# TeraFrame™

# N-Series TeraFrame™
# Network Cabinet System
# User's Manual

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PRODUCTS, INC.**

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## TABLE OF CONTENTS

*TeraFrame*™

## OVERVIEW

To easily navigate within this PDF document, use the bookmarks located to the left of the screen, or click on the section titles located on the contents page. Additionally, Adobe Acrobat features a search tool for searching by keyword or part number.

This manual provides the information necessary to receive, unpack, and assemble the N-Series TeraFrame™ Network Cabinet System and some TeraFrame accessories and options. The information in this document is subject to change without notice. CPI is not liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Because of the dynamic nature and continued enhancement of CPI products, the illustrations and descriptions in this manual may differ from the various products you receive.

## ORGANIZATION OF THIS MANUAL

This manual is organized as follows:

Chapter 1 includes preassembly information such as
- Tools needed for assembly
- Moving the cabinet
- Handling and unpacking
- Anchoring the cabinet
- Standard cabinet parts
- Accessories and options

Chapter 2
- Installing on slab and access floors
- Removing and installing the cabinet doors
- Reversing the door swing
- Door locks
- Removing and installing side panels
- Configuring the top panel

*TeraFrame*™

Chapter 3
- Baying cabinets
- Bonding and grounding
- Overhead cable pathways
- Aligning radius drops, underfloor cable pathways, floor pass-through

Chapter 4
- Equipment mounting rails
- Cable management
- Vertical and horizontal power management
- Thermal management accessories
- Securing equipment to mounting rails

Chapter 5
- Cable routing recommendations
- Cable management: bundling, dressing, radius bend
- Environmental monitoring

## CONVENTIONS USED IN THIS MANUAL

This manual provides general safety guidelines to be observed when planning for, installing, and operating your N-Series TeraFrame cabinet.

Special messages used throughout this manual are explained below:

**WARNING**: Text highlighted in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life. Obey all safety messages that follow this symbol to avoid possible injury or death.

**CAUTION**: Text highlighted in this manner indicates that failure to follow instructions could result in damage to equipment or data.

**IMPORTANT:**  Text set off in this manner presents clarifying information or specific instructions.

**NOTE:**  Text set off in this manner presents commentary, sidelights, or interesting points of information.

## SAFETY INFORMATION

*Keep a printed copy of the Preface of this User's Manual, especially the following safety information, in or near the cabinet.*

⚠️ **WARNINGS**

- Improper use of this product may lead to serious injury or death. Read and understand all instructions for proper installation and use of this product.

- Be sure to use sufficient personnel to safely remove the cabinet from the pallet.

- Do not attempt to move large cabinets by yourself. Obtain adequate assistance to stabilize the cabinet during movement or hire professional equipment riggers.

- Move cabinets on installed casters with extreme care. Sudden stops, excessive force, and uneven surfaces may cause the cabinet to overturn. Never push on the sides.

- Unload equipment from the cabinet before moving it.

- A standalone cabinet should be level, stable, and anchored to the floor. Two or more cabinets can be bayed together (coupled) to enhance their stability. Each cabinet should be anchored to the floor.

- Before loading equipment in the cabinet, be sure to adjust and lock the leveling feet to level the cabinet. Do not use casters to stabilize the cabinet; always anchor the leveling feet or the cabinet frame to the floor.

- Always load heavy equipment, such as a UPS, at the bottom of the cabinet first, and add lighter equipment on higher levels.

- There is a safety risk when equipment is mounted on a shelf installed more than 30 inches above the floor in a cabinet without doors and/or side panels. The equipment may accidentally slide or be accidentally pushed off the shelf and fall on personnel. When equipment is mounted on a shelf in this condition, securely fasten the equipment to the shelf or cabinet frame. The following accessories may be used to secure certain equipment on shelves: Monitor tie-down kit (P/N 11725-X01), Seismic equipment tie-down bracket (P/N 14061-X19), or Equipment tie-down bracket (P/N 16356-X19).

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- The N-Series TeraFrame cabinet can support many system configurations. The amount of force required to tip or make the cabinet unstable differs with each configuration. Be sure to read and follow your equipment manufacturer's specific assembly, installation, and safety instructions.

- When servicing slide-mounted equipment such as servers:
  - Secure all equipment in position, other than the unit being serviced, to prevent it from sliding out and destabilizing the cabinet.
  - Extend only one unit at a time. Extending multiple units may cause the cabinet to tip over.
  - Extend the unit slowly. Rapid deployment of the unit could cause the cabinet to tip over.

- For protection of the equipment and personnel, ground each cabinet individually to the Telecommunication Ground Circuit (TGC) or signal reference grid.


⚠️ **CAUTIONS**

- Doors <u>must</u> remain supported during repositioning so that the hinge components are not damaged. Use blocks or have an assistant support the edge of the door opposite the hinges. Do not allow the top hinge to support the entire weight of the door during repositioning.

- Before swinging the front door, confirm that both top and bottom hinge pins are in the correct cavities of the door frame member. Swinging the door while the hinges are positioned in the wrong cavity may damage the door and/or the hinge.

- Keep the rear door closed while removing the hinge pins. An open door will fall off the cabinet when the pins are removed. When remounting the door, be sure to reinsert the hinge pins. If the hinge pins are not reinserted, the door could fall off the next time it is opened.

- For optimal load bearing capacity, move the mounting rails back no more than 10 inches (250 millimeters) from the front or rear of the cabinet.

**WARRANTY**

Chatsworth Products, Inc. (CPI) guarantees manufactured products and each part or component thereof against all defects in material and/or workmanship. CPI agrees to remedy any manufacturing defect either through replacement or repair at no charge, provided that the defective unit is returned, transportation prepaid, to the CPI factory. The warranty extends for a period of one year from the date of installation or initial use, provided that this period shall not exceed 18 months from the original date of shipment from the factory.

Any product that has been repaired or replaced shall be similarly warranted on its repair or replacement for the remaining product warranty period or 90 days from the date of repair or replacement, whichever expires last.

This warranty does not extend to products that have been subjected to neglect, accident or improper use, nor to units that have been altered by non-CPI personnel.

No warranties other than those set forth in this section are given or implied with respect to the products furnished. CPI shall, in no event, be liable for consequential damages, for loss, damage or expense directly or indirectly arising from the use of the products, for any inability to use materials or from any other cause.

**SERVICE AND SUPPORT**

For answers to your questions, please email Technical Support at **techsupport@chatsworth.com**, or call toll-free at **800-834-4969** (US. & Canada) Monday to Friday, 5 a.m. to 5 p.m., Pacific Time.

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## INTENDED USE

***Keep a printed copy of the Preface of this User's Manual in or near the cabinet.***

- Install the cabinet only in a restricted service environment, such as a data center. Use indoors only, in environmentally controlled areas; do not use outdoors, in harsh environments, or in air-handling spaces.

- Use the cabinet for information technology and telecommunications equipment, including servers and peripherals.

- Allow only qualified service personnel to use the cabinet.

- Use casters only for moving empty cabinets to their final location. The cabinets <u>must</u> be anchored to the floor to ensure stability.

- The static load-bearing capacity of the N-Series TeraFrame cabinet on leveler feet is 2500 lb (1134 kg).

- The ambient temperature operating range for the N-Series TeraFrame cabinet and installed cabinet accessories is 0° to 60°C (32° to 140°F).

## FREQUENTLY ASKED QUESTIONS (FAQ)

**Q: What cabinet sizes are available?**
**A:** The N-Series TeraFrame cabinet is customizable to include 10 heights (42U to 51U); 11 depths (950mm to 1200mm); and 1 width (800mm).

**Q: Does the cabinet come with leveling feet?**
**A:** Yes. They are factory-installed and come with brackets to anchor the leveling feet to the floor.

**Q: Can the cabinet be bayed with other cabinets?**
**A:** Yes. A baying kit is required. Each cabinet should be anchored to the floor.

**Q: What accessories can be used with the N-Series TeraFrame?**
**A:**

| | |
|---|---|
| • Casters | • Power management options |
| • Combination lock | • Cable management options |
| • Electronic door lock | • Thermal management options |
| • Top panel | • Side panels |
| • Baying kit | • Filler panels |
| • Doors | • Shelves and trays |

**Q:  What accessories <u>cannot</u> be used with the N-Series TeraFrame?**
**A:**
- Non-N-Series TeraFrame vertical cable managers
- Non-N-Series TeraFrame casters
- Non-TeraFrame equipment mounting rails
- Half-height equipment mounting rails

**Q:  How much height do casters add to the N-Series TeraFrame cabinet?**
**A:**  Casters add 2.8 inches (71 millimeters) of height.

**Q:  What is the load-bearing capacity?**
**A:**  The static load-bearing capacity of the N-Series TeraFrame cabinet on leveler feet is 2500 lb (1134 kg).

**Q:  How heavy is the N-Series TeraFrame cabinet?**
**A:**  The weight of the cabinet will vary depending on its size plus options and accessories.

**Q:  What finishes are available for the cabinet?**
**A:**  Epoxy-polyester hybrid powder coat in Basic Black, Signature Blue, Glacier White, and Steel Gray.

**Q:  Does the cabinet come partially assembled like other Chatsworth cabinets?**
**A:**  No. The N-Series TeraFrame cabinet comes fully assembled.

