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NETWORKS

# Amosphere NPM Installation Procedures (MMDS)

## Release 1.3

Part 004071A revision 00b

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A list of third-party software used in the production of or included in this product, as well as any available documentation for such software, can be obtained at www.somanetworks.com/thirdparty.html.

# PREFACE

This book explains how to install an Amosphere NPM basestation. Installation includes installing the racks, connecting the basestation to the network core, and powering on the system.

This book is intended for field technicians with experience installing and configuring telecommunications equipment at cellular basestations and network operations centers.

## How This Book Is Organized

Table 1 shows how information in this book is organized.

| Chapter | Title | Description |
|---|---|---|
| Chapter 1 | Installation Overview | Provides an overview of the installation process |
| Chapter 2 | Site Preparation | Lists the physical, environmental, electrical, and network requirements of an NPM basestation |
| Chapter 3 | Pre-Installation Activities | Lists activities that must be performed prior to installing an NPM basestation |
| Chapter 4 | Installation Procedures | Provides procedures for installing an NPM basestation |
| Chapter 5 | Power-On Procedures | Provides procedures for applying power to the NPM basestation |

**Table 1** Book Organization (1 of 2)

| Chapter | Title | Description |
|---|---|---|
| Chapter 6 | On-Site Software Installation and Configuration Procedures | Provides procedures for installing and configuring the software on the NPM basestation |
| Appendix A | NPM Decommissioning | Describes how to power off and decommission the NPM basestation |

**Table 1** Book Organization (2 of 2)

## Related Documentation

SOMA Networks documentation is modular, so users need to read or carry only those components relevant to a particular job function. This guide makes cross-references to the following documents:

- *Amosphere NPM Maintenance Procedures* – provides procedures for performing maintenance on the NPM basestation.
- *Amosphere OAMP Guide* – provides installation and configuration instructions for the initial commissioning of an NPM basestation.

### Additional SOMA Networks Documentation

Table 2 shows the other guides in the SOMA Networks customer documentation suite.

| Component | Description | Audience |
|---|---|---|
| Amosphere Alarms and Events Reference | Comprehensive list of all alarms and events | Network operations center operators and field technicians |
| Amosphere Diagnostics Reference | Procedures for isolating and fixing network problems | Network operations center operators and field technicians |
| Amosphere NPM Hardware Reference | Description of the NPM hardware architecture | Network operations center operators, field technicians, and network engineers |
| Amosphere Core Server Installation and Maintenance Procedures | Procedures for installing core server software | Network operations center operators and field technicians |
| Amosphere System Overview | Complete solution overview | Network operations center operators and network engineers |

**Table 2** Amosphere Customer Documentation Components (1 of 2)

| Component | Description | Audience |
|---|---|---|
| SAU Installation Guide | Installation instructions for optional SOMAport external antenna | Subscribers |
| SOMAport Setup Guide | Installation and maintenance guide for subscriber premises equipment | Subscribers |

**Table 2** Amosphere Customer Documentation Components (2 of 2)

### Third-Party Documentation

Table 3 shows third-party documents that provide additional information which may be useful when installing the NPM basestation.

| Document | Description |
|---|---|
| Central Office Environment Installation/Removal Generic Requirements (GR-1275-CORE) | Available from Telcordia Technologies, Inc. Provides generic installation requirements for telecommunication suppliers and carriers. |
| Zyfer AccuSync-R GPS Synchronized Time and Frequency Instrument User's Manual (377-8006) | Available from Zyfer, Inc. Provides installation, configuration, and operational information about the GPS clock module. |
| XIP68 Installation and Use Manual | Available from Motorola, Inc. The manual describe the utility bus controllers, radio sector controllers, and application hosts in detail. |
| CPC4400 Ethernet Switching Platform User's and System Integrator's Guide | Available from Performance Technologies Inc. The manual describe the Ethernet switch and rear I/O card in detail. |

**Table 3** Third-Party Documentation

## Conventions

This section outlines the conventions used in this guide.

### Measurement Conventions

Measurements in this guide are expressed according to the Systeme International d'Unites (SI) standards for metric units and abbreviation. Equivalent Imperial measurements (used in the United States) are provided in parentheses, except when Imperial is the international standard.

### *Bits and Bytes*

For clarity, bits and bytes are not abbreviated in this document, but their prefixes are. SOMA Networks follows the common practice of using SI prefixes (base 10) with these terms. Thus, 1 kbit/s (kilobit per second) is equivalent to 1000 bits/s; it should not be confused with 1 Kibit/s (kilobinary bit per second) or 1 x $2^{10}$ = 1024 bits/s.

Unless otherwise specified, SI prefixes with bits and bytes in this document refer to a factor of 10.

