block.
12	Repeat steps 2 to 11 for each DS1 transmit cable. ***Note:*** DS1 transmit cables connect to J29, J30, J31 and J32 on the DS1 Tx protector block. DS1 receive cables connect to J33, J34, J35 and J36 on the DS1 Rx protector block.

Figure 11-4
Attaching the ABM left-side ground lugs

PC-15535



Note 1: I/O card bar code label mounting plate has been omitted for clarity.

Note 2: Four cables are shown. Two cables are used if only one mapper is being installed.

—end—

Procedure 11-2
Routing and terminating MTA cables

Use this procedure to route and terminate metallic test access (MTA) cables in the ModCab.

The MTA cables route from the side interconnect left (SIL) J01 on the left side of the access bandwidth manager (ABM) shelf in a daisy chain to the copper distribution shelves (CDS).

Plan your cable routing before beginning the procedure. Cable routes depend on the configuration you are installing. MTA cables are supplied in specific lengths that route from one specific location to another. When you are installing the cables, be sure that you have enough cable for the route.

Tools and materials

You need the following tools and materials:

- cable-tie cutter to fit the cable tie materials
- 6–8 in. (15.24–20.32 cm) cable ties

Action

Step	Action
	Routing MTA cables
	Note: The first MTA cable is factory-connected in the common equipment module (CEM) to J01 on the left side of the ABM and is connected to the MTA In connector on CDS 1 in the bottom of the swing frame. Depending on your configuration and how many CDS you have, the MTA daisy chain can continue to CDS 2.
1	Verify that an MTA cable has been routed from ABM shelf J01 to the CDS 1 MTA In connector. Then check for the MTA cabling as listed in Table 11-3.

—continued—

Procedure 11-2 (continued)
Routing and terminating MTA cables

Step Action

Table 11-3
CDS cable daisy chain connections

Cable	From Shelf/connector	To Shelf/connector
MTA cable #1	ABM, J01	CDS 1, MTA In
MTA cable #2	CDS 1, MTA Out	CDS 2, MTA In
MTA cable #3	CDS 2, MTA Out	CDS 3, MTA Out
MTA cable #4	CDS 3, MTA In	CDS 4, MTA Out
MTA cable #5	CDS 4, MTA In	CDS 5, MTA Out
MTA cable #6	CDS 5, MTA In	CDS 6, MTA Out
MTA cable #7	CDS 6, MTA In	CDS 7, MTA Out
Note: The MTA connections on the CDS shelf are bussed (electrically connected).		

2 Route the required cables (as listed in Table 11-3) using the cable routing listed in Table 11-4. See Figure 11-5 on page 11-10.

Table 11-4
MTA daisy chain cabling through the modules

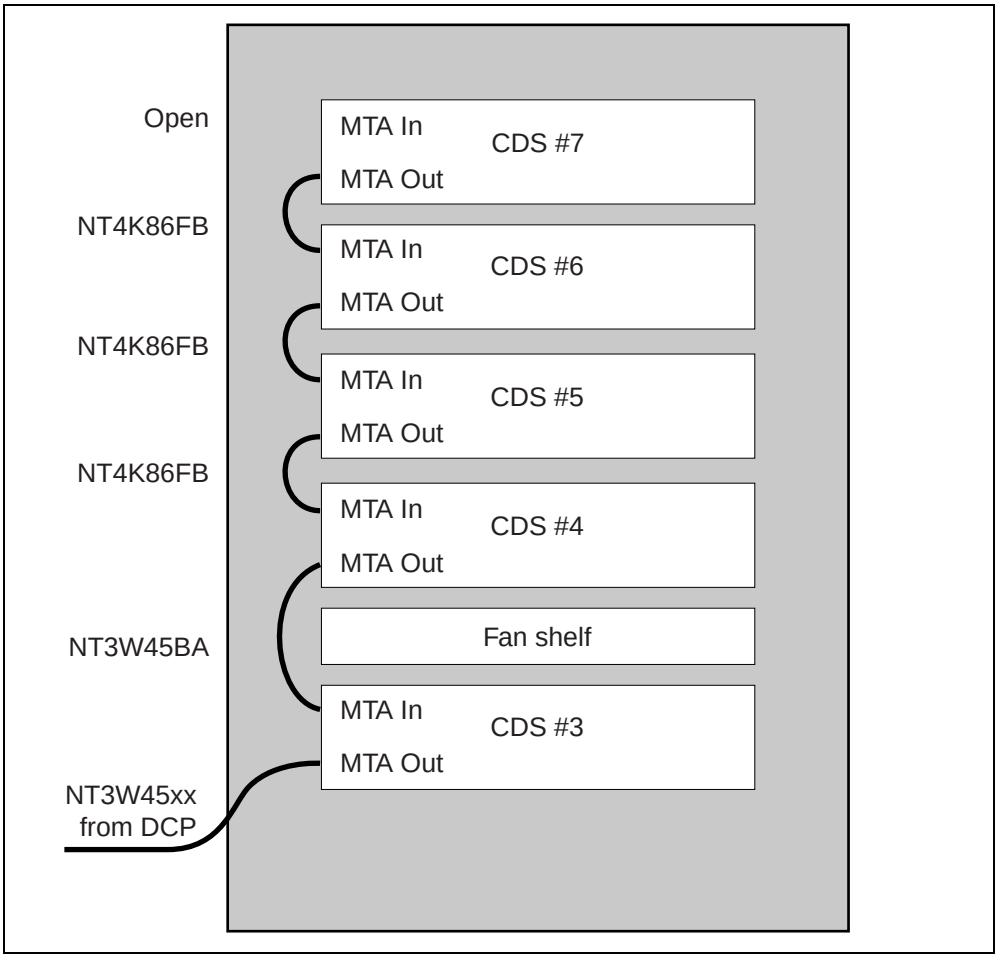
Cable routing hole	To Module	Through routing hole	To Module
Side-by-side configuration			
CEM, 1	LTM	1	DCP to CDS 2
DCP, 6	LTM	6	CDM to CDS 3
Back-to-back, basic configuration			
CEM, 3	DCP to CDS 2	3	
DCP, 4	CEM	24	CDM to CDS 3

—continued—

Procedure 11-2 (continued)
Routing and terminating MTA cables

Step	Action

Figure 11-5
CDS and MTA cable layout in the CDM



3 Inside the modules, route the MTA cables up the left wall to the swing frame.

Note: Be sure to leave a 25.4–35.6 cm (10-14 in.) service loop in the cables between the left wall and the swing frame.

4 Connect the cable connectors to the CDS as listed in Table 11-3 on page 11-9.

5 Verify that the termination plug is installed on the MTA Out connector in the last CDS in the chain.

6 Secure the cable with cable ties throughout the entire route.

—end—

Connecting alarms

This chapter describes wiring and connecting alarms in the modular cabinet (ModCab), which has internal and external alarming provisions.

Internal alarms monitor the operation of the AccessNode system and are software-controlled. Software-controlled internal alarms are wired at the factory; therefore, no physical connections are required at the time of installation.

External alarms that are outside the realm of the AccessNode system include environmental, powering, and customer-assigned equipment alarms. ModCab external alarms are in most cases factory-connected before being shipped from the factory. Exceptions to this include field upgrades which add cabinets to in-service systems or side-by-side (SxS) systems which ship to the site segmented into cabinet groupings.

An alarm interface unit (AIU) in the common equipment module (CEM) gathers ModCab alarm status for each individual module.

The AccessNode breaker interface panel (BIP) contains a connectorized wire-wrap block that has connection points for customer-assigned optional external alarms, orderwire, and parallel telemetry.

Chapter task list

This chapter includes the following task:

Procedure	Task	See
12-1	Wiring customer-assigned external alarms	page 12-4

Provisioning alarms

The AIU uses three of the E2A provisional alarms by combining all the environmental, power, and the T1 failure alarms according to their severity (major, minor, or critical). It transmits these severities from the output module (OM) card in slot 1 to the access bandwidth manager (ABM) using cable assembly NT3W42BA.

Table 12-1 lists the assigned scan points.

Table 12-1
Assigned scan points

Scan point	ABM connector	Pin	Alarm
1	J11	21	Critical
2	J11	22	Major
4	J11	24	Minor

T1 alarms and other non-AccessNode equipment may take advantage of the two spare alarms in the dc power (DCP) module and the six spare alarms in each of the CEM, common distribution module (CDM), and the optional expansion module (OEM) cabinets. Each spare alarm must be set to its reference voltage and its alarm severity by manipulating jumpers on the AIU circuit pack which corresponds to the cabinet in which this equipment is placed.