**Q:  Are there RMU marks on the equipment mounting rails?**
**A:**  Yes. There are RMU marks on all the N-Series TeraFrame equipment mounting rails: the punched square hole rails and the drilled and tapped rails.

**Q:  How do you attach equipment to the cabinet?**
**A:**  The N-Series TeraFrame cabinet includes two pairs of adjustable depth, equipment mounting rails. **NOTE**: Front rails of ducted cabinets are not adjustable. Equipment or shelves attach to the equipment mounting rails. Equipment mounting rails have 1-3/4" (44.45 mm) high rack-mount spaces (RMS, RMU, U). Mounting spaces are marked and numbered for easy placement of equipment. Mounting rails have square-punched or tapped mounting holes spaced according to the EIA-310-D Universal hole pattern. Square-punched rails accept cage nuts allowing you to quickly change the mounting hardware. Tapped rails are threaded for #12-24 screws. Use square-punched rails for server applications. Use tapped rails for network and cabling applications.

**Q:  Are the top frames pre-drilled to accommodate J-Hooks for installing cable pathway products?**
**A:**  Yes, for 12-inch (300 millimeter) wide cable runways only. Cable runway can be connected at a right angle to the cabinet or parallel to the cabinet.

**Q:  Is the bottom of the cabinet open or closed?**
**A:**  The bottom of the cabinet is open.

**Q:  Is there a true "front" or "rear" to the N-Series TeraFrame cabinet?**
**A:**  Yes. The single front door of the cabinet is curved and the rear double door is flat, with a rear door bracket.

**Q:  Are the doors reversible?**
**A:**  Yes. See section 2.3 for instructions.

**Q:  Can combination locks be reset?**
**A:**  Yes, as long as you know the existing combination. If unknown, you must use a key to gain access to the cabinet, or order a new lock.

**Q:  I did not find the answer to my question. Who do I contact for assistance?**
**A:**  Please email Technical Support at **techsupport@chatsworth.com**, or call toll-free at **800-834-4969** (US. & Canada) Monday to Friday, 5 a.m. to 5 p.m., Pacific Time.

**TABLE OF CONTENTS**

## 1.1 INTRODUCTION

The N-Series TeraFrame Network Cabinet is a unique computer storage system comprising a suite of comprehensive technology, including power and thermal management, access control, and remote monitoring. The base cabinet uses an expandable array of accessories to monitor and communicate various critical environmental attributes. In addition, the N-Series TeraFrame mitigates risk by anticipating the emergence of future technology and evolving standards.

New features and unique qualities that distinguish N-Series TeraFrame:
- Distinctive, high-tech front, consistent with the standard TeraFrame cabinet
- Integrated, consistent look to frame, doors, and accessories
- An integrated cable management system that supports right-hand cabling associated with Cisco® switches
- Reversible doors that can open from the right or left
- Tamper-resistant door hinges
- Serviceable parts fully accessible and serviceable in bayed, fully populated cabinet with side panels installed
- Heavy-duty casters

## 1.2 BEFORE YOU GET STARTED

Planning Tools
- Autodesk® AutoCAD Equipment Layout Resources helps you design a complete equipment room layout. This program is compatible with AutoCAD versions 14 and above. It is not compatible with AutoCAD LT. To access: www.chatsworth.com> Support> Design Tools> Layout Software & CAD Blocks.

- Web-based Product Configurator saves 25 percent planning time, with ordering errors reduced by 25 percent. To access: www.chatsworth.com/configurator

  CPI's easy-to-use Product Configurator guides you through the steps and selections necessary to create the optimal N-Series TeraFrame Network Cabinet product. This step-by-step process gives you detailed product information along with various options and accessories that can be added during the configuration process. Once the solution has been configured, this confidential tool gives you a bill of materials (BOM), rendered drawings of the customized system, and a selection of distributors or global resellers. You can save multiple configured projects within the Product Configurator and can reaccess them at any time.

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## 1.2.1 Tools needed for the cabinet and accessories

- Flat screwdriver
- Large Phillips screwdriver
- Small Phillips screwdriver
- 3/8-in socket
- 8mm wrench
- 10mm socket wrench
- 12mm socket wrench
- 13mm socket and open end wrench
- 16mm open end wrench
- 5mm hex key (Allen wrench)
- Pliers (to install cage nuts)
- Hand-held tool to insert cable fingers

## 1.3 MOVING THE CABINET ON THE JOB SITE

### 1.3.1 Allotting space

The N-Series TeraFrame cabinet has 110 possible size configurations. Refer to TIA/EIA-942 standards for minimum spacing in the front and back for access, ventilation, and door swing.

**Height**: available in ten cabinet heights, without leveling feet:

| U | 42U | 43U | 44U | 45U | 46U | 47U | 48U | 49U | 50U | 51U |
|------|------|------|------|------|------|------|------|------|------|------|
| **Inch** | 78.3 | 80.0 | 81.8 | 83.5 | 85.3 | 87.0 | 88.8 | 90.5 | 92.3 | 94.0 |

**Width**: available in one cabinet width:

| Metric (mm) | 800 |
|-------------|-----|
| **English (inch)** | 31.5 |

**Depth**: eleven depth options, from 950mm (37.4 inches) to 1200mm (51.1 inches).

### 1.3.2 Load bearing capacity

- The static load-bearing capacity of the N-Series TeraFrame cabinet on leveler feet is 2500 lb (1134 kg).

**NOTE**: Casters are used only to move empty cabinets to their final location, where they must be bolted to the floor to ensure stability.

## 1.4 UNPACKING THE CABINET

1. Remove the outer packing material, consisting of stretch wrap that secures corrugated cardboard around the cabinet, and an inner plastic bag covering the cabinet. Remove the packaging carefully to avoid damage to the cabinet.
2. Check for damage. If any packaging or equipment damage is observed, immediately contact your distributor.
3. Check the packing list (in a plastic envelope fastened to the outside packaging) against all the components.

### 1.4.1 Removing the cabinet from the pallet

**WARNING**: Be sure to use sufficient personnel to safely remove the cabinet from the pallet.

**NOTE**: To lighten the load to be moved, remove any doors and side panels before lifting the cabinet from the pallet.

1. Open the front and back doors to access bolts in each corner of the frame that hold the cabinet to the shipping pallet.
2. Remove the bolts (using a 3/8-in socket) and wood shims from under the front and rear cabinet frame.
3. Remove the cabinet from the pallet.

## 1.5 INCLUDED WITH THE CABINET

The N-Series TeraFrame cabinet features adjustable vertical rails, integrated vertical cable management, locking doors, and a choice of side panels. Depending on your specifications, the N-Series TeraFrame may have the following features:

- Vertical frame with four vertical mounting rails – two front and two back
  Square punched EIA-310-D-Standard for cage nuts
    or
  Tapped (threaded) holes (buyer specified)
  12-24 combo-head screws
- Front door of perforated metal
- Door keys, two sets, that fit all cabinet locks
- Side panels, easy to remove, lockable
- Common parts kit
  - o 4 leveling feet
  - o 4 floor anchors
  - o Grounding block

  o  Fasteners
- Box of hardware

The N-Series TeraFrame cabinet is provided with hardware to secure equipment to the mounting rails. Cabinets with tapped rails include 50 each #12-24x5/8 screws. Cabinets with square-punched rails include 25 sets of M6 cage nuts and screws. Additional hardware is available for purchase (see section 4.5.1).

| TAPPED RAIL HARDWARE KITS (SOLD SEPARATELY) | | | | |
|---|---|---|---|---|
| PART NO. | NOMINAL SIZE | PACKAGE OF | FINISH | SHIPPING WEIGHT |
| 40605-001 | 12-24 | 50 | ZINC | 1 lb |
| 40605-004 | 12-24 | 1,000 | ZINC | 9 lb |
| 40605-005 | 12-24 | 50 | BLACK | 1 lb |
| 40605-006 | 12-24 | 1,000 | BLACK | 9 lb |

| MULTI-MOUNT HARDWARE KITS (SOLD SEPARATELY) | | | | |
|---|---|---|---|---|
| PART NO. | NOMINAL SIZE | PACKAGE OF | FINISH | SHIPPING WEIGHT |
| 12637-001 | M-6 | 25 | GOLD OVER ZINC | 1 lb |
| 12638-001 | 10-32 | 25 | ZINC | 1 lb |
| 12639-001 | 12-24 | 25 | BLACK | 1 lb |

### 1.5.1 Adjusting leveling feet

Adjustable leveling feet, installed on every cabinet, provide stability, support the full weight of the cabinet, and compensate for uneven floors. Adjust the height of the leveling feet to level the cabinet.

If leveling feet are used, CPI strongly recommends using floor anchors to clamp each leveling foot to the floor. See section 1.5.2, Anchoring the cabinet.