## Typographical Conventions

Table 4 shows how different fonts are used throughout this guide.

| Font | Usage | Example |
|---|---|---|
| `Courier` | System output and all things involving source code (commands, samples, methods, functions, objects, variables, types, constants, fields, properties, and structures) | `echo "NETWORKING=yes HOSTNAME=soma GATEWAY=10.110.0.1"` |
| **`Courier bold`** | User-keyed commands | **`eject cdrom`** ↵ |
| **Arial gray** | Interface objects: buttons, links, fields, and drop-down list names | Click **OK**. |
| *Italics* | Anything that appears as part of the file system, such as files, applications, paths, directories, libraries, scripts, daemons, devices, and commands with parameters when used as a noun | Data is in *subscribers/billing*<br>All devices use *devfs*. |
| ***`Courier bold italic`*** | Placeholders in commands | **`boot cdrom -install`** ***`arg`*** ↵ |
| *`Courier italic`* | Placeholders in code | `n urn:soma:dialplan:`*`domain`* |

**Table 4** Display Font Usage

Table 5 shows the meaning of symbols used in procedures throughout this guide.

| Symbol | Meaning | Example |
|---|---|---|
| ↵ | Indicates that you should press the Return, or Enter, key | **`su admin`** ↵ |
| + | In a keystroke combination, indicates that you should press the keys simultaneously | Control+Alt+Delete |
| , | In a keystroke combination, indicates that you should press the keys consecutively | Control, Shift, q |
| → | Indicates that you should choose a menu option or a submenu | Choose File→Import→Formats |

**Table 5** Symbols Used in Procedures

## Special Information

Information of special importance is highlighted in the text using indentation and icons. The following examples show the special information types used in the document. They are listed in ascending order of importance.

**NOTE:** A note contains information of special interest.

**CAUTION:** A general caution is shown when there is a risk of affecting service.

**WARNING:** A general warning is shown when there is a risk of personal injury from a nonelectrical hazard or a risk of irreversible damage to data, software, or the operating system.

**WARNING:** A heat warning is shown when there is a risk of personal injury from a heat source.

**WARNING:** An electrical warning is shown when there is danger of physical harm to a person or damage to equipment due to electrical hazard.

## Trademark Identification

The following SOMA Networks trademarks are used without notation in the rest of this document:

- Amos™ software environment
- Amosphere™ system
- NPM™ basestation
- SOMAport™ subscriber device

## Tell Us How We Are Doing

If you have any feedback about this document, e-mail Technical Communications at SOMA Networks: **docs@somanetworks.com**.

## Document Change History

Table 6 shows the change history for this document.

| Revision | Date | Change Summary |
|---|---|---|
| 00a | July 29, 2003 | Initial draft release |
| 00b | August 6, 2003 | Updated power bay circuit breaker information |

**Table 6** Document Change History

# CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

Chapter 1

# INSTALLATION OVERVIEW

This chapter provides an overview of the installation process. Please familiarize yourself with the installation process in general before proceeding to the next chapter.

**Contents**

# Installation Process Summary

Installation of an NPM basestation should take approximately two to three days, assuming the site already meets the requirements specified in Chapter 2, "Site Preparation".

Three people should be present during the installation, especially when moving NPM equipment.

Table 1.1 lists the procedures to install an NPM basestation.

| Step | Chapter Title | Page | Procedures |
|---|---|---|---|
| 1 | Site Preparation | 23 | Ensure that the installation site is equipped to handle the basestation. Collect information and add additional infrastructure if necessary. |
| 2 | Pre-Installation Activities | 39 | Unpack the racks. Review checklists to ensure you have the required equipment, software, and tools to perform an installation. |
| 3 | Installation Procedures | 49 | Install the racks. Connect ground and power. Add components to their respective shelves. Attach cables. Install the GPS, main, and diversity antennas. |
| 4 | Power-On Procedures | 115 | Apply power to the basestation. Perform basic system verification tests. |
| 5 | On-Site Software Installation and Configuration Procedures | 119 | Configure software on the basestation. |

**Table 1.1** Installation Process Summary

Appendix A contains the procedure for decommissioning a basestation.

Appendix B contains the procedure for upgrading a basestation.

See "Post-Installation Activities" on page 125 for information about additional tasks that must be performed for the basestation to be fully functional.

# Necessary Conditions for Installation

The installation procedures in this manual assume that the following conditions have been met:

- The core servers located at the network operations center (NOC) are operational and connected to the backhaul.
- The backhaul has been tested and is connected to the edge routers.
- The utility bus controllers, radio sector controllers, and application hosts are each configured in their BIOS to boot from the correct source.
- At least one of the hard disk drives contains an Amosphere software image.
- A power supply that meets the specifications listed in "Electrical Requirements" on page 29 has been installed.