The seven remaining E2A alarm scan points (R05 - R11) may be allocated by the customer as needed. They may be accessed from the wire wrap panel on the front left of the BIP located in the CEM cabinet. See Procedure 12-1 on page 12-4 for information relating to the use of E2A alarms for the BIP. Also refer to *System Administration Procedures*, 323-3001-302, in *Operations, Administration, & Provisioning*, Volume 4A, and alarm testing procedures which are part of *Site Testing Procedures*, 323-3001-221, in *Commissioning and Testing*, Volume 3, for those seven alarms only.

Routing alarm cabling

The AIU contains one OM, one DCP unit, and up to eight input units that process and report the alarms from each of the ModCab modules.

Alarm cables are routed from each cabinet module to the AIU or BIP. Use the cable routing ports in each cabinet to connect alarm cabling to the AIU or BIP wire-wrap block in the CEM.

Modules which ship attached to the CEM are wired for alarms to the AIU in the factory. Modules shipped separate from the CEM must be connected at the customer site. Alarms wired directly to the BIP must be routed and connected

at the site. In back-to-back (B-B) systems, this may be the CDM or the OEM during upgrades. In SxS systems, this will be the DCP and/or the OEM during both initial installs and upgrades which add the OEM to an existing system.

Table 12-2 lists the alarm cables and their connection points.

Table 12-2
Alarm cables

Cable	From	To
OM interface cable NT3W42BA	AIU output module	ABM J5, J11 DC distribution shelf TB3, TB4
DCP alarm cable NT3W42AA/AB	DCP	AIU dc module
IM alarm cable NT3W42CA NT3W42CB NT3W42CC	CEM (B-B) CDM (B-B) OEM (B-B), CDM (SxS) OEM (SxS)	AIU input modules

Note: When OEM is placed next to a CEM, use NT3W42CB for the OEM and use NT3W42CC for CDM.

AIU Cables

Due to shipping limitations, cabinets may not be shipped in a SxS configuration of more than two cabinets. This section gives installation instructions only for those cables which must be left disconnected from the factory.

Wiring from the DCP

The following table shows the standard method for wiring cable assembly NT3W42AA/AB which provides all the environmental alarm signals from the DCP.

Procedure 12-1
Wiring customer-assigned external alarms

Use this procedure to wire customer-assigned external alarms. Alarm connection points are provided for customer-defined alarm reporting options.

See *System Administration Procedures*, 323-3001-302, in *Operations, Administration, & Provisioning*, Volume 4A, for AccessNode alarm provisioning.

See *Commissioning and Testing,* Volume 3, for the alarm testing part of the procedures.

Note the following items when performing this procedure:

- Relays or switches for alarm reporting must have normally open (NO) contacts.
- Standard alarm configurations can be changed (by reconnecting the fiber cables) based on local requirements.

Tools and materials

You need the following tools and materials:

- wire strippers for 22–24 AWG wire
- wire-wrap tool for 22–24 AWG solid wire
- 22–24 AWG solid wire that meets all national, state and local requirements

Action

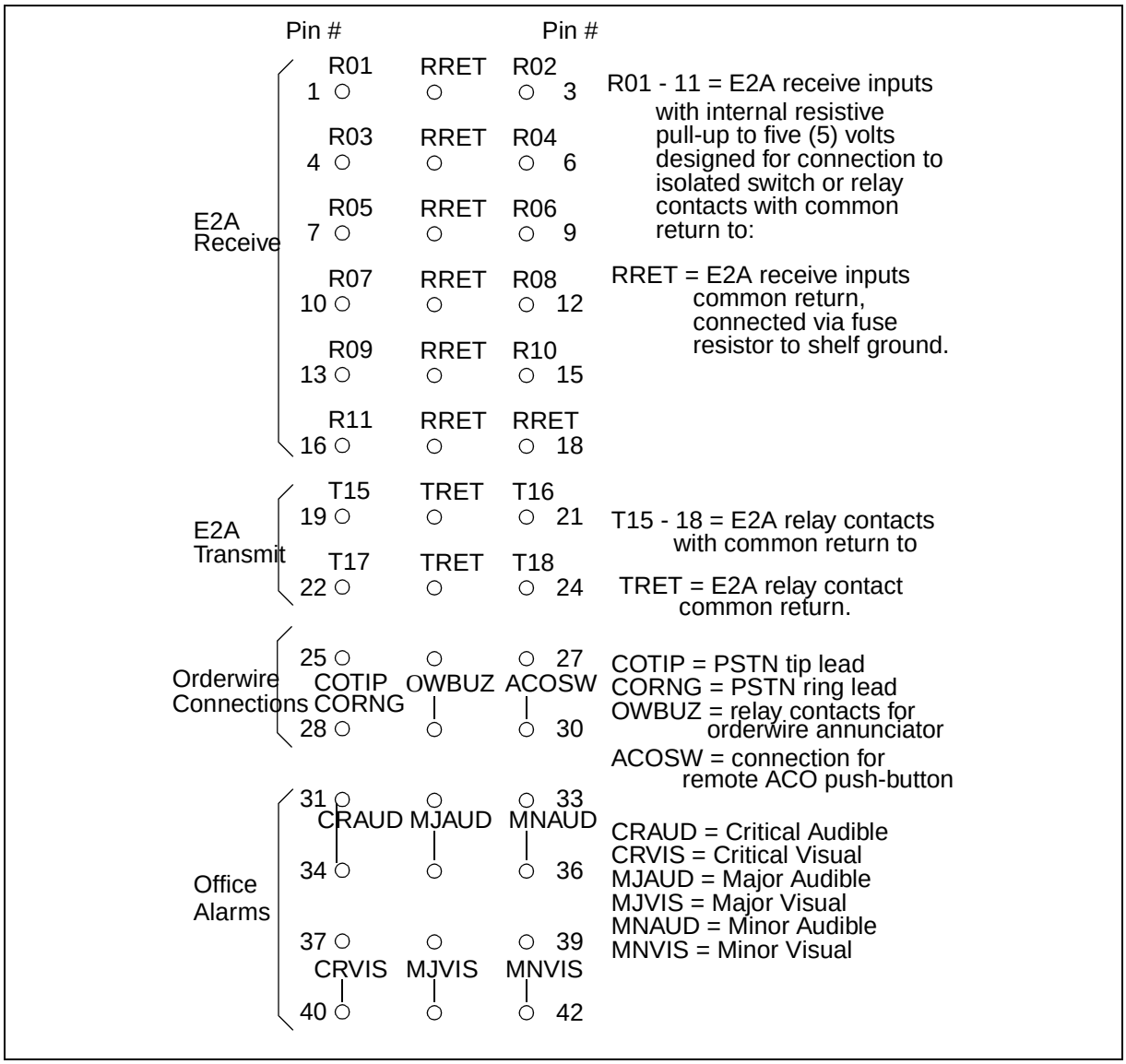
Step	Action
1	Set up the optional equipment (according to the manufacturer's recommended procedures) to generate the required alarm. ***Note:*** Relays or switches for alarm reporting must have normally open (NO) contacts.
2	Locate the wire-wrap block on the front left side of the breaker interface panel (BIP) in the common equipment module (CEM).
3	Route the 24 AWG alarm wiring from the optional equipment to the BIP wire-wrap block.

—continued—

Procedure 12-1 (continued)
Wiring customer-assigned external alarms

Step	Action
4	Terminate the customer-assigned external alarms to the alarm connection points on the BIP as shown in Figure 12-1.
5	Dress and tie-wrap all installed alarm cabling.

Figure 12-1
BIP wire-wrap block



—end—

Installing and connecting the batteries

This chapter describes installing internally mounted batteries in the modular cabinet (ModCab).

Battery strings should provide at least four hours of battery reserve. The batteries are valve-regulated lead-acid cells equipped with plug-in connectors. The batteries are mounted in the ModCab battery drawers in the bottom of the equipment modules.

> ***Note:*** The large termination module (LTM) does not contain a battery drawer.

Chapter task list

This chapter includes the following tasks:

Procedure	Task	See
13-1	Installing the batteries in the cabinet	page 13-4
13-2	Routing and connecting the battery harnesses	page 13-6

Battery options

The following battery option is available: Johnson Controls TEL 12-90 (one string of 4 batteries).

Cautions

Observe the following cautions when performing the procedures in this chapter.

DANGER
Electrical shock hazard
Any unused battery cables must be disconnected from the BBP to prevent potential electrical shock and equipment shorting.

CAUTION
Battery string minimum requirements
Always install a minimum of three battery strings to evenly distribute the charge current between BBP circuit breakers.