### 1.5.2 Anchoring the cabinet

N-Series TeraFrame cabinets, whether standalone or bayed with other cabinets, must always be anchored to the floor. You can anchor the leveling feet on access floor and slab installations, or anchor the frame, without leveling feet, directly to the concrete slab. Four floor anchors are included with each cabinet, or can be ordered (P/N 34587).
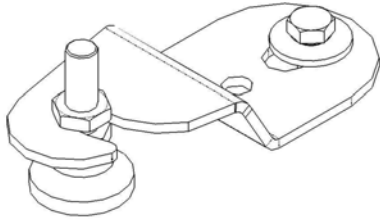
Fig. 1.5.2a Floor anchor with leveling foot

1. Install the floor anchors from inside the framework, capturing each of the four leveling feet.
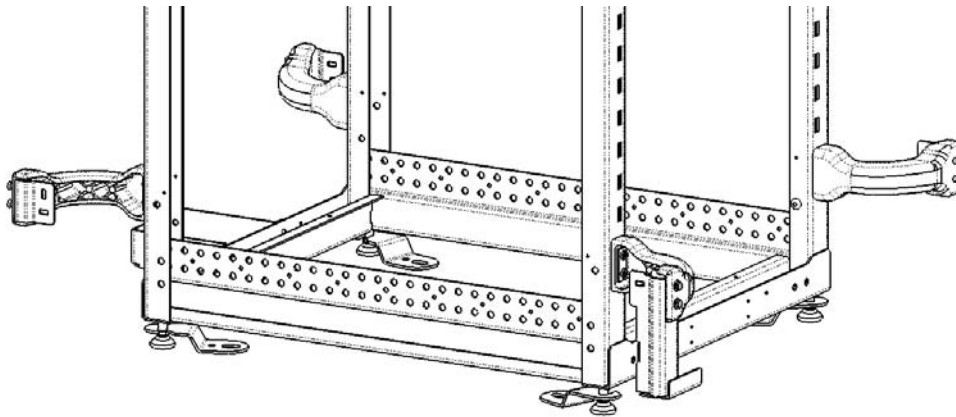


Fig. 1.5.2b Positioning floor anchors

2. Attach to the floor with appropriate hardware for your type of floor.
3. If the cabinet does not have leveling feet, use four bolts to attach the cabinet frame directly to the floor.
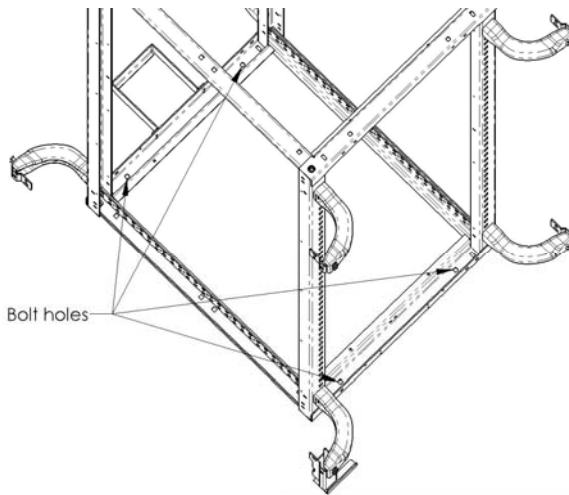
Fig. 1.5.2c Frame bolt down

## 1.6 ACCESSORIES AND OPTIONS

A full range of accessories is available to complement and to integrate with your N-Series TeraFrame cabinet. For more information, please contact your authorized CPI Distributor or CPI Customer Service Representative, or go to www.chatsworth.com. General accessories can be added to nearly all CPI structural support systems. These add-ons include power management, active components, and grounding and bonding accessories.

All options are in independent, self-contained Service Parts, and include the installation hardware and instruction sheets.

### 1.6.1 Casters

Casters provide easy mobility, especially helpful in areas of limited space and for quick room reconfigurations. Caster Kits (P/N 34628-C01) are used with the N-Series TeraFrame cabinet.

**NOTE**: Casters are intended for moving empty cabinets to their final location, where they must be bolted to the floor to ensure stability. Casters add 2.8 inches of height to the N-Series TeraFrame cabinet.

Features and benefits:
- 4 3-inch-diameter swivel casters
- Recessed under the cabinet to avoid tripping hazard

If your N-Series TeraFrame purchase includes the optional casters, they will be installed at the factory. If ordered as an accessory, an installation sheet is included with the kit.

> ⚠️ **WARNING**: Move cabinets on installed casters with extreme care. Sudden stops, excessive force, and uneven surfaces may cause the cabinet to overturn. Never push on the sides.
>
> To reduce the risk of personal injury or damage to the equipment, do not attempt to move large cabinets by yourself. Obtain adequate assistance to stabilize the cabinet during movement or hire professional equipment riggers.
>
> Before loading equipment in the cabinet, be sure to adjust and lock the leveling feet to level the cabinet. Do not use casters to stabilize the cabinet; <u>always</u> bolt the leveling feet or the cabinet frame to the floor. Always load heavy equipment at the bottom of the cabinet first, and add lighter equipment to higher levels.

### 1.6.2 Top panel

The N-Series TeraFrame Network Cabinet has a unique, five-part top panel. The top panel is factory-installed and allows for a variety of configurations depending on cable routing and volume. Multiple knockouts around the perimeter and four grommets in the center section provide numerous locations and ample capacity for cable ingress into the cabinet.

The five-piece top panel consists of one center panel with four 3" (76mm) diameter, grommet-protected holes. Perimeter panels are solid with three, four, or five 3.1" x 5.3" (79mm x 135mm) cable port knockouts. The perimeter side panels are 3.5" (89mm) wide and can be removed for larger cable quantities.

The top and frame are drilled for accessory attachments, such as ladder rack and FastTrac attachments. When planning the cable runways, be sure to align them with top panel openings.

See section 2.5, Configuring the top panel.

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### 1.6.3 Baying kits

Cabinets are bayed (joined) to align cabinets, provide safety and stability, and eliminate spaces that could allow cool air and return air to mix. Use Baying Kit (P/N 34682) to bay N-Series TeraFrame cabinets at 800mm spacing.

See section 3.1, Baying cabinets, for installation instructions.

### 1.6.4 Floor anchors

Attach the cabinet to the access subfloor or to a slab floor. Bolt cabinets to the floor with or without leveling feet.

See section 1.5.2, Anchoring the cabinet.

### 1.6.5 Bonding and grounding

Bonding and grounding systems prevent transient voltage from injuring individuals or damaging computers and networking equipment. Follow TIA/EIA 607 standards for bonding and grounding guidelines.

See section 3.2, Bonding and grounding the cabinet.

### 1.6.6 Cable management

Cable management products create a pathway for data cables, patch cords, and power cords around and between the installed equipment.

Cable management products provide critical support for cable bundles. Defining cable pathways results in better cable organization, which means easier moves, additions, and changes of your connections. In addition, fewer tangles and smoother turns help you maintain the quality of your circuit and data transmission.

See section 3.3, Aligning overhead cable pathways; section 4.2, Adding/adjusting cable management; section 5.1, Cable routing recommendations; and section 5.2, Dressing cables and attaching equipment to power.

### 1.6.7 Vertical power managers

An optional vertical power manager (P/N 34581) allows you to attach multiple power strips to the N-Series TeraFrame cabinet. The vertical bracket is factory-installed if ordered with the N-Series, and includes three cable spools, three M-5 pan head screws and three M-5 flange nuts to attach the spools, and three Saf-T-Grip straps for cable bundle management. Order additional spool kits from CPI.

Vertical power manager brackets are available in all heights from 42U to 51U, and two widths: 2-1/2 inches wide and 8 inches wide. The narrow bracket can hold two power strips, and the wide bracket can accommodate up to four power strips.

The brackets are optimized for 42U and 45U N-Series TeraFrame cabinets, and are provided as kits with adapter brackets for other height cabinets. Horizontal power strips are also available from CPI (P/N 12816-series).

See section 4.3, Vertical power managers.

### 1.6.8 Thermal management

The N-Series TeraFrame cabinet provides a broad combination of integrated thermal management options to eliminate hot air recirculation, ensure adequate availability of cold air to the equipment intake, and lower the temperature of the intake air.

- The Network Switch Exhaust Duct System directs hot air out of the back of the cabinet.
- Filler panels block hot air recirculation.
- CPI Koldlok floor sealing solutions eliminate bypass air flow.

For all thermal management accessories, see section 4.4, Adding/adjusting thermal management accessories.

### 1.6.8.1 Koldlok

The CPI Koldlok® Raised Floor Grommet is a permanent, access floor, airflow sealing solution that lets you easily make cabling changes without requiring technician training or labor to cut, scribe, re-install, reposition, or modify any part of the Koldlok unit. The units are easy to install in the middle or along the edge of floor tiles.

The heavy-duty grommet contains overlapping, offset, multilayer, interwoven brushes that automatically reseal around cables, eliminating data center hot spots. A wide trim lip around the grommet, molded from high-impact-resistant polypropylene, provides a bumper to prevent equipment casters from falling through access floor openings and helps compensate for imprecise tile cutting.

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The Integral unit is designed specifically for installation in new data center access floor cable cutouts before equipment arrives or in existing sites during equipment moves.

The Surface Mount unit, which divides into two panels, installs above the floor over existing cable cutouts, without affecting live data center operations, for those situations where existing equipment can't be moved or unplugged.

Features and benefits:
- Eliminates the need for additional cooling units, saving capital.
- Improves reliability by decreasing risk of unscheduled downtime or random undiagnosed heat-related problems.
- Reduces or eliminates hot spots when used with other best practices.
- Increases efficiency of data center air cooling equipment.
- Dissipates static charge buildup to prevent electrostatic discharge (ESD).

For further information, see CPI Koldlok® Raised Floor Grommet at www.chatsworth.com/Koldlok.