> **NOTE:** If these conditions are not met, it is still possible to complete the physical installation of an NPM basestation. However, you will not be able to boot the basestation and provide cell coverage until you satisfy these conditions.

Chapter 2

# SITE PREPARATION

This chapter identifies the requirements that your site needs to meet before you can proceed with the installation of the NPM basestation. Please review these requirements before proceeding to the next chapter.

**Contents**

# Physical Requirements

Before you begin installing the NPM basestation, read the following physical requirements. Ensure that each requirement is met before proceeding with the installation, and consult your methods of procedures (MOPs) for information concerning transportation method, route, and precise installation location.

**WARNING:** Failure to meet the following requirements may result in personal injury and cause damage to or destruction of the basestation and surrounding equipment.

## Space

Table 2.1 and Figure 2.1 show the physical dimensions of the NPM racks. These dimensions do not include space for cabling, the insertion and removal of modules, or adequate airflow.

| Racks | Width | Height | Depth |
|---|---|---|---|
| One rack | 0.6 m (23 5/8 inches) | 2.11 m (83 inches) | 0.6 m (23 5/8 inches) |
| Two racks | 1.2 m (47 1/4 inches) | 2.11 m (83 inches) | 0.6 m (23 5/8 inches) |

**Table 2.1** Rack Dimensions

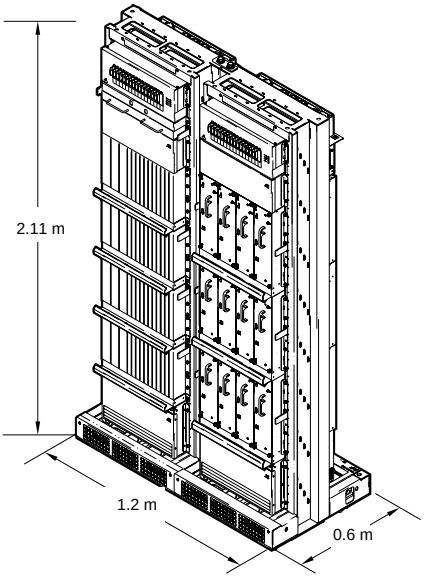


**Figure 2.1** NPM Rack Dimensions

## Weight

The total weight of a 6-sector NPM basestation is approximately 544 kg (1219 pounds). The racks have a floor loading of approximately 354 kg/$m^2$ (92 pounds/$foot^2$), as per *Telcordia Technologies GR-1275-CORE*. A dolly or crane is required to move the racks.

Table 2.2 shows the weight of the different NPM components.

| Component | Weight |
|---|---|
| Empty single rack | 69.2 kg (155 pounds) |
| RF rack, filled to capacity | 298 kg (657 pounds) |
| Radio rack, filled to capacity | 204.0 kg (457 pounds) |
| Utility or radio shelf, empty | 6.5 kg (14.3 pounds) |
| RFSS module | 16 kg (35 pounds) |
| Lower cooling unit | 10.5 kg (23.2 pounds) |
| Upper cooling unit | 8.4 kg (18.8 pounds) |
| Power distribution panel (PDP) | 17.9 kg (40 pounds) |

**Table 2.2** Weight of NPM Components

## Torque Values

Table 2.3 shows the recommended torque values for the different sizes of fasteners used in the NPM racks.

| Fastener Size | Recommended Torque |
|---|---|
| #4 (0.112-inch) screw | 6 inch-pounds |
| #6 (0.138-inch) screw | 12 inch-pounds |
| #8 (0.164-inch) screw | 18 inch-pounds |
| 1/4-inch compression lug nuts on PDP | 78 inch-pounds |
| 5/16-inch screw | 50 inch-pounds |
| SMA connector | 5 inch-pounds |
| Type-N connector | 12 inch-pounds |
| 7/16 DIN connector | 17 foot-pounds |
| RFSS module thumb screws (#6 screw) | 12 inch-pounds |
| Power cable screws | 8 inch-pounds |

**Table 2.3** Torque Values of Threaded Fasteners

**NOTE:** Unless otherwise specified, torque tolerances are ±2 inch-pounds.

# Environmental Requirements

Before you begin installing the NPM basestation, read the following environmental requirements. Ensure that each requirement is met before proceeding with the installation and consult your MOPs for procedures concerning building requirements, hazardous materials and waste, and environmental systems.

**WARNING:** Failure to meet the following requirements may result in personal injury and cause damage to or destruction of the NPM basestation and surrounding equipment.