CAUTION
Battery replacement requirements
Do **not** replace battery packs on an individual basis. When one or more battery packs in the same string fail, replace **all** packs in that string with matched batteries that have similar date codes.

CAUTION
Fire hazard
Remove all paper and any other combustible materials from inside the cabinet before powering up the cabinet. Failure to comply with this warning can cause a fire.

Battery cables in a back-to-back configuration

Table 13-1 lists the provisional cables that are routed in the back-to-back (B-B) ModCab configuration.

Table 13-1
B-B battery cable routing

Equipment description	PEC	Quantity
Battery cable DCP to BBP	NT3W41DA	1
Battery cable CDM to BBP	NT3W41DB	1
Battery cable CEM to BBP	NT3W41DC	1
Battery cable OEM to BBP	NT3W41DD	1

Battery cables in a side-by-side configuration

Table 13-2 lists the provisional cables that are routed in the side-by-side (SXS) ModCab configuration.

Table 13-2
SXS battery cable routing

Equipment description	PEC	Quantity
Battery cable DCP to BBP	NT3W41DA	1
Battery cable CDM to BBP	NT3W41DB	1
Battery cable CEM to BBP	NT3W41DC	1
Battery cable OEM to BBP	NT3W41DD	1

Procedure 13-1
Installing the batteries in the cabinet

Use this procedure to install the batteries in the equipment modules, route the battery harnesses, and connect the battery harnesses to the battery breaker panel (BBP) in the ModCab dc power module (DCP).

Battery strings should provide at least four hours of battery backup for a fully equipped ModCab configuration.

Note: The rectifier(s) can be used in a battery-less operation.

Tools and materials

You need the following tools and materials:

- voltmeter RMS Fluke 8050A (or equivalent)
- cable tie-wraps, 6–8 in. (15–20 cm)
- Lexan separator sheets

Action

Step	Action
1	Remove the battery drawer's front cover.
2	Loosen and open the drawer.
3	Turn Off the BBP circuit breakers.
4	Measure the voltage between the terminals of each new battery pack. ***Note:*** The acceptable voltage range for Johnson Control 12 V 90 batteries is ≥1.5 V dc on each 12 V battery pack Replace any battery pack set that does not meet this requirement.

—continued—

Procedure 13-1 (continued)
Installing the batteries in the cabinet

Step	Action
5	Insert two lexan separator sheets into the battery drawer, one at each end to separate end batteries from the metallic sides of the drawer. A single large sheet should be attached to the underside of the lid to prevent batteries from touching the cover.
6	Place the batteries in the drawers, four batteries per drawer in the orientation shown in Figure 13-1.
7	Connect the battery lead connectors to the drawer.
8	Close the drawer.
9	Verify that all the circuit breakers on the BBP are in the Off position.

Figure 13-1
12 V battery string arrangement in a battery drawer

PC-15802

—end—

Procedure 13-2
Routing and connecting the battery harnesses

Use this procedure to route the battery harnesses from the battery breaker panel (BBP) to each equipment modules that has batteries in the battery drawer.

The mating connectors on the harnesses are 2-pin Mate-N-Lok assemblies. The harness wire is color-coded as follows: red (–48 V dc) and black (+48 V dc).

Tools and material

You need the following tools and materials:

- voltmeter RMS Fluke 8050A (or equivalent)
- cable ties, 6–8 in. (15–20 cm)

Action

Step	Action
1	Verify that the BBP circuit breakers are in the Off position.
2	Uncoil the battery harnesses in the dc power module (DCP).
3	Based on your configuration, route the cables according to the diagrams shown in Figure 13-2 on page 13-7 or Figure 13-3 on page 13-7 as required.
4	Connect the harnesses in each cabinet to the battery connector on the inside right wall of the equipment modules.
5	At the BBP, check that -48 V dc (red harness wire) is present on the input to the BBP circuit breakers. ***Note:*** If the voltage is incorrect or missing, troubleshoot the harness, connectors and battery drawer leads and connectors for short or open circuits, and loose or defective connections.
6	Secure the cables with cable ties.

—continued—

Procedure 13-2 (continued)
Routing and connecting the battery harnesses

Figure 13-2
Routing battery harnesses in the B-B basic configuration

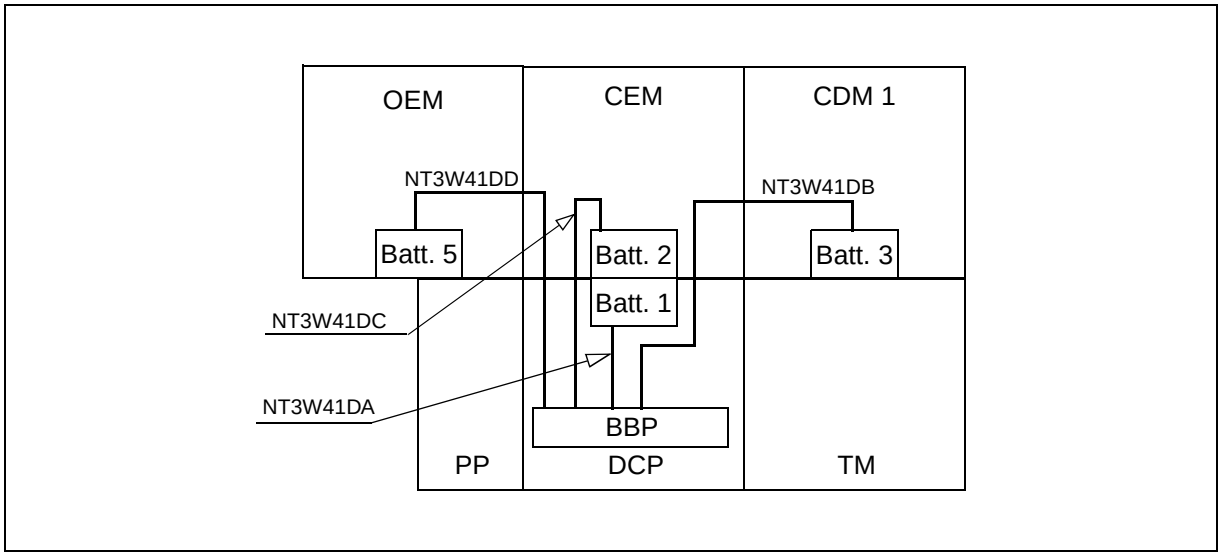
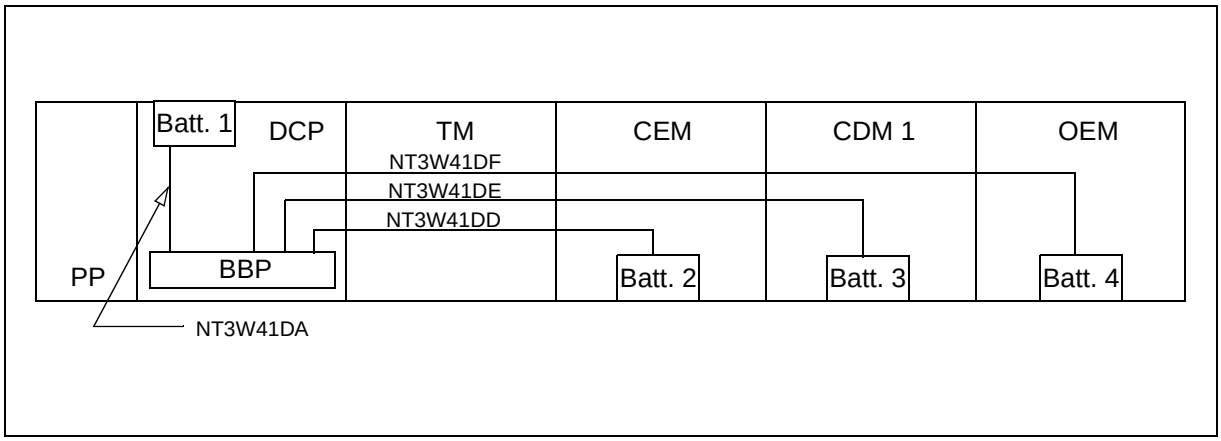


Figure 13-3
Routing battery harnesses in the SXS configuration



—end—

Adjusting the rectifier and the dc distribution shelf

This chapter describes powering and adjusting the MPR 25 rectifiers, and adjusting the dc distribution shelf in the ModCab.