## 1.6.8.2 Filler panels

Filler panels fill empty RMU spaces, thus providing for enhanced air flow, maintaining thermal integrity, and improving the functioning of hot and cold aisles.

See section 4.4.1, Installing snap-in filler panels in open RMU spaces.

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### 1.6.8.3 Network Switch Exhaust Duct System

The Network Switch Exhaust Duct System is available for N-Series TeraFrame cabinets with a depth of from 1000mm to 1200mm. The exhaust duct fully isolates hot exhaust air and directs it out of the back of the cabinet.

See section 4.4.2, Installing the Network Switch Exhaust Duct System.

### 1.6.9 Doors

The N-Series TeraFrame cabinet has a single, curved, perforated metal front door. The rear doors are double, flat, perforated metal.

**IMPORTANT**: The N-Series TeraFrame cabinet ships with the door latch on the left-hand side of the door, though you may order it on the right-hand side. Changing the door swing requires a Service Part (P/N 34684-X02) to replace the lower door catch on the front of the cabinet.

See section 2.3, Removing and installing the cabinet doors.

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# Table of Contents

*TeraFrame*™

## 2.1 SLAB FLOOR INSTALLATION

Because the N-Series TeraFrame™ Network Cabinet is available in 11 depths, there are 11 possible dimension scenarios. The position of anchoring holes will vary depending on the size of the cabinet frame.

To use the actual cabinet as a "template" for anchoring holes, position the cabinet at its permanent location, mark the floor with the hole pattern for anchoring studs, move the cabinet aside, and drill the holes.

If leveling feet will be anchored, hook the anchors to the leveling feet, position the anchors inside the frame, and mark the holes to be drilled. You can also drill through the floor anchor slot without moving the cabinet.

See section 1.5.2, Anchoring the cabinet.

## 2.2 ACCESS FLOOR INSTALLATION

In a "hot aisle/cold aisle" installation, cold air is drawn into the front of a cabinet through perforated floor tiles and expelled into a hot aisle through the back of the cabinet. See the White Paper, "Thermal Management in CPI Cabinet Systems."
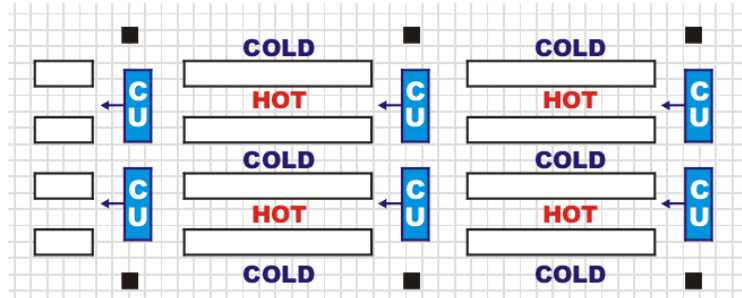


Fig. 2.2 Hot aisle/cold aisle layout

### 2.2.1 Bracing to the subfloor

In an access floor installation, ensure that the floor is strong enough to support the fully populated computer cabinets. Add subfloor bracing to provide the proper support for equipment.

Fig. 2.2.1 Subfloor bracing

### 2.2.2 Coordinating floor tile cuts for cable access

Plan the floor layout before installing N-Series TeraFrame™, so that cable openings in the access floor will be correctly aligned. Position the cabinet on the access floor with the cold aisles in front. If both power and data cables are under the floor, it is advisable to provide separate ingress for the two types of cables.

The CPI Koldlok® Raised Floor Grommets (P/N 13571-001, Integral Grommet; P/N 13576-001, Surface Mount Grommet) seal cable openings in access floors to prevent the loss of cold air through cable pass-through holes.

An impact-resistant polypropylene grommet insert protects cables as they pass through the cut in the access floor tile, while a double-layer brush closure seals around cables and prevents cold air from escaping through the hole in the floor. Blocking airflow through cable pass-through holes in the access floor can have significant impact on cooling effectiveness as more cold air is directed to equipment where it is needed. A surface-mount grommet that covers existing holes in the floor is also available.

Determine the best orientation of the grommet over the cable cutout. Determine whether the long or short dimension of the grommet will be parallel to the equipment or cabinet. Align the front of the cabinet with the floor tile. Do not make a floor cut over a stringer.

For further information, see CPI Koldlok® Raised Floor Grommet at www.chatsworth.com/Koldlok.

## 2.3 REMOVING AND INSTALLING THE CABINET DOORS

⚠️ **CAUTION**: The front door <u>must</u> remain supported during repositioning so that the hinge components are not damaged. Use blocks or have an assistant support the edge of the door opposite the hinges. Do not allow the top hinge to support the entire weight of the door during repositioning.

Doors can be removed to provide complete access to the inside of the cabinet or to reverse the door swing.

### 2.3.1 Removing the front door

1. Open the door to a 90-degree angle.
2. Lift the lower hinge pin until you feel it click into position. A pin retainer keeps the hinge pins from being completely removed.
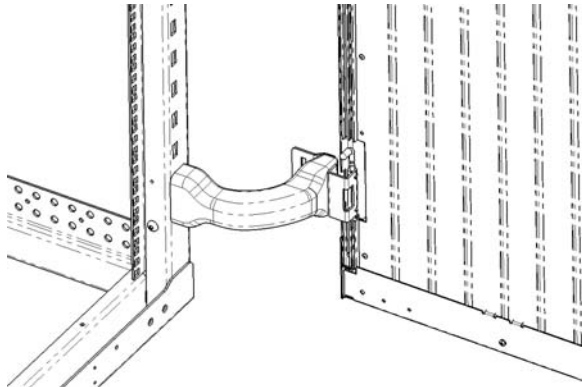
Fig. 2.3.1a Lower door pin

3. Pull the door away from the lower hinge, and lift the door up and off the upper hinge pin.
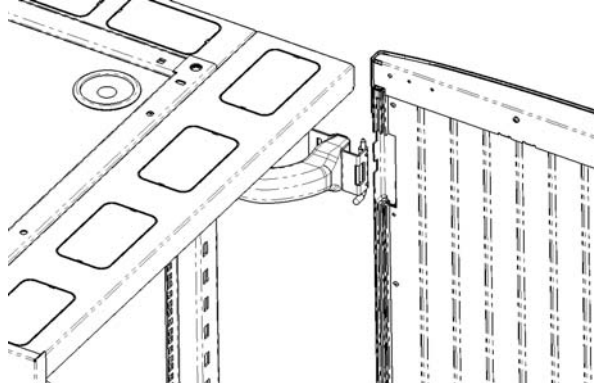
Fig. 2.3.1b Upper door pin

## 2.3.2 Reversing the door swing

You can reverse the door swing by removing the door, switching the hinges to the other side, and repositioning the door latch.

**IMPORTANT**: The N-Series TeraFrame cabinet ships with the door latch on the left-hand side of the door, though you may order it on the right-hand side. Changing the door swing requires a Service Part (P/N 34684-X02) to replace the lower door catch on the front of the cabinet.

1. Remove the hinges and brackets from the front of the cabinet using a 10mm wrench. The left hand lower door bracket may be discarded, but all other components will be reused.
2. Install the hinges to the left side stand-off brackets.  Insert the screws thru the side panel bracket, through the stand-off bracket, and into the hinge. The upper hinge is in the correct orientation when the hinge pin handle is below the hinge. The lower hinge pin is in the correct orientation when the hinge pin handle is above the hinge, as shown.
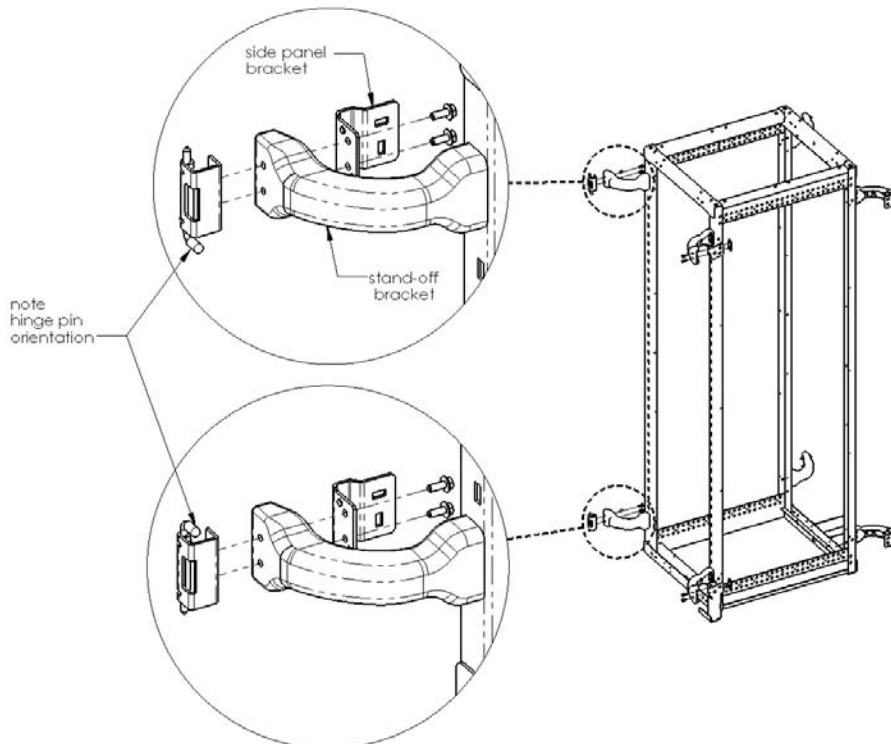