## Temperature

The NPM basestation is designed to be installed in a temperature-controlled environment. Table 2.4 shows the ambient temperature requirements for the basestation.

| Operational State | Temperature Requirement |
|---|---|
| Operating | +5°C to +40°C (+41°F to +104°F) |
| Short-term operation (less than 96 hours/year) | –5°C to +50°C (+23°F to +122°F) |
| Storage | –40°C to +70°C (–40°F to +140°F) |

**Table 2.4** Temperature Requirements

## Humidity

The NPM basestation is designed to be installed in a humidity-controlled environment. Table 2.5 shows the humidity requirements for the basestation.

| Operational State | Humidity Requirement |
|---|---|
| Operating | 5% to 85% relative humidity, noncondensing |
| Short-term operation (less than 96 hours/year) | 5% to 90% relative humidity, noncondensing |
| Storage | 5% to 95% relative humidity, noncondensing |

**Table 2.5** Humidity Requirements

## Altitude

Certain components in the NPM basestation are sensitive to altitude. Table 2.6 shows the altitude requirements for the basestation.

| Operational State | Altitude Requirement |
|---|---|
| Operating | –60 m to +1800 m (–197 feet to +5904 feet) |

**Table 2.6** Altitude Requirements

## Airflow

Each NPM basestation rack requires 0.6 m (2 feet) of open space in front of and behind it to allow suitable airflow for cooling. Each cooling fan draws approximately 600 cubic feet per minute (CFM) of air.

## Heat Output

Table 2.7 shows the amount of heat produced by the NPM basestation.

| Configuration | Heat Output (W) | Heat Output (BTU/hour) |
|---|---|---|
| 6 sectors | 6795 | 23 201 |
| 3 sectors | 3725 | 12 719 |
| 1 sectors | 1680 | 5 736 |

**Table 2.7** Heat Output

## Shock and Vibration

The NPM basestation uses network equipment-building system (NEBS2000) racks designed for use in level 4 seismic zones.

# Electrical Requirements

Before you begin installing the NPM basestation, read the following requirements. Ensure that each requirement is met before proceeding with the installation and consult your MOPs for procedures concerning power, grounding, and high-risk cut-over activities.

**WARNING:** Failure to meet the following requirements may result in personal injury and cause damage to or destruction of the NPM basestation and surrounding equipment.

## Main Power

The NPM basestation requires a +24V DC power supply. See your field engineering package (FEP) for the recommended settings of your power supply.

The minimum DC input voltage at the PDP is 22.6V; the maximum DC input voltage at the PDP is 29.2V. The input power noise level should not exceed a maximum of 100 mV peak-to-peak, DC to 20 MHz.

**NOTE:** The minimum gauge for the wires connecting the basestation to the main power source is #2 AWG. The maximum loop length of #2 AWG wire is 19.8 m (65 feet). #2 AWG wire that is less than this length will not be damaged or overheat in the event of a current overload or short-circuit condition.

Table 2.8 shows the power consumption for the different configurations of the MMDS basestation when receiving +28V DC at the PDP.

| Configuration | Radio Rack (A) | RF Rack (A) | Total (A) | Total (W) |
|---|---|---|---|---|
| 6 sectors | 79.8 | 201.6 | 281.4 | 7035 |
| 3 sectors | 48.8 | 105 | 153.8 | 3845 |
| 1 sectors | 28.2 | 40.6 | 68.8 | 1720 |

**Table 2.8** Power Consumption Values

**NOTE:** Each RFSS module draws 16.1A at +28V DC.

## Main Power Bay Circuit Breaker Size

Each NPM rack is connected to the main power bay by three power cables. Table 2.9 shows the sizes of circuit breakers required to protect the power cables in the event of a current overload or short-circuit condition.

| Rack | Circuit Breaker Size |
|---|---|
| Radio rack | 70A per feed (3) |
| RF rack | 100A per feed (3) |

**Table 2.9** Power Bay Circuit Breaker Requirements

## Backup Power

The NPM basestation does not contain any internal battery backup systems. Ensure that your main power source has a backup power system in case of a power failure.

## Power Bay Ground and Voltage Levels

Table 2.10 shows the required electrical levels as measured at the PDP terminals.

| Unit | Measurement | Specification |
|---|---|---|
| Voltage | +24V DC (+) to return (–) | +27.5V DC nominal<br>(25.0V DC min, 28.0V DC max) |
| Power | +24V DC (+) to return (–) | 10kW minimum |
| Voltage | Return (–) to ground | 0.5V DC maximum |
| Resistance | Return (–) to ground | 0.1Ω maximum |
| Voltage | +24V DC (+) to ground | +25.0V to +28.5V DC |

**Table 2.10** Required Ground Levels

## NPM Circuit Breaker Current Loads

Each NPM rack contains a power distribution panel (PDP). The PDP has up to 16 circuit breakers (CBs). Each breaker switch controls the power to a specific NPM component. Individual NPM components can be powered off by setting the appropriate breaker switch to the OFF (down) position.