Chapter task list

This chapter includes the following tasks:

Procedure	Task	See
14-1	Powering the rectifier(s)	page 14-3
14-2	Adjusting high voltage shutdown	page 14-7
14-3	Adjusting equalize voltage	page 14-10
14-4	Adjusting float voltage	page 14-11
14-5	Adjusting the second or third rectifiers	page 14-12
14-6	Adjusting load sharing for more than one rectifier	page 14-14
14-7	Verifying dc distribution shelf alarms	page 14-18
14-8	Adjusting dc distribution shelf low voltage alarms	page 14-20

Perform Procedure 14-1 through Procedure 14-6 to adjust the rectifiers in rectifier shelf 1. If shelf 2 is installed, repeat Procedure 14-1 through Procedure 14-6 for the second shelf.

After adjusting all rectifiers, perform dc distribution shelf adjustments using Procedure 14-7 through Procedure 14-8.

Cautions

Before performing any rectifier replacement procedures, carefully read each caution in this section.

CAUTION
Air flow requirements
Do not leave any materials or other objects lying over the batteries or in other parts of the cabinet. This can block air flow throughout the cabinet and disrupt cabinet cooling.

CAUTION
Test the output dc voltage levels
The dc voltage output level from each rectifier module ***must*** be tested and adjusted based on the Nortel Networks recommended float voltages for the following battery:

Johnson Control TEL 12-90: −55.00 ± 0.10 V dc

Note: These ranges are subject to change without notice.

CAUTION
DC voltage input requirements
The AccessNode input voltage specifications require that the dc input to the breaker interface panel (BIP) not exceed −56.0 V dc. Battery float, equalize, and high voltage shutdown levels ***must*** be set below this maximum regardless of the type of batteries installed.

CAUTION
Circuit breaker verification
Use caution before switching a circuit breaker. Make sure you are switching the correct one.

CAUTION
Fire hazard
Remove all paper and any other combustible materials from inside the cabinet before powering up the cabinet. Failure to comply with this warning can cause a fire.

Procedure 14-1
Powering the rectifier(s)

Use this procedure to power up the rectifiers and verify ON/RFA LED indicators.

The ModCab dc power module (DCP) accommodates up to two NT5C10CE rectifier shelves containing up to three NT5C06CA-3 25 A rectifier modules each.

Tools

You need the following tools:

- voltmeter RMS Fluke 8050A or equivalent
- screwdriver, slotted, small (0.1-inch width)

Action

Step	Action
1	Turn Off all ac, rectifier, battery breaker panel (BBP) and breaker interface panel (BIP) circuit breakers.
2	Before powering up a rectifier, turn Off the SENSE DIP switch (see Table 14-1) on the dc distribution shelf (see Figure 14-1). ***Note:*** The SENSE DIP switch is in the Off position when the switch is pulled toward you.

Table 14-1
DC distribution shelf SENSE DIP switch designations

SENSE DIP Switch Position	Rectifier shelf	Associated rectifier
1	1	RECT1
2	1	RECT2
3	1	RECT3
4	2	RECT1
5	2	RECT2
6	2	RECT3

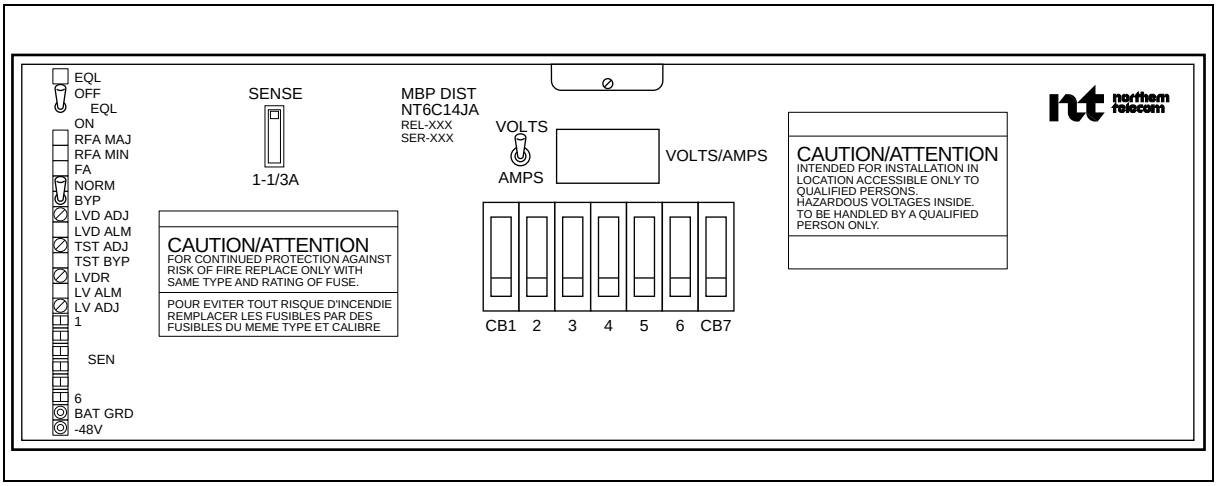
—continued—

Procedure 14-1 (continued)
Powering the rectifier(s)

Step Action

Figure 14-1
NT6C14JC distribution faceplate

PC-11100



3 Perform the following steps based on the ac option installed:

If the ac option installed is the	Then perform the following steps
Load center	a. Set the main circuit breaker (MAIN) to the ON position. b. Go to step 4.
AC power pedestal	a. Set the transfer knife switch to either: the normal position (NORMAL AC POWER) the emergency power position (GENERATOR POWER). b. Set the MAIN transfer circuit breaker to the ON position. c. Go to step 4.

4 Turn Off the EQL switch on the dc distribution shelf.

5 Turn On the dc circuit breaker on the rectifier (RECTIFIER 1). See Figure 14-2 on page 14-5.

Note: The dc circuit breaker on the rectifier ***must*** be turned On before the ac circuit breaker.

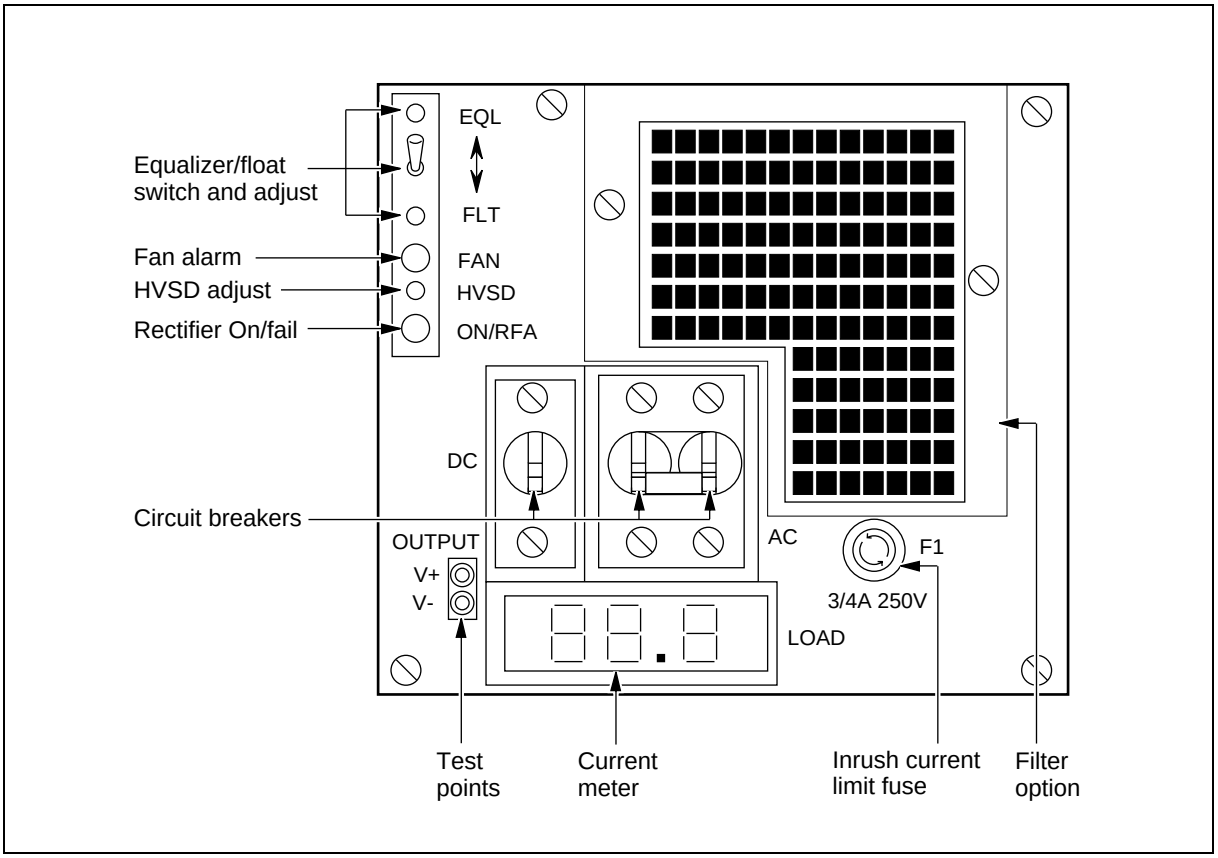
—continued—

Procedure 14-1 (continued)
Powering the rectifier(s)

Step	Action

Figure 14-2
MPR25 (NT5C06) rectifier faceplate

PC-11099



6 In the load center, turn On the rectifier 1 circuit breaker (CB1).

7 Turn On the ac circuit breaker (RECTIFIER 1).

Note: When the rectifier is initially turned On, the rectifier OK/FAIL alarm (ON/RFA) LED is red.