Fig. 2.3.2a Switching hinge positions

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3. Install the side panel bracket to the upper right stand-off bracket. Pass the screws thru the stand-off bracket, then the side panel bracket, and into the nut plate, as shown
4. Install the right hand door striker bracket supplied with this kit to the lower right stand-off bracket. Pass the screws thru the stand-off bracket, then the door striker bracket, and into the nut plate as shown
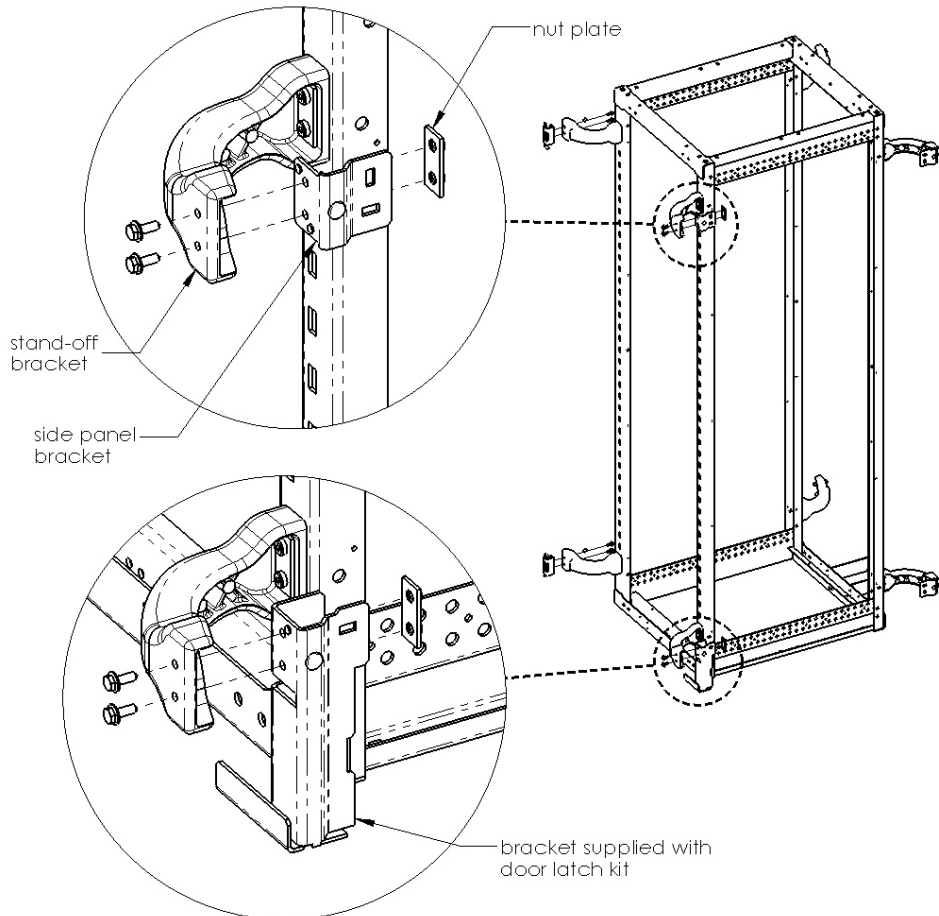
Fig. 2.3.2b Bracket installation

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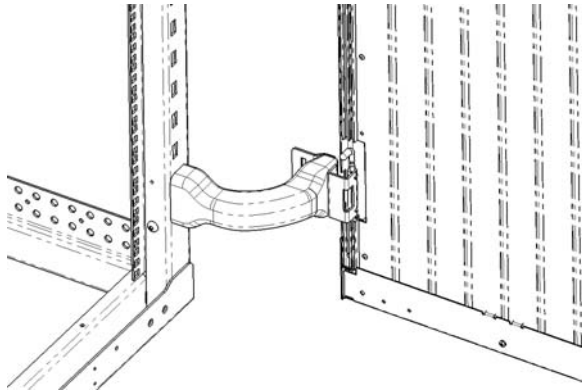
Fig. 2.3.2c Aligning lower door hinge

5. Turn the door top to bottom.
6. Slide the upper hinge onto the upper hinge pin. Slide the lower hinge into place.
7. Push down the lower hinge pin until it clicks into place.
8. Remove the clamp bar screws inside the door frame to remove the latch.

### 2.3.2.1 Two-point lock

For doors that have a two-point lock, the lock must be inverted 180 degrees when the door swing is reversed.

1. Remove the lock cam.
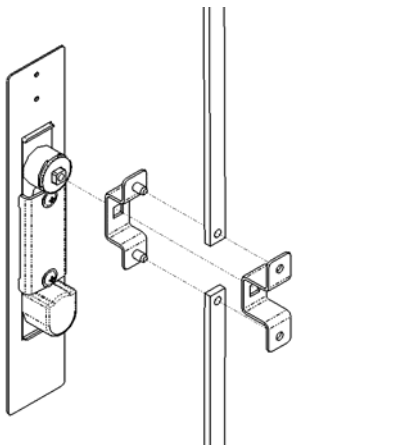


Fig. 2.3.2.1a Two-point lock

2. Remove the two mounting screws from the lock bracket.
3. Remove the lock and face plate and rotate 180 degrees.
4. Reinstall into the lock opening and replace the lock bracket.

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The lock bars must also be inverted.

1. Slide each bar outward toward the end of the door until it is completely removed from the plastic guide.
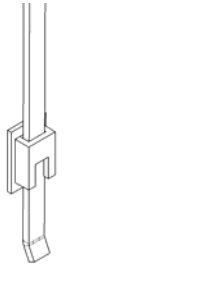
Fig. 2.3.2.1b Invert the lock bar

2. Reinstall at the opposite end of the door. Note that the long bar is always on the bottom, and the short bar is on top.

3. Reinstall the lock cam.

### 2.3.3 Reinstalling the front door

**CAUTION**: The front door <u>must</u> remain supported during assembly so that the hinge components are not damaged. Use blocks or have an assistant support the edge of the door opposite the hinges. Do not allow the top hinge to support the entire weight of the door during assembly.

1. Configure the upper and lower hinge pins in their upper-most positions. As the upper and lower hinges are assembled opposite each other, the upper hinge pin will be extended, while the lower hinge pin will be recessed.

2. Orient the front door perpendicular to the cabinet, with the lower part of the door tilted sideways slightly away from the cabinet.
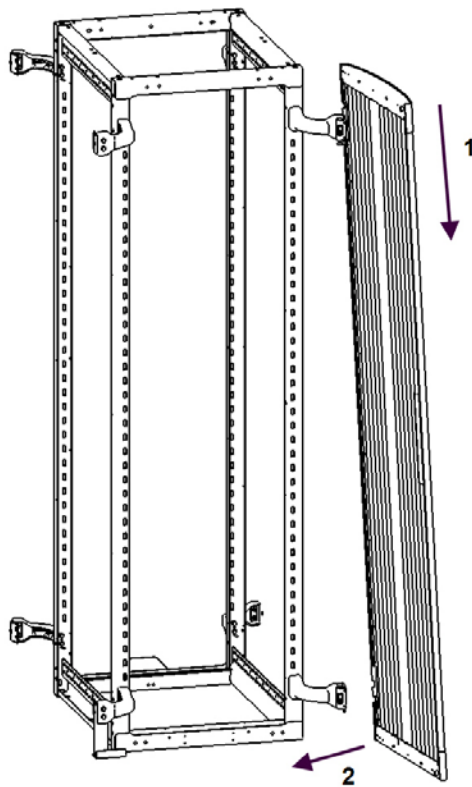
Fig. 2.3.3a Installing the front door

3. Carefully lower the door onto the upper hinge pin. Be sure that the hinge pins align correctly with the hinge pivot axis cavity in the door frame (see Fig. 2.3.3b).



hinge pin
axis cavity
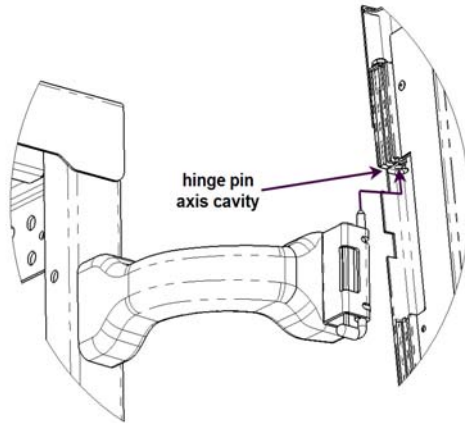
Fig. 2.3.3b Hinge pivot axis cavity

4. Bring the door frame vertical and align the lower hinge pin with the hinge axis in the door extrusion. Engage the lower hinge pin in the door by pushing it downwards.

**CAUTION**: Before swinging the door, confirm that both top and bottom hinge pins are in the correct cavities of the door frame member. Swinging the door while the hinges are positioned in the wrong cavity may damage the door and/or the hinge.

### 2.3.4 Removing the rear door

The rear doors have 180-degree hinges, but with bayed cabinets, the doors can open only 175 degrees.

**CAUTION**: Keep the rear door closed while removing the hinge pins. An open door will fall off the cabinet when the pins are removed. When remounting the door, be SURE to reinsert the hinge pins. If the hinge pins are not reinserted, the door could fall off the next time it is opened.