Table 2.11 shows the maximum current loading of the circuit breakers in the RFSS and radio rack PDPs.

| Circuit Breaker | RFSS Rack PDP | Radio Rack PDP |
|---|---|---|
| CB 01 | 10A | 10A |
| CB 02 | 30A | 30A |
| CB 03 | 30A | 30A |
| CB 04 | 30A | 30A |
| CB 05 | 30A | 30A |
| CB 06 | 30A | 30A |
| CB 07 | 30A | 30A |
| CB 08 | 30A | 30A |
| CB 09 | 30A | 30A |
| CB 10 | 30A | 30A |
| CB 11 | 30A | 30A |
| CB 12 | 30A | 30A |
| CB 13 | 30A | 30A |
| CB 14 | 10A | 10A |
| CB 15 | — | 2.5A |
| CB 16 | — | — |

**Table 2.11** Circuit Breaker Current Loads

## Fuses

Each RFSS module contains one 2A, 250V, fast-blowing fuse (1.25 × 0.25 inch) to protect the RF components from damage in the event of an electrical overload.

## Rack Grounds

Table 2.12 shows the grounding requirements for each rack.

| Ground Type | Requirement |
|---|---|
| Frame ground | Each NPM rack requires one connection to its frame assembly for use as a frame ground. The frame ground cable uses #6 AWG wire. |
| Main ground | Each NPM rack requires one connection to the main building ground, such as the master ground bar (MGB). The ground cable uses #6 AWG wire. |
| Isolation pad | Each NPM rack must be installed on an isolation pad to ensure proper grounding. The isolation pads are included in the installation kit. |

**Table 2.12** Grounding Requirements

## Compression Lug Color Codes

Table 2.13 shows the compression lug color codes for common wire gauges.

| Wire Gauge (AWG) | Color Code |
|---|---|
| #6 (used for NPM ground cables) | Blue |
| #4 | Gray |
| #2 (used for NPM main and return power cables) | Brown |
| #1 | Green |
| 1/0 | Pink |
| 2/0 | Blank |

**Table 2.13** Compression Lug Color Codes

# Network and Backhaul Requirements

Before you begin installing the NPM basestation, see the *Amosphere System Overview* for a description of network requirements and consult your field engineering package (FEP) for information involving the network equipment.

## PSTN Gateway

The NPM basestation does not connect directly to the PSTN. A PSTN gateway, such as a PRI, connects the Amosphere IP-based equipment to the circuit-switched PSTN.

**NOTE:** Ensure that any equipment connecting the basestation to the PSTN is UL-listed.

## Edge Routers

The NPM basestation requires a connection to at least one edge router configured to direct packets between the basestation and the network core. The basestation connects to the edge router using 100-Mbit/s Ethernet.

## Backhaul Circuits

See your preliminary RF design package for information about bandwidth requirements for the backhaul.

See your field engineering package information about your site's backhaul circuits and the configuration of any necessary customer service units (CSUs).

**NOTE:** Backhaul circuits must be tested by qualified personnel before the NPM basestation is placed into operation in order to ensure connectivity with the core servers.

## Internet Gateway

See your field engineering package (FEP) for Internet gateway connectivity information.

## Core Servers

See your core server field engineering package (FEP) for connectivity information.

# Site Requirements

Each site has unique requirements and characteristics. See your field engineering package (FEP) for specific requirements relating to your installation. The field deployment package contains the site's floor plan, cabling routing and termination, and other site-specific

## Restricted Access

Access to the site must be controlled by the authority for that location and granted through the use of special tools, locks and keys, or other means of security. Access should be limited to service personnel who have been instructed about the reasons for the access restrictions and about any precautions that must be taken while at the location.

## Mounting Surface

The NPM basestation is suitable for mounting on concrete or other noncombustible surfaces only.

## Equipment Entrance and Unloading Area

A route must be provided between the unloading area and the equipment room where no restrictions will be encountered with a clearance less than 0.9 m (36 inches) wide (side-to-side), and 2.0 m (80 inches) high (floor-to-obstruction).

All turns along the route must allow sufficient clearance to turn or tilt an object 0.6 m (24 inches) wide, 0.6 m (24 inches) deep, and 2.1 m (83 inches) high.

## AC Outlets

The site must have at least two duplex AC receptacles located within a convenient distance to facilitate installation and maintenance of the NPM basestation.

## Antenna Mounting Locations

The NPM basestation uses two antennas (main and diversity) per sector. Ensure that your tower can support the number of antennas shown in Table 2.14.

| Sectors Supported by Basestation | Required Antennas |
|---|---|
| 1 | 2 |
| 2 | 4 |
| 3 | 6 |
| 4 | 8 |
| 5 | 10 |
| 6 | 12 |

**Table 2.14** NPM Antenna Requirements

The field engineering package (FEP) contains information about the size, weight, and installation requirements of the antennas.