—continued—

Procedure 14-1 (continued)
Powering the rectifier(s)

Step	Action

8 Verify the ON/RFA LED indication by performing the following:

If after 15 seconds the ON/RFA LED is	Then perform these steps
RED	a. Turn OFF the dc and ac breakers on the rectifier. b. Turn OFF the ac breaker in the load center for the affected rectifier. c. Verify the inrush fuse (F1) and the 220 V ac input. If the fuse and input are correct, replace the rectifier with a new one. d. Turn ON the ac breaker in the load center for the affected rectifier. e. Go to step 5.
Not illuminated	a. Replace the rectifier with a new one. b. Go to step 5.
Green	Go to Procedure 14-2, “Adjusting high voltage shutdown” on page 14-7.

—end—

Procedure 14-2
Adjusting high voltage shutdown

Use this procedure to adjust the high voltage shutdown (HVSD) adjustments on the rectifier.

Table 14-2 lists the Nortel Networks recommended rectifier settings for the optional battery selections.

Table 14-2
Rectifier adjustment settings

Battery manufacturer	HVSD	Equalize	Float	Low voltage alarm	Low voltage disconnect
Johnson Controls TEL 12-90	–56.0 ± 0.1	–55.5 ± 0.1	–55.0 ± 0.1	–47.0 ± 0.1	–43.0 ± 0.1

Tools

You need the following tools:

- voltmeter RMS Fluke 8050A or equivalent
- screwdriver, slotted, small (0.1-inch width)

Action

Step	Action
1	Insert the test leads of the digital voltmeter (DVM) into the test points (negative to negative, positive to positive) on the rectifier. ***Note:*** On the faceplate of the rectifier module are test points labeled outputs V+ and V- (see Figure 14-2 on page 14-5).
2	Set the EQL/ FLT switch on the rectifier to the FLT position.

CAUTION
Overvoltage damage to equipment hazard
If you adjust the voltage above –56.0 V dc you can damage the AccessNode equipment.

—continued—

Procedure 14-2 (continued)
Adjusting high voltage shutdown

Step	Action
3	Slowly adjust the FLT potentiometer clockwise and complete the following steps. ***Note 1:*** Nortel recommends setting the HVSD level at –56.0 ± 0.1 V dc. See Table 14-2. If the –56.0 V level cannot be reached, hold the FLOAT/EQL switch in the EQL position while adjusting the FLT potentiometer. ***Note 2:*** If the shutdown occurs before –56.0 V dc is reached, the RFA LED illuminates red.

If	Then
the ac circuit breaker on the rectifier trips before –56.0 V dc is reached	a. Record the voltage measurement at which the HVSD occurred. b. Go to step 4.
the voltage level reaches –56.0 V dc before the ac circuit breaker on the rectifier trips	Go to step 4.
the ac circuit breaker trips at –56.0 V dc	Go to Procedure 14-3, “Adjusting equalize voltage” on page 14-10.

4	Turn the FLT potentiometer one complete turn counterclockwise.
5	Reset the ac breaker to On to turn the rectifier back on.
6	Slightly turn the HVSD potentiometer clockwise to increase HVSD limit.
7	Slowly adjust the FLT potentiometer clockwise again until HVSD occurs or –56.0 V dc is reached.
8	Proceed according to the results of step 7: • If shutdown occurs at –56.0 V dc, go to Procedure 14-3, “Adjusting equalize voltage” on page 14-10. • If shutdown occurs before –56.0 V dc is reached, repeat steps 4 through 7. • If shutdown does NOT occur before –56.0 V dc is reached, go to step 9.
9	Leave the FLT voltage set at –56.0 V dc.
10	Slowly turn the HVSD potentiometer counterclockwise until the system shuts down (the ON/RFA LED is red).

—continued—

Procedure 14-2 (continued)
Adjusting high voltage shutdown

Step	Action
11	Slowly turn the FLT potentiometer counterclockwise one-half (1/2) turn.
12	Turn On the ac breaker to turn the rectifier back on.
13	Slowly turn the FLT potentiometer clockwise (no farther than –56.0 V dc).
14	Proceed according to the results of step 13: • If shutdown occurs at –56.0 V dc, go to Procedure 14-3, “Adjusting equalize voltage” on page 14-10. • If shutdown does NOT occur before –56.0 V dc is reached, repeat steps 9 though 13 of this procedure. • If shutdown occurs before –56.0 V dc is reached, go to step 4 of the procedure.

—end—

Procedure 14-3
Adjusting equalize voltage

Use this procedure to adjust the equalize (EQL) voltage adjustments on the rectifier.

Table 14-3 lists the Nortel Networks recommended rectifier settings for the optional battery selections.

Table 14-3
Rectifier adjustment settings

Battery manufacturer	HVSD	Equalize	Float	Low voltage alarm	Low voltage disconnect
Johnson Controls TEL 12-90	−56.0 ± 0.1	−55.5 ± 0.1	−55.0 ± 0.1	−47.0 ± 0.1	−43.0 ± 0.1

Tools

You need the following tools:

- voltmeter RMS Fluke 8050A or equivalent
- screwdriver, slotted, small (0.1-inch width)

Action

Step	Action
1	Hold the FLOAT/EQL momentary switch to EQL for local equalize and measure the equalize voltage at the test points labeled V+ and V- on the rectifier.

CAUTION
Overvoltage damage to equipment hazard
If you adjust the voltage above −56.0 V dc you can damage the AccessNode equipment.

2	Adjust the EQL voltage by turning the EQL potentiometer clockwise to increase the EQL voltage or counterclockwise to reduce the EQL voltage to −55.5 V dc (see Table 14-3). ***Note:*** Nortel recommends setting the equalize voltage at −55.5 V dc for the battery options listed. Other types of batteries may require setting voltages at different levels.
3	Turn Off the ac circuit breaker on the rectifier.
4	Turn Off the dc circuit breaker on the rectifier.

—end—

Procedure 14-4
Adjusting float voltage

Use this procedure to adjust the float (FLT) voltage on the rectifier.

Table 14-4 lists the Nortel Networks recommended rectifier settings for the optional battery selections.

Table 14-4
Rectifier adjustment settings

Battery manufacturer	HVSD	Equalize	Float	Low voltage alarm	Low voltage disconnect
Johnson Controls TEL 12-90	−56.0 ± 0.1	−55.5 ± 0.1	−55.0 ± 0.1	-47.0 ± 0.1	-43.0 ± 0.1

Tools

You need the following tools:

- voltmeter RMS Fluke 8050A or equivalent
- screwdriver, slotted, small (0.1-inch width)

Action

Step	Action
1	Turn On the dc circuit breaker on the rectifier. ***Note:*** The dc circuit breaker on the rectifier ***must*** be turned On before you turn On the ac circuit breaker.
2	Turn On the ac circuit breaker on the rectifier.
3	Set the EQL switch on the rectifier to the FLT position. ***Note:*** The EQL/ FLT switch on the rectifier ***must*** be in the FLT position when you adjust the voltage.

CAUTION
Overvoltage damage to equipment hazard
If you adjust the voltage above −56.0 V dc you can damage the AccessNode equipment.

4	Slowly adjust the FLT potentiometer clockwise to raise the float voltage or counterclockwise to lower the float voltage to −55.0 V dc (see Table 14-4). ***Note:*** Nortel recommends setting the float voltage at −55.0 V dc for the battery options listed. Other types of batteries may require setting voltages at different levels.

—end—

Procedure 14-5
Adjusting the second or third rectifiers

Use this procedure to adjust the voltage on the second and third rectifiers in the shelf.

Table 14-5 lists the Nortel Networks recommended rectifier settings for the optional battery selections.