1. With the door closed, remove the hinge pins by pushing the pin up from the bottom as far as it will go with a tool such as a small screwdriver. Grasp the pin head and pull the pin out the rest of the way.
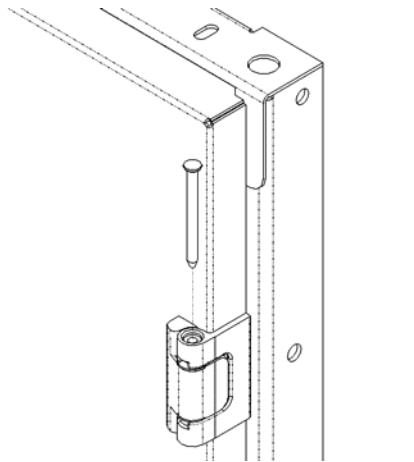
Fig. 2.3.4a Removing the hinge pin

2. Open the door while holding it firmly with a hand on each side. With the door at the 90-degree position, pull the door off the hinges perpendicular to the cabinet.
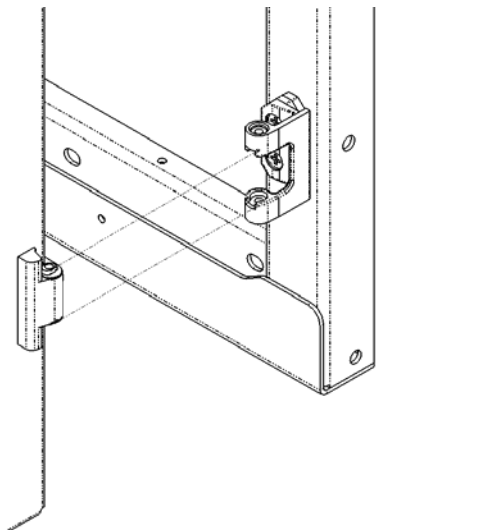
Fig. 2.3.4b Removing the door

3. To remount the doors, reverse the process: Slide the door onto the hinges, close the door, and be sure to insert the hinge pins.

## 2.3.5 Door locks

### 2.3.5.1. Two point lock

This lock is used on single or double doors.

To open the door:
1. Unlock the lock with the key.
2. Pull the lock handle out, rotate it, and open the door.

To close the door:
1. With the handle in the open position, close the door.
2. Rotate the handle and push it in.
3. Lock with the key.

### 2.3.5.2 Combination lock

The combination lock is opened with a three-digit code, entered by turning three dials built into the swing handle.
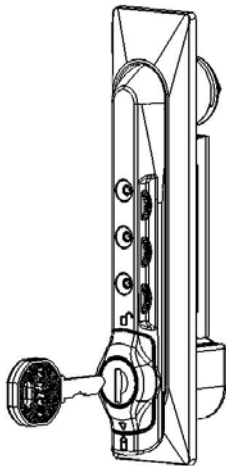


Fig. 2.3.5.2a Combination lock

The lock can also be opened with a key. The combination can be changed if you know the existing combination. The lock is set at the factory with the combination "000".

To open the door when your cabinet is first received:

1. Dial in the factory-set combination "000".

2. Turn the wing knob 180 degrees counterclockwise until the arrow points up (unlocked sign). Lift the handle and turn.
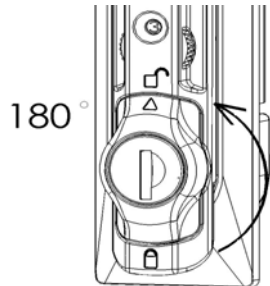


Fig. 2.3.5.2b Unlocking the lock

3. To relock, return the handle to the closed position, turn the wing knob 180 degrees clockwise to lock, and then scramble the combination.

To change the combination, the existing code must be known. The factory-set combination is "000".

1. Be sure that the key lock is in the locked position (arrow on the wing knob points down).
2. Dial in the existing combination.
   **NOTE**: If the combination is unknown, you can use the key to unlock the door and gain access to the cabinet, but you cannot reset the combination.
3. Turn the wing knob 180 degrees + 15 degrees counterclockwise.
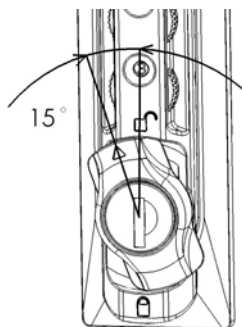


Fig. 2.3.5.2c Resetting the combination

1. Set the new combination numbers.
2. Turn the wing knob 15 degrees clockwise. The new combination is now set.
3. Turn the wing knob 180 degrees clockwise to lock, and then scramble the combination numbers.

## 2.4 REMOVING/INSTALLING THE SIDE PANELS

Side panels are factory-installed when ordered with the N-Series TeraFrame cabinet. The side panels can be removed and reinstalled on fully populated cabinets. Optional vented side allow for side-to-side venting.

⚠️ **WARNING**: Be sure to use sufficient personnel to safely remove and replace the side panels. They are heavy, weighing from 68 to 81 lbs.

1. To remove, unlock the side panel lock. Tilt the panel away from the frame, and lift the panel off the bottom frame.
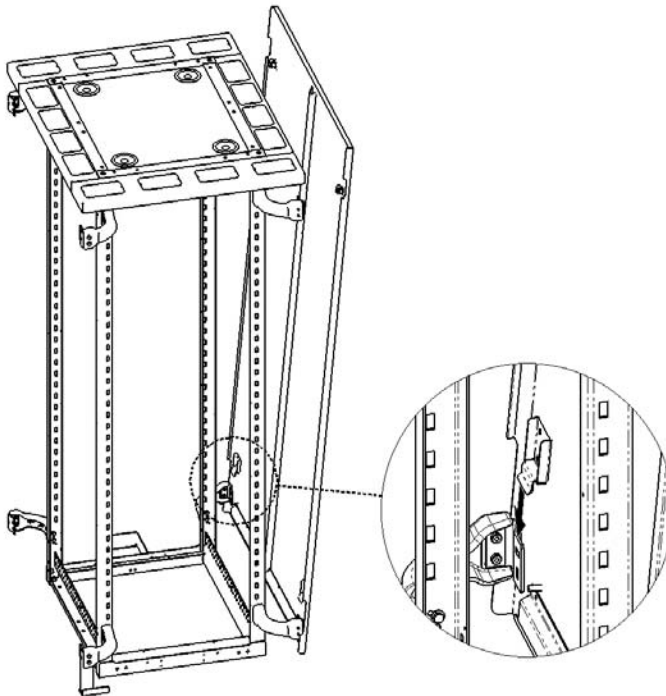


Fig. 2.4a Removing the side panel

2. To install, tilt the top of the panel 10 degrees away from the cabinet and guide the flange at the bottom of the panel over the edge of the frame. Rotate the panel toward the cabinet until flush with the outer frame. Lock into position.
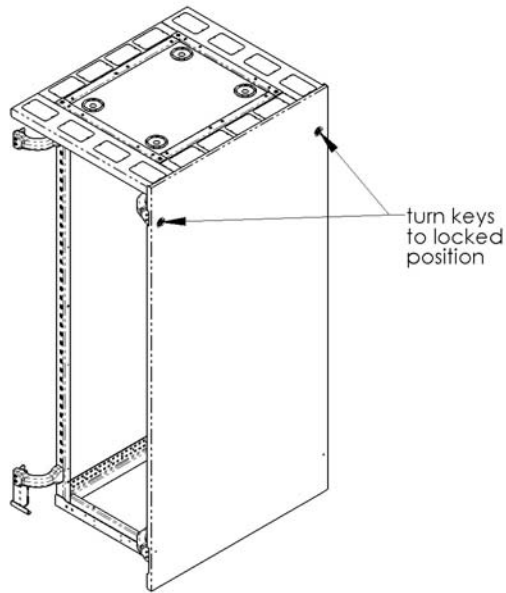
Fig. 2.4b Locking the side panel

## 2.5 CONFIGURING THE TOP PANEL

The five-piece top panel consists of one center panel with four 3" (76mm) diameter, grommet-protected holes.
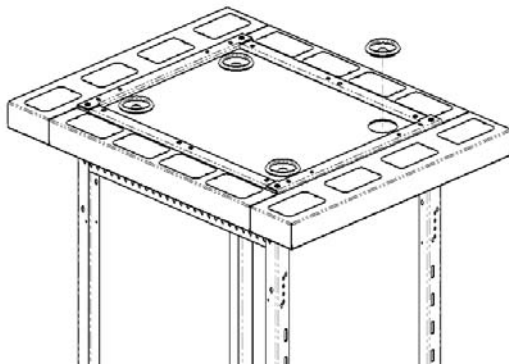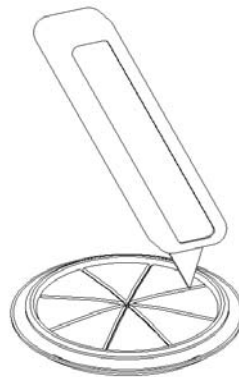


Fig. 2.5a Top panel             Cutting a grommet

To use one of these round cable ports:

1. Remove the grommet. Place on a hard surface that can act as a cutting board.

2. Use a knife to cut one or more slits in the grommet diaphragm, appropriate for the volume of cable that you want to route through the cable port.