## GPS Antenna Mounting Locations

The NPM basestation requires two 1-inch diameter hollow pipes for mounting the two GPS antennas. The mounting location must be free of any objects that might block satellite visibility within 10° of the horizon.

## Cabling Requirements

Ensure that your site has the necessary cable racks and ladders to accommodate an NPM basestation and that your site has external cable access ports for the GPS and RF antenna cabling. The field engineering package (FEP) contains the cable layout specific to your site.

## Fire Protection System

SOMA Networks recommends a fire protection system for the site.

## Lighting

The site must have sufficient lighting to conduct work in a safe manner. Emergency lighting is recommended. Lighting must meet local and other applicable regulations.

## Isolated Ground Plane Environment

Ensure that the NPM basestation will be installed in an isolated ground plane environment as defined in *Telcordia Technologies GR-1275-CORE*.

## Master Ground Bar Requirements

The site's master ground bar (MGB) must be connected to the building principal ground's electrode system. The building principal ground is the point where grounding conductors of the building (such as air-conditioning, communication systems, and structure) are bonded together.

Ensure that the electrode system meets the requirements specified in the National Electrical Code (NEC) article 250, sections 150–170, 1999.

**NOTE:** See the floor plan drawing in your field engineering package (FEP) for the location of the MGB.

### Ground Riser Cable

The ground riser cable (the cable connecting the MGB to the building principal ground) must have a minimum conductor sizing of 2/0 AWG. If any equipment cables at the site are larger than 2/0 AWG (such as to compensate for voltage drop), the size of the ground riser cable must be adjusted. The ground riser cable must use an equal or larger gauge than the largest conductor. The ground riser cable must be labelled with a tag conforming to *GR-1275-CORE*.

In order for the ground riser cable to be nonrestrictive to lightning, the following guidelines should be observed:

- The cable should be run using the most direct route possible. The number and severity of turns and bends should be minimized. Bends must not exceed 90°.
- The cable must not be looped or coiled.
- The cable must not be supported by metal clamps.
- If a conduit is required to protect the cable, the conduit should be made of PVC. If a metal conduit is used, the conduit must be bonded to the ground riser cable on both ends.
- The cable must not run through or enter any metal boxes unless the boxes are bonded to the ground riser cable at the entry and exit point.

### Ground Resistance

The resistance of the building principal ground should be as low as practically possible (typically less than 5Ω). Under no circumstances should the resistance exceed the local electrical utility limits of 25Ω (NEC article 250-56, 1999).

## Additional Site Requirements

See *Telcordia Technologies GR-1275-CORE* for a comprehensive description of generic site requirements.

Chapter 3

# PRE-INSTALLATION ACTIVITIES

This chapter lists the tools and equipment required for installing and testing the NPM equipment. It also provides procedures for unpacking the racks and configuring individual cards and shelves.

**Contents**

# PREPARING FOR INSTALLATION

This section describes precautions, equipment, and tasks that should be reviewed or performed prior to beginning the NPM basestation installation.

Table 3.1 shows the topics described in this section.



**Table 3.1** Pre-Installation Requirements

# Antistatic Precautions

**WARNING:** Components in the NPM basestation are highly sensitive to electrostatic discharges (ESD). Follow the procedures described below to prevent unseen damage from occurring.

To prevent damage to NPM components from static electricity:

- Do not handle circuit boards unless you are using the appropriate antistatic protection, such as wrist straps, boot straps, boots, or a conductive mat. Wrist straps must have snug but comfortable contact with your skin, and they must be connected to a grounding point on the racks.
- Handle circuit boards by the faceplate, handles, or edges. Do not touch any integrated circuits, connections, pins, or soldered surfaces.

## Wrist-Strap Grounding Point

Each NPM rack contains a wrist-strap grounding point in the bottom-left corner of the power distribution panel (PDP). The grounding point is connected to the frame ground and provides antistatic protection when technicians work with circuit cards.