Table 14-5
Rectifier adjustment settings

Battery manufacturer	HVSD	Equalize	Float	Low voltage alarm	Low voltage disconnect
Johnson Controls TEL 12-90	-56.0 ± 0.1	-55.5 ± 0.1	-55.0 ± 0.1	-47.0 ± 0.1	-43.0 ± 0.1

Tools

You need the following tools:

- voltmeter RMS Fluke 8050A or equivalent
- screwdriver, slotted, small (0.1-inch width)

Action

Step	Action
1	Repeat Procedure 14-1 through Procedure 14-4 for each rectifier to be adjusted.
2	Verify that all rectifiers have been adjusted for HVSD, EQL, and FLT.
3	Turn Off the dc and ac circuit breakers for all rectifiers.
4	Turn On the dc circuit breaker on the first rectifier
5	Turn On the ac circuit breaker on the first rectifier.
6	Turn On the SENSE DIP switch for the first rectifier.
7	Turn On the battery string circuit breakers on the BBP.

—continued—

Procedure 14-5 (continued)
Adjusting the second or third rectifiers

Step	Action

8 Verify the rectifier ac circuit breakers as follows:

If a rectifier circuit breaker	Then
trips	a. Turn Off the battery string circuit breakers. b. Turn the FLT potentiometer on the rectifier slowly and slightly (about 1/2 turn) counter clockwise. c. Reset the circuit breaker on the rectifier. d. Go to step 7.
does NOT trip	Go to step 9.

Note: All battery breaker panel (BBP) breakers must be in the On position regardless of whether the associated battery string is being used.

9 Allow the batteries to charge for approximately 10 minutes.

10 Slowly adjust the FLT potentiometer on the rectifier clockwise to increase the float voltage to the normal level.

11 Repeat from step 3 for rectifiers 2 and 3 if installed.

12 Go to Procedure 14-6, “Adjusting load sharing for more than one rectifier” on page 14-14.

—end—

Procedure 14-6
Adjusting load sharing for more than one rectifier

Use this procedure to adjust the load sharing on the second and third rectifiers in the shelf.

Table 14-6 lists the Nortel Networks recommended rectifier settings for the optional battery selections.

Table 14-6
Rectifier adjustment settings

Battery manufacturer	HVSD	Equalize	Float	Low voltage alarm	Low voltage disconnect
Johnson Controls TEL 12-90	−56.0 ± 0.1	−55.5 ± 0.1	−55.0 ± 0.1	−47.0 ± 0.1	−43.0 ± 0.1

Tools

You need the following tools:

- voltmeter RMS Fluke 8050A or equivalent
- screwdriver, slotted, small (0.1-inch width)

Action

Step	Action
1	Examine all rectifiers for the status of the RFA LEDs (see Figure 14-3).

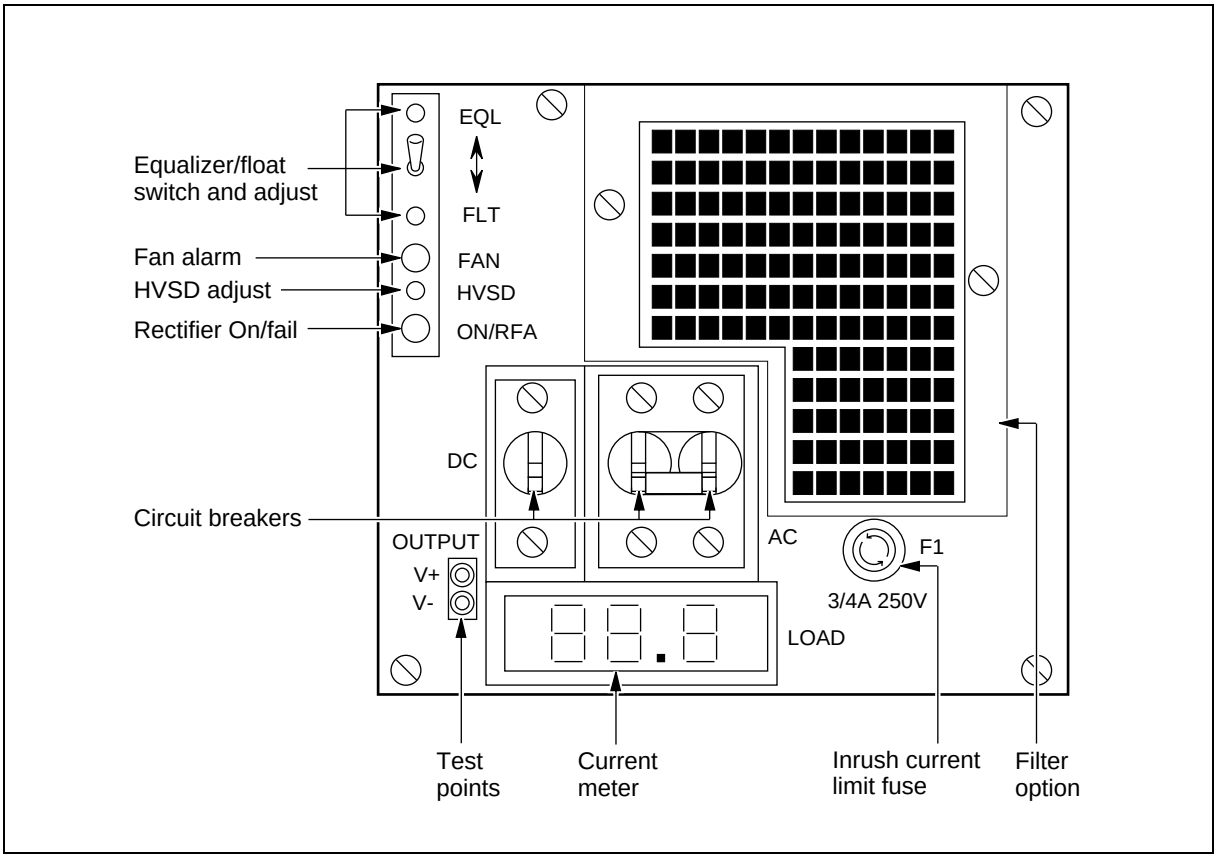
—continued—

Procedure 14-6 (continued)
Adjusting load sharing for more than one rectifier

Step	Action

Figure 14-3
MPR25 (NT5C06) rectifier faceplate

PC-11099



2 Perform the load sharing adjustment steps listed in Table 14-7 on page 14-16.

—continued—

Procedure 14-6 (continued)
Adjusting load sharing for more than one rectifier

Step Action

Table 14-7
Rectifier load sharing adjustments

If the RFA LED indicates	And the number of rectifiers installed is	Then	Perform these steps
one RFA LED is GREEN	two	the rectifier with the GREEN RFA LED is floating slightly too high	Slowly and very slightly adjust the FLT potentiometer of the rectifier counterclockwise until the RFA LED on at least one of the other rectifiers is GREEN. Go to step 3.
two RFA LEDs are GREEN	three	the rectifier with the RED RFA LED is floating slightly too low	Slowly and very slightly adjust the FLT potentiometer of the rectifier clockwise until the RFA LED is GREEN. Go to step 3.
all installed rectifier RFA LEDs are GREEN	any number of rectifiers	the rectifiers are sharing the load closely	go to step 4.

3 Repeat step 2 until the RFA LEDs for all of the rectifiers are illuminated GREEN.

4 Examine and compare the display of the ammeters on the rectifiers.

Note: Nortel recommends that the ammeters read within 0.1 V dc of each other for proper load sharing.

5 Adjust the FLOAT voltage of the rectifier with the lowest current reading on the ammeter display by slowly and very slightly adjusting the FLT potentiometer clockwise until the ammeter reading is no longer the lowest.

Note: The FLT potentiometer load sharing adjustment is very sensitive. Small adjustments can reflect large changes in the ammeter readings.

—continued—

Procedure 14-6 (continued)
Adjusting load sharing for more than one rectifier

Step	Action
6	Adjust the FLOAT voltage of the rectifier with the highest current reading on the ammeter display by slowly and very slightly adjusting the FLT potentiometer counterclockwise until the ammeter reading is no longer the highest. ***Note:*** The FLT potentiometer load sharing adjustment is very sensitive. Small adjustments can reflect large changes in the ammeter readings.
7	Repeat step 4 through step 6 until the RFA LED for all the rectifiers are GREEN and the ammeter displays all read within 0.1 A of each other.

—end—

Procedure 14-7
Verifying dc distribution shelf alarms

Use this procedure to verify the alarms on the NT6C14JC dc distribution shelf.