3. Reinstall the grommet in the top panel.

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Perimeter panels are solid with three, four, or five 3.1" x 5.3" (79mm x 135mm) cable port knockouts. To use one of these rectangular cable ports, the knockout must be removed.

1. Place the tip of a flat head screwdriver in the small slot at either end of the knockout.

2. Use the screwdriver to pop the end of the knockout loose.

Fig. 2.5b Removing a knockout

3. Repeat at the opposite end of the knockout.

4. Once the knockout is removed, use one of the supplied snap-in edge protectors to guard against unwanted abrasion of cables.

The perimeter side panels are 3.5" (89mm) wide and can be removed for larger cable quantities. Remove screws along the narrow front and rear edges of the side perimeter panels, then remove the panels. This provides a very large area for routing cables out the top of the cabinet.
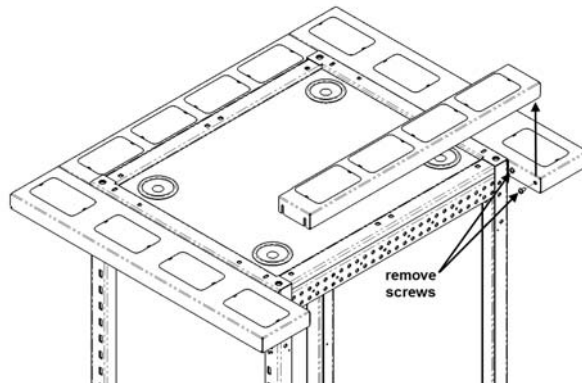
Fig. 2.5c Removing the top panel side piece

**IMPORTANT**: Do not remove the front or rear perimeter panels, as these provide the necessary latching points for both the front and rear doors.

## TABLE OF CONTENTS

*TeraFrame*™

## 3.1 BAYING CABINETS

Cabinets may be bayed with side panels in place, or with a shared side panel, or without side panels, depending on data center requirements.

### 3.1.1 Baying Kit

Use this Baying Kit (P/N 34682-C01) to bay and align N-Series TeraFrame cabinets. This kit is used to bay adjacent cabinets <u>without</u> side panels installed.

Parts list
- 4 baying spacers
- 4 M6x1x35mm screws
- 4 6mm nuts

### 3.1.2 Installing the baying bracket

1. Position two N-Series TeraFrame cabinets side by side. They must be of equal height and depth.
2. Remove the side panels from the cabinet, if installed.
3. Align the cabinets front-to-back so that the standoff brackets in each corner are aligned. There will be a slight gap between the standoff brackets of approximately .86 inches (22 millimeters).
4. Install one spacer in between each standoff bracket as shown in the drawing to the right. After installing all spacers, check the alignment of the cabinets and then tighten the hardware using the 10 mm socket and wrench.
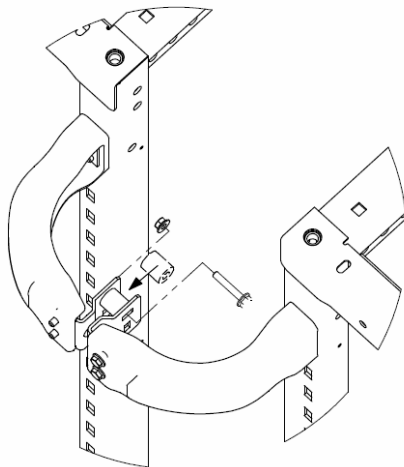
Fig. 3.1.2a Attaching the baying bracket

## 3.2 BONDING AND GROUNDING THE CABINET

To help prevent transient voltage from damaging sensitive electronic equipment, bond and ground all cabinet components. A ground terminal block (grounding lug) (P/N 40167-001) is included in the hardware box inside the N-Series TeraFrame™ cabinet, and grounding studs are provided in the side panels and doors for the attachment of ground wires.
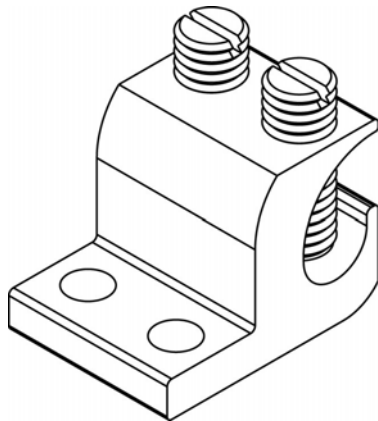


Fig. 3.2a Ground terminal block

Mount the terminal block to an unpainted, tapped and drilled area on the bottom of the front or rear cabinet frame.

**NOTE**: Equipment mounting rails are plated rather than painted to facilitate ground connections to equipment chassis.
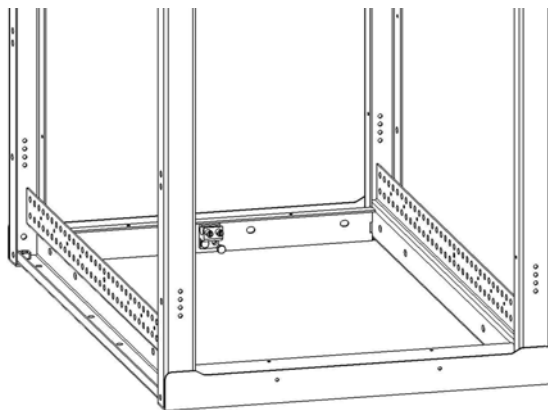


Fig. 3.2b Ground terminal block attached to frame

Follow TIA/EIA-607 standards to complete the bonding and grounding process.

> ⚠ **WARNING**: For protection of the equipment and personnel, ground each cabinet individually to a bus bar or signal reference grid.

## 3.3 ALIGNING OVERHEAD CABLE PATHWAYS

Install overhead cable pathways to route patch cords between cabinets. See FastTrac Cable Tray Installation Instructions at http://www.chatsworth.com/Product_Docs/IIS-713340.PDF for proper installation.

- Elevate pathways 6 to 12 inches above the cabinet and center them to the front or back of the cabinet. Alignment will depend on the top panel style and routing of cables.
- Support cable pathways from the ceiling, not from the cabinet. This allows for variations in cabinet height and for cabinet relocation.
- Use multiple tiers of pathways or cable trays, one for power cables and one or two for telecommunications cables.
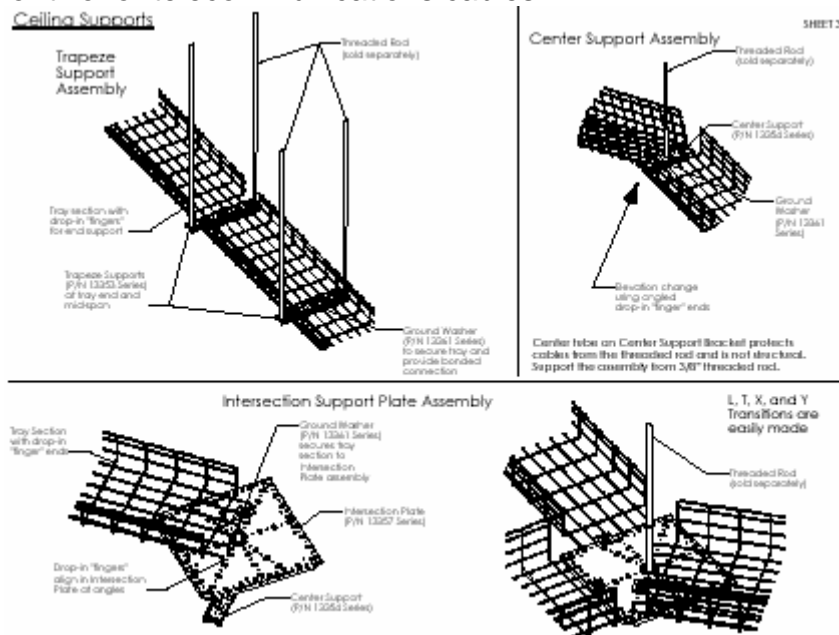
Fig. 3.3 Overhead cable pathways

### 3.3.1 Bonding and grounding overhead cable pathways

Ensure that pathways are properly grounded in accordance with prevailing code and the authority having jurisdiction (AHJ). Follow standards established by the National Electric Code (NEC) and TIA/EIA 607 and 942. Bond the pathway to the

signal reference grid and/or the telecommunications grounding busbar (TGB), using the appropriate hardware.

### 3.3.2 Aligning radius drops with top cable access

Radius drops allow you to maintain proper bend radius to prevent cable tears, tangles, and stretching. Add a radius drop wherever cable enters or exits the pathway to maintain a gradual bend in the cable, which helps maintain signal quality on the cables. Bend radius is in accordance with cable manufacturing specifications or the standards that define minimum bend radius at 4x cable diameter for copper and 10x for fiber or 1 inch. Positioning of the drops relative to the top of the cabinet follows the same discussion as above. You can use the stringer radius drop (P/N 12101-series) to drop off of the back of runway into the brushes in the server top, and the cross-member radius drop (P/N 12100-series) to go into the brush openings in the network top.
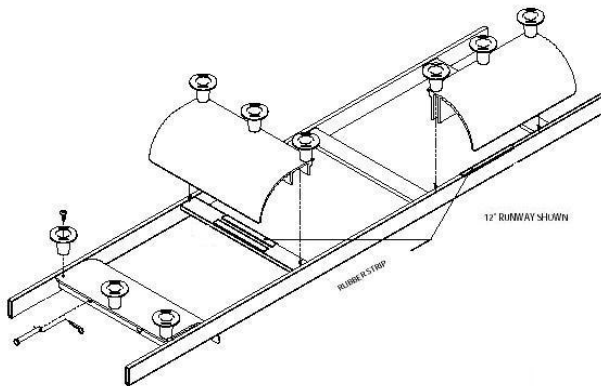


Fig. 3.3.2a Radius drop with server top cable access

Follow the guidelines in TIA/EIA-568-B.1 for information on cable stress and minimum bend radius considerations.