**NOTE:** The racks must be grounded for the wrist-strap grounding point to be effective.

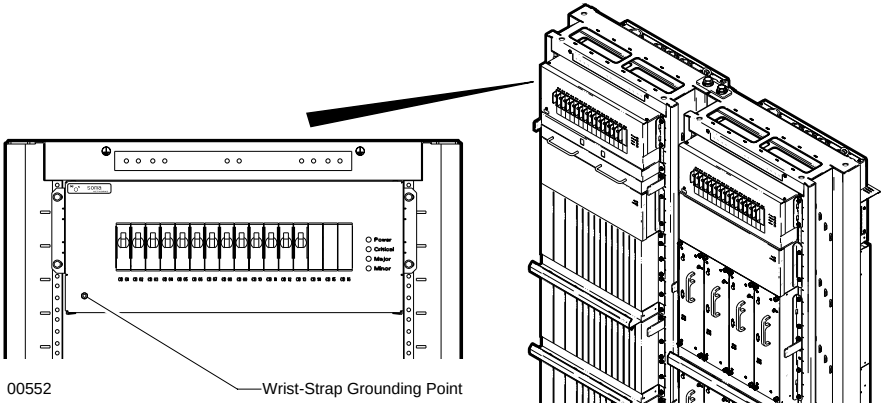


**Figure 3.1** Wrist-Strap Grounding Point

# Equipment, Tools, and Supplies Checklists

## Tools

The following tools are recommended for a typical NPM basestation installation:

- Allen key set
- Bolt cutter
- Cable ties
- Chalk line
- Drill bits (metal and masonry)
- Electrical tape
- Extension cord
- Flat file
- Framing square
- Hacksaw (with blades)
- Hammer drill
- Heat gun (with heat shrink roll)
- Label maker
- Marking pencil
- Oxide-inhibiting compound
- Platform stepladder (6-foot)
- Plumb bob
- Portable bandsaw kit
- Scissors
- Scratch awl
- Shims (for leveling NPM)
- Socket sets (Imperial and metric)
- Strap (with buckle)
- Tape measures (linen and metal)
- Thomas and Betts (T&B) crimper
- Torpedo level
- Torque wrenches
- Utility knife
- Wrench sets (Imperial and metric)
- Vacuum cleaner with high-efficiency particulate air (HEPA) filter

**NOTE:** Ensure that your torque wrenches are correctly calibrated according to the methods and schedule specified by the manufacturer. The calibration date should be indicated on each wrench.

## Safety Equipment

The following safety equipment is recommended for a typical NPM basestation installation.

- Ear plugs
- Electrical gloves
- ESD straps
- First aid kit
- Flashlight
- Portable eye-wash station
- Safety glasses
- Safety shoes

## Test Equipment

Table 3.2 shows the equipment recommended for testing NPM basestation functionality.

| Equipment | Purpose |
|---|---|
| Digital multimeter | Checking continuity and electrical characteristics |
| Sunset OCx | Testing SONET and T-carrier network and services |
| Workstation or terminal | Installing, configuring, and verifying software |
| Cable sweep generator | Testing the electrical integrity of antenna and RF cables |
| Spectrum analyzer | Monitoring RF signal output |
| Ethernet cable tester | Testing the type and integrity of Ethernet cables |
| Oscilloscope | Checking input power noise levels |

**Table 3.2** Recommended Test Equipment

**NOTE:** Ensure that your test equipment is correctly calibrated according to the methods and schedule specified by the manufacturer. The calibration date should be indicated on each piece of test equipment.

# Unpack the Equipment

The NPM racks are delivered on shipping pallets. Each rack is secured in an upright position and is bolted to the pallet. Additional equipment is delivered in separate shipping boxes.

## To unpack the NPM equipment

1. Transport the shipping boxes to the installation area using a dolly or pallet jack.
2. Inspect the exterior packaging for any noticeable damage that may have occurred during shipment.
3. Verify that the shipment is complete by checking the contents of each box against the bill of materials (BOM) or shipping invoice that arrives with each box. The BOM for each box may be located on the outside or inside of the box.
4. Report any missing or damaged components to the field support coordinator as soon as possible.
5. Cut the packaging tape on each box using scissors or a utility knife.
6. Remove the cardboard packaging from the racks:
   - **i** Remove the top of the cardboard packaging.
   - **ii** Remove the cardboard sides. The cardboard sides are bolted to the shipping pallet and pull off with minimal effort.
7. Remove the protective bags covering the racks.
8. Check the racks for extra mounting hardware or invoices. If there are additional items, remove them and keep them for future use.
9. Remove the four 9/16-inch bolts that secure the base of each rack to its shipping pallet.
10. Verify the contents of the other boxes by examining their BOMs.

    **NOTE:** Do not remove any items from their antistatic bags until you are ready to install them.

11. Save the packaging material and the BOMs in case any of the equipment needs to be returned or moved in the future.

# Review Site Deliverables List

Table 3.3 shows the paperwork that ships with each NPM basestation.

| Document | Description |
|---|---|
| Anchor kit | Lists installation kit contents |
| NPM BOM | Lists every component in the basestation |
| Shelf inspection checklist | Factory inspection of each utility and radio shelf |

**Table 3.3** NPM Inventory Documents

## To check the NPM inventory

1. Perform an inventory check using the site deliverables list provided with the E1 package and BOMs.
2. Ensure that all equipment and accessories have been shipped.
3. Document any shortages and report them to the field support coordinator so that any missing equipment may be procured and delivered to the site as soon as possible.
4. Ensure that the serial number for each piece of equipment is recorded in the basestation's on-site documentation.