Tools

You need the following tools:

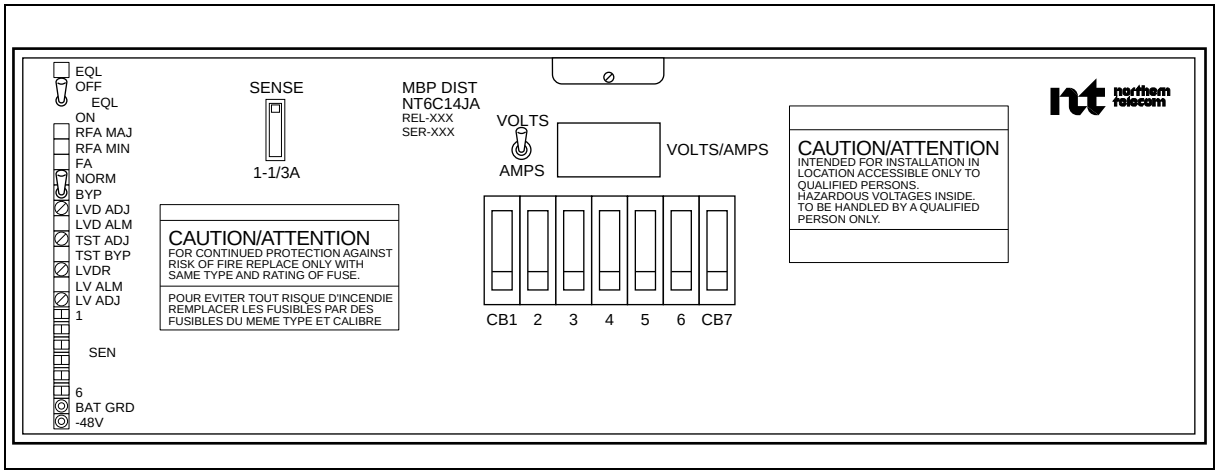
- voltmeter RMS Fluke 8050A or equivalent
- screwdriver, slotted, small (0.1-inch width)

Action

Step	Action
1	Verify that all of the circuit breakers on the breaker interface panel (BIP) are turned Off.
2	Turn On all circuit breakers on the dc distribution shelf (see Figure 14-4).

Figure 14-4
NT6C14JC DC distribution shelf faceplate

PC-11100



3	Record the voltage displayed on the faceplate readout.
4	Confirm that the FA alarm indicator is off.
5	Turn Off CB1 on the dc distribution shelf to verify that the FA alarm LED is red.
6	Turn CB1 back On to verify that the FA alarm LED is off.
7	Turn Off, then On, each of the circuit breakers, one at a time, to verify that the FA indicator comes on and goes off with each breaker trip.
8	Turn Off all breakers.

—continued—

Procedure 14-7 (continued)
Verifying dc distribution shelf alarms

Step	Action
9	Turn On the EQL switch on the dc distribution shelf to verify that the EQL indicator is yellow and that the voltage level displayed on the faceplate display corresponds to the EQL level (-55.5 ± 0.1) set on the rectifiers.
10	Turn Off the EQL switch to verify that the voltage level returns to the FLOAT level on the dc distribution shelf display.
11	Turn Off the ac breaker on Rectifier 1 to verify that the RFA MIN LED is yellow on the dc distribution shelf.
12	Turn On the ac circuit breaker on the rectifier to verify that the RFA MIN LED goes off.
13	Repeat step 11 and step 12 for each rectifier.
14	If more than one rectifier is installed, turn Off the ac breaker on two rectifiers to verify that the RFA MAJ LED comes on.
15	Turn On one of the rectifiers ac circuit breaker to verify that the RFA MAJ LED goes off and that the RFA MIN LED comes on.
16	Turn On the ac breaker on the remaining rectifier to verify that the RFA MIN LED goes Off.
17	Set the LVD BYP/NORMAL switch to the BYP position to verify that the TST BYP LED comes on.
18	Continue dc distribution shelf adjustments using Procedure 14-8, “Adjusting dc distribution shelf low voltage alarms” on page 14-20.

—end—

Procedure 14-8
Adjusting dc distribution shelf low voltage alarms

Use this procedure to adjust the low voltage alarm (LVA) on the NT6C14JC dc distribution shelf.

Tools

You need the following tools:

- A or equivalent
- screwdriver, slotted, small (0.1-inch width)

Action

Step	Action

1 Verify that the LVA BYP/NORMAL switch is set to the BYP position.

2 Connect the digital voltmeter to the BAT GRD and -48 V test points on the front of the dc distribution shelf.

3 Monitor the voltage at the test points to verify the LVA threshold.

4 Slowly adjust the TST ADJ potentiometer counterclockwise until one of the following occurs:

If	Then
the LVA LED comes on before the reading reaches -47.0 ± 0.2 V dc	a. Continue adjusting the TST ADJ potentiometer counterclockwise until the voltage reading reaches -47 ± 0.2 V dc. b. Slowly turn the LVA ADJ potentiometer clockwise until the LVA LED goes off. c. Slowly turn the LVA ADJ potentiometer counterclockwise until the LVA LED comes on.
the LVA LED does NOT come on before the reading reaches -47.0 ± 0.2 V dc	a. Using the TST ADJ potentiometer, set the voltage reading to -47 ± 0.2 V dc. b. Slowly turn the LVA ADJ potentiometer clockwise until the LVA LED comes on.

—end—

Finishing the ModCab installation

This chapter describes installing the protector modules and includes steps to prepare the modular cabinet (ModCab) for commissioning and testing operations.

See *Commissioning and Testing*, Volume 3, for additional information on commissioning and testing the AccessNode system.

Chapter task list

This chapter includes the following tasks:

Procedure	Task	See
15-1	Installing the protector modules	page 15-2
15-2	Performing commissioning and site testing	page 15-6

Procedure 15-1
Installing the protector modules

Use this procedure to install the line protector modules into the service protection center (SPC) protector blocks inside the large termination module (LTM).

> ***Note:*** Protector positions 97–100 on each voice frequency (VF) protector block are not used in the ModCab. Each copper distribution shelf (CDS) has 96 VF lines and the last VF cable from each CDS (CDS connector 76–96 on the right side of the CDS) has pairs 97–100 spared out.

If the cross-connect wiring in the LTM has not been installed, then the VF pairs from the CDS are not connected to the outside plant (OSP) subscriber cable and you can install the protector modules at any time.

Materials

Type 7X or better UL approved protector modules are required.

Nortel Networks recommends solid state protectors in all outside applications. Solid state protectors offer faster reaction times, a more predictable operating voltage, a longer service life and are safer than station protectors.

CAUTION
Risk of damage to equipment
During initial setup of the AccessNode, Nortel Networks recommends that you not connect the equipment to the outside plant subscriber loops (at the protector modules) until you have installed and powered up the line cards. For example, when using five-pin protector modules, pull the modules out to the first detent to disconnect the modules.

—continued—

Procedure 15-1 (continued)
Installing the protector modules

Action

Step	Action

1 Open the LTM door.

2 Engage the door restrainer bar.

3 Perform the following steps:

If the cabinet	Then
has a cross-connect swing frame	a. Unlatch the cross-connect swing frame by releasing the top and bottom latches. b. Carefully open the cross-connect swing frame. ***Note:*** Do not stress the cabling. c. Latch the swing frame in the open position using the bar on the top of the outside door. d. Go to step 4.
does not have a cross-connect swing frame	Go to step 4.

4 Loosen the thumbscrews for each SPC block and open each cover.

Note: Nortel Networks recommends that the VF pairs from the CDS to the OSP VF subscriber cable be OPEN when you first power up the CDS. That is, an electrical connection from the CDS to the OSP VF cable must not exist when you power up the CDS.

5 Plug in all the protectors based on the customer configuration required (see Figure 15-1 on page 15-5).

Note: If the cross-connect wiring has been completed or will be completed before you power up the CDS (installing batteries and powering the rectifiers), install the protector modules only up to the first indent position. Therefore, the equipment is not connected to the OSP cable and the OSP cable is protected. Otherwise, you can plug the modules completely into the block positions.

—continued—

Procedure 15-1 (continued)
Installing the protector modules

Step	Action
6	Close the SPC cover and tighten the thumbscrews.

CAUTION
Fire Hazard
Before closing the cabinet, remove all paper and any other combustible materials from inside the cabinet after any maintenance operation is completed.

Failure to comply with this warning can cause a fire.