# CONFIGURING CARDS AND SHELVES

Some of the jumpers and switches on the cards and shelves in the NPM basestation require configurations which differ from the factory defaults. This section provides the procedures for making the necessary alterations.

Table 3.4 shows the actions described in this section.

| Action | Page |
|---|---|
| Configure Ethernet Switch Jumpers | 47 |

**Table 3.4** Configuring Cards and Shelves Procedure Summary

**NOTE:** Older basestations may use ZT5550 cards for the utility bus and radio sector controllers and ZT5541 cards for the application hosts. If the basestation uses these cards, see "Discontinued NPM Equipment" on page 137 for pre-installation configuration procedures.

See your field engineering package (FEP) for information about the cards used in the basestation.

# Configure Ethernet Switch Jumpers

It may be necessary to modify the jumpers on the Ethernet switches. The NPM basestation uses a configuration of the Ethernet switches that differs from the manufacturer's original settings.

> **NOTE:** If the Ethernet switches are pre-installed in the shelves, then they have already been configured and this procedure is not required.

Table 3.5 shows the correct settings of the Ethernet switch jumpers.

| Jumper | Setting | Appearance | Description |
|---|---|---|---|
| K1 | OFF |  | PCI reset. Removing this jumper causes the card NOT to be reset when the utility bus controller is reset. This jumper must be left OFF. |
| K2–K4 | ON |  | User-defined. These jumpers must be left ON. |
| K5, K6 | OFF |  | Burn-in mode (K5) and break detect (K6). These jumpers must be left OFF. |
| K7 | ON (pins 1–2) |  | CPCI BDSEL. This jumper configures the card for use in a hot-swap shelf. This jumper must be left ON on pins 1 and 2. Pin 3 should be left open. |

**Table 3.5** Ethernet Switch Jumper Settings

## To configure the Ethernet switches

1 Remove the two Ethernet switches from their antistatic packaging at a grounded work area. Ensure that you are properly grounded with a wrist or boot strap before handling the cards.

2 Remove the K1 PCI Reset jumper from each card. Figure 3.2 shows the location of the jumper.

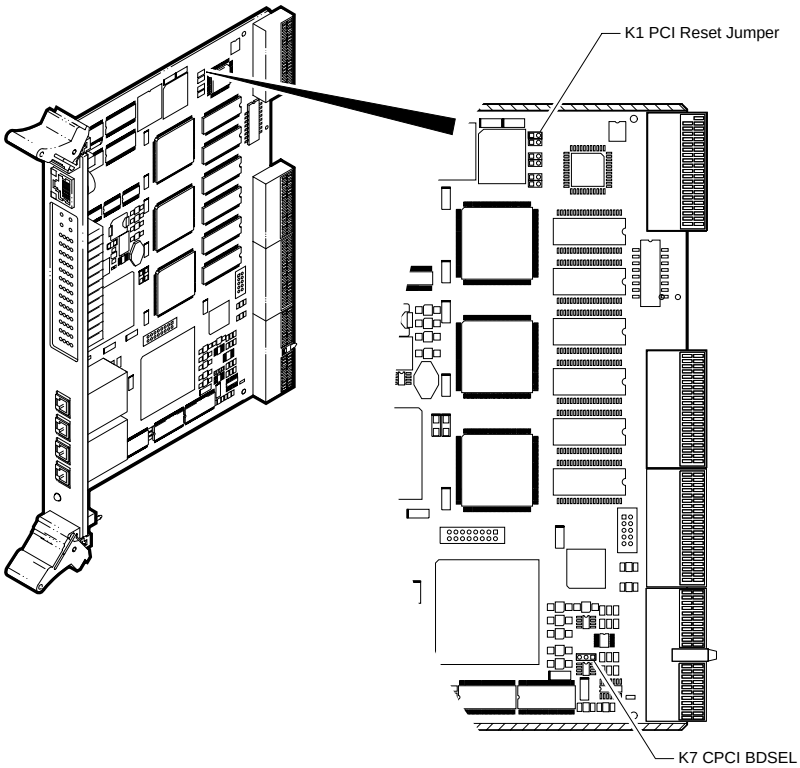


**Figure 3.2** Ethernet Switch Jumper Configuration

3 Hang the jumper off the header pins as shown in Table 3.5. This ensures that the jumper is still present if future changes to the cards are required.

4 Ensure that jumpers K2 to K7 are configured as shown in Table 3.5.

5 Place the cards back in their antistatic packaging until you are ready to install them in the shelves.