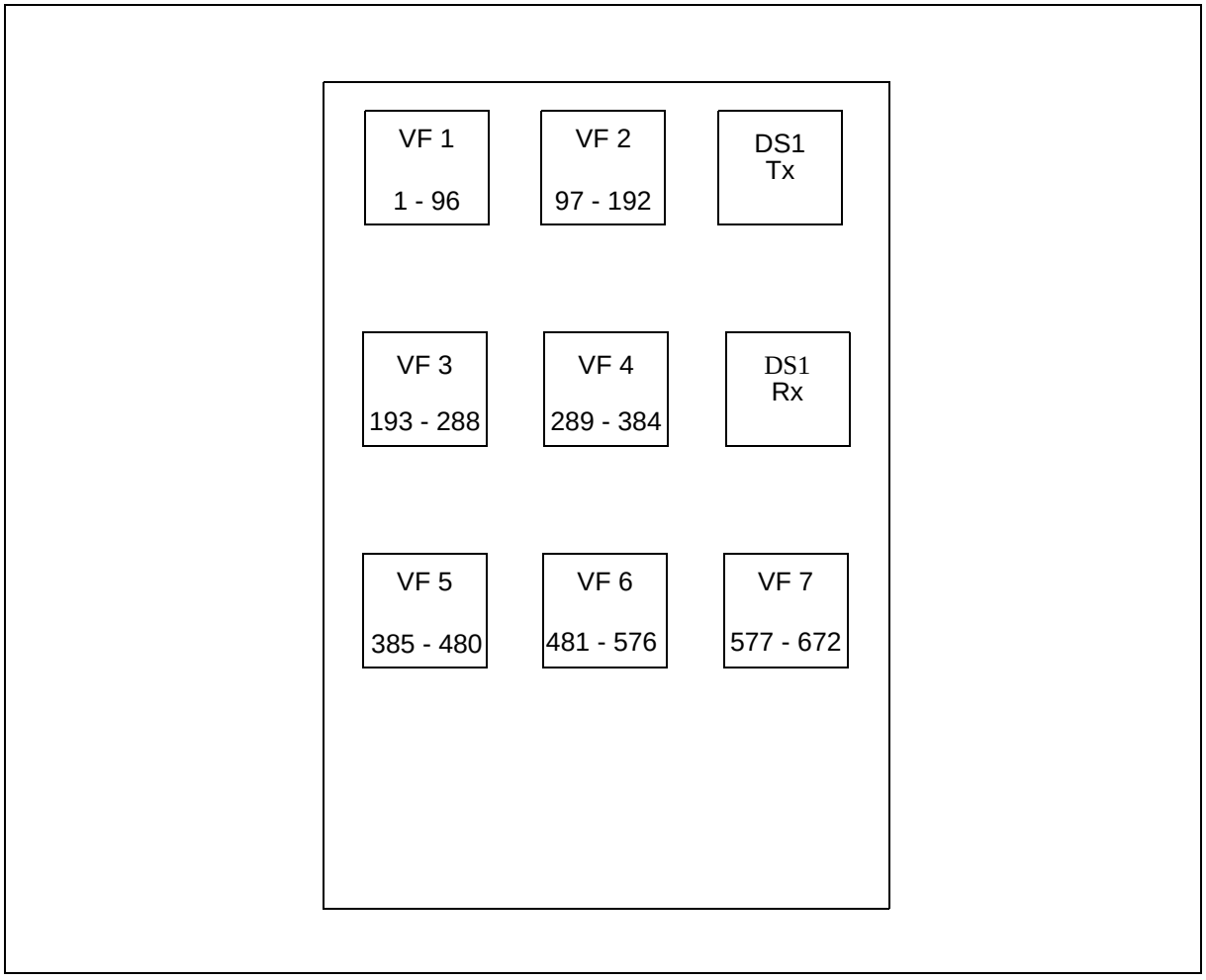
7	Carefully close the swing frame and fasten the it in place using the top and bottom latches.
8	Close the LTM door.
9	Go to Procedure 15-2, “Performing commissioning and site testing.”

—continued—

Procedure 15-1 (continued)
Installing the protector modules

Step	Action

Figure 15-1
Protector block layout



—end—

Procedure 15-2
Performing commissioning and site testing

Use this procedure to continue the ModCab installation procedures for commissioning and site testing.

See *Commissioning and Testing,* Volume 3, for additional information on commissioning and testing the AccessNode system.

Requirements

The ModCab must be operating normally on rectifier power.

Action

Step	Action

1 Verify that no combustible materials are in the cabinet.

CAUTION
Fire Hazard
Before closing the cabinet, remove all paper and any other combustible materials from inside the cabinet after any maintenance operation is completed.

Failure to comply with this warning can cause a fire.

2 Proceed with the ModCab installation and testing as shown in the following table.

If you want to	Then use the following document
commission the ModCab AccessNode system	*Commissioning and Testing,* Volume 3
test the ModCab AccessNode system	*Commissioning and Testing,* Volume 3

—end—

List of terms

ABM
access bandwidth manager

AC
alternating current

ACEG
alternating current equipment ground

ACO
alarm cut off

AIC
access interface card, a plug-in module for the common-equipment shelf

AIU
alarm interface unit

APC
access processor card, a plug-in module for the common-equipment shelf

ATD
about this document

AWG
American wire gauge, defines the size of electrical conductors

B-B
back-to-back, a ModCab configuration

BBP
battery breaker panel

Bellcore
Bell Communications Research

BIP

breaker interface panel, an equipment shelf that provides internal interface and shelf distribution of battery power, and processes system alarm and telemetry signals.

CDM

copper-distribution module

CDS

copper-distribution shelf, an equipment shelf that provides voice-frequency processing and line powering for user-end equipment

CDSP

copper-distribution shelf power card, a plug-in module to supply power for the copper-distribution shelf

CE

common equipment

CEM

common-equipment module

COP

cable organizer panel, an equipment shelf that provides external cabling management facility for the AccessNode ABM shelf

CSA

Canadian Standards Association

DC

direct power

DCP

dc power module

DS0

digital signal, level 0, having a transmission rate of 64kb/s

DS1

digital signal, level 1, having a transmission rate of 1.544Mb/s carrying 24 DS0s plus overhead bits

DS3

digital signal, level 3, having a transmission rate of 44.7Mb/s carrying 28 DS1s plus overhead bits

DSX-1

digital signal cross-connect

DVM

digital voltmeter

ESD

electrostatic discharge, a transfer of energy from one electromagnetic potential to another. ESD protection is provided for AccessNode on the LCAP to allow for a wrist strap connection by local maintenance personnel.

EQL

equalize voltage

FCC

Federal Communications Commission (USA)

FLT

floating voltage

HVSD

high voltage shutdown

Hz

Hertz, a unit of frequency equal to one cycle per second

IM

input module

I/O

input/output

LED

light emitting diode

LCAP

local craft access panel

LIC

line interface card, a plug-in module for the line drawer in the copper-distribution shelf

LTM

large termination module

LVA

low voltage alarm

LVD

low voltage disconnect

LVDR

low voltage disconnect return

MIC

maintenance interface card, a plug-in module for the common-equipment shelf

ModCab

modular cabinet package

MPR

modular power rectifier

MTA

metallic test access

MTAC

metallic test access card, a plug-in module for the line drawer in the copper-distribution shelf

MVOA

miniature variable-optical attenuator

NEC

National Electrical Code, defines the electrical codes required in the USA. It is similar to the CEC in Canada

NLIC

narrowband line interface card, a plug-in module for the line drawer in the copper-distribution shelf

NO

normally open

NTP

Northern Telecom Publication

OC-n

optical signal carrier, where n defines the level (1, 3, 9, 12, 24, 36, or 48) equal to the STS signal of the same level

OEM

optional expansion module

OM

output module

OPC

operations controller

OSP

outside plant

PEC

product engineering code, used by Northern Telecom for product identification

RFT

remote fiber terminal

Rx

receive (also denoted by Rcv)

SAI

serving area interface, a provision for outside-plant cabling access to an outdoor cabinet

SIL

side interconnect left

SIR

side interconnect right

SONET

Synchronous Optical Network. A standard for optical transport that defines optical carrier levels and their electrically equivalent synchronous transport signals. The SONET standard allows a multi-vendor environment, positioning of the network for transport of new services, and synchronous networking.

SPC

service protection center

STSBM

SONET transport signal bandwidth manager

SxS

side-by-side, a ModCab configuration

T1

carrier with a transmission rate of 1.544 Mb/s

T3

carrier with a transmission rate of 44.7 Mb/s

TAC

test access card, a plug-in module for the common-equipment shelf

TAP
: test access pairs

Tx
: transmit

UL
: Underwriter Laboratories

VF
: voice frequency

VT
: virtual tributary

VTBM
: virtual tributary bandwidth manager

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AccessNode

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