## 3.4 ALIGNING UNDERFLOOR CABLE PATHWAYS AND FLOOR PASS-THROUGHS

In proper alignment, the cable pathway runs parallel to the airflow from the computer room air conditioner.

To minimize air loss from the access floor plenum, align underfloor cable pathways along the centerline of the brushes in the Koldlok unit and pass cables through the center of the brushes. The Koldlok grommets (P/N 13571-001, Integral Grommet; P/N 13576-001, Surface Mount Grommet) help prevent air loss or cold air being directed to areas where it is not effective, and provide a protective edge around the opening to prevent cable damage.
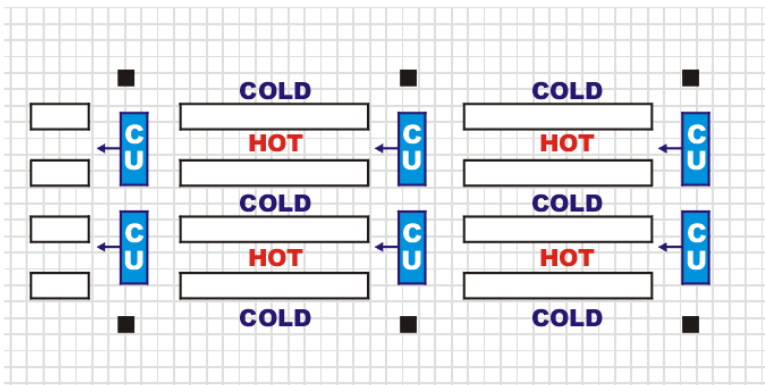
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Fig. 3.4 Cold aisle/hot aisle layout

**NOTE**: If both power and data cables are located under the access floor, provide separate ingress for each type of cable; for example, bundle all <u>power</u> cables and pass through one Koldlok grommet, and bundle all <u>data</u> cables to enter via a separate Koldlok grommet. Run network cables from the hot aisle and power cables from the cold aisle.

### 3.4.1 Supporting underfloor cable pathways

Use FastTrac Cable Trays (P/N 13345-020) to support cable under access floor plenums.

FastTrac Floor Supports (P/N 13350-020) include underfloor support brackets for the FastTrac Cable Tray. Underfloor support brackets attach directly to the concrete subfloor. Be sure to support cable pathways from the subfloor, not the floor pedestals. See http://www.chatsworth.com/Product_Docs/IIS-713340.PDF for proper installation of underfloor supports.
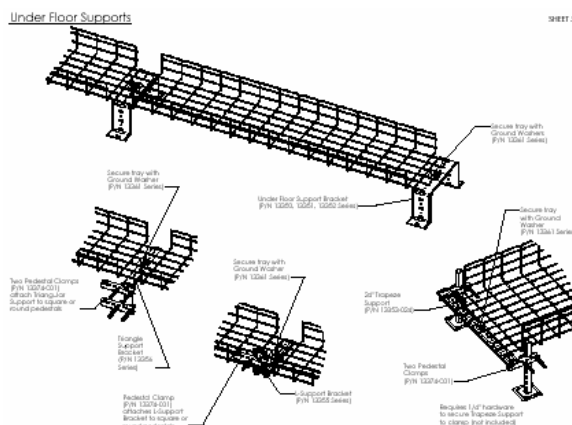

Fig. 3.4.1 Attachment of underfloor cable pathway

## TABLE OF CONTENTS

*TeraFrame*™

## 4.1 ADDING AND ADJUSTING THE EQUIPMENT MOUNTING RAILS

Vertical equipment mounting rails conform to the standards in TIA/EIA 942, section 5.11.6.5–Adjustable Rails. Four equipment mounting rails are factory installed at the time of the order. The four vertical mounting rails, two in the front and two in the back, provide a secure four-point attachment for equipment.

Customer-specified options for rails are:
- Square punched EIA-310-D-Standard for cage nuts
  (P/N 024-734667-005)
- Tapped and drilled (threaded) holes for 12-24 screws
  (P/N 024-734409-005)

### 4.1.1 Adding mounting rails

The N-Series TeraFrame Network Cabinet has four equipment mounting rails. When the cabinet is ordered with the Network Switch Exhaust Duct, the front rails are fixed (not adjustable). In cabinets with out the Exhaust Duct, all four rails are adjustable. Additional rails may be added.
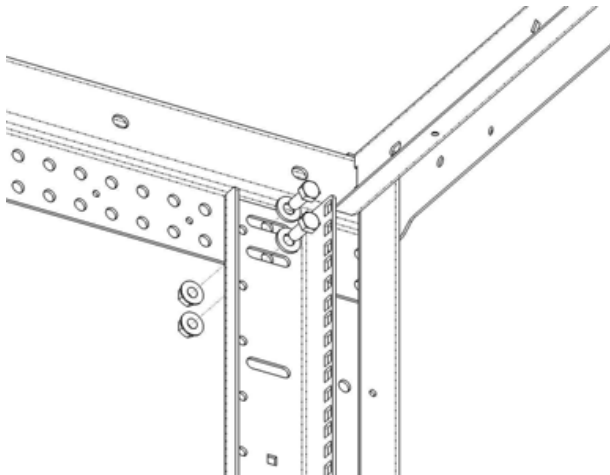


Fig. 4.1.1 Equipment mounting rail

1. Put a bolt through the top hole in the zinc-plated mounting rail, and from the inside of the cabinet, insert the bolt into the desired frame hole. Hold a nut in place and spin the bolt on. Even with the side panel still on, there is enough space to turn the bolt.
2. Fasten the rail at the bottom of the frame, using the same sized bolt and nut.

### 4.1.2 Adjusting mounting rails

Adjustable mounting rails attach through a slot in the rail, and can be adjusted about 25mm without removing the rail and hardware. Simply loosen the bolts, slide the rail, and retighten the bolts.

To move the rails farther than 25mm, remove the bolts, reposition the rails, and retighten the bolts. Be sure that the 1-RMU marking is at the bottom of the rails.

> ⚠️ **CAUTION**: For an optimal load rating, move the mounting rails back no more than 10 inches from the front and rear of the cabinet. The load rating is 2500 lb for the N-Series cabinet.

## 4.2 ADDING/ADJUSTING CABLE MANAGEMENT

### 4.2.1 Vertical cable management

The N-Series TeraFrame cabinet includes vertical cable management fingers and spools mounted to the cabinet frame. Additional cable management fingers and spools may be purchased and installed. Be sure to select the part number that matches the height of your cabinet.

| Part Number | Description |
|-------------|-----------------------|
| 34680-002 | For 42 RMU cabinets |
| 34680-003 | For 43 RMU cabinets |
| 34680-004 | For 44 RMU cabinets |
| 34680-005 | For 45 RMU cabinets |
| 34680-006 | For 46 RMU cabinets |
| 34680-007 | For 47 RMU cabinets |
| 34680-008 | For 48 RMU cabinets |
| 34680-009 | For 49 RMU cabinets |
| 34680-010 | For 50 RMU cabinets |
| 34680-011 | For 51 RMU cabinets |

The cable management fingers are aligned with each rack mount unit (RMU or U) to provide unsurpassed support of high density cabling associated with network implementations. The cable management spools prevent cable from blocking the air intake of network switches as well as providing support for cables transitioning towards the rear of the cabinet.

Additional cable management fingers can be installed in all four corners of the cabinet frame except when the Network Switch Exhaust Duct is

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installed. When the Exhaust Duct is installed, cable management fingers should not be placed in the left rear corner of the cabinet as this might block the exhaust air flow exiting the rear of the cabinet.

When installing additional cable management fingers, use the hand-held tool to assist in snapping the fingers into place.

### 4.2.2 Horizontal cable management

There are two types of horizontal cable managers: a two-piece front-to-rear cable tray and a two-piece cable trough.

The horizontal cable tray (Rack-Mount Cable Shelf - P/N 13517-701) permits side-to-side and front-to-back transition of cable within the cabinet and between adjacent bayed cabinets. The tray extends from 22 to 40 inches and features brush openings for cables along the front panel. The tray can be pulled apart to attach directly to the vertical mounting rails using 12-24 or M-6 screws, then adjusted and reassembled. The cable tray fits all EIA 19"W cabinets and is available as a separate hardware kit.

Fig. 4.2.2 Horizontal cable tray

### 4.3 VERTICAL POWER MANAGERS

The vertical power manager is shipped factory-installed, with three cable spools, three M-5 pan head screws and three M-5 flange nuts to attach the spools, and three Saf-T-Grip straps for cable bundle management.

The power manager comes in two sizes: wide, C-shaped, 8-inch (P/N 34582) and narrow, L-shaped, 2.5-inch (P/N 34581). Up to four power strips can be mounted in the wide manager and up to two power strips in the narrow manager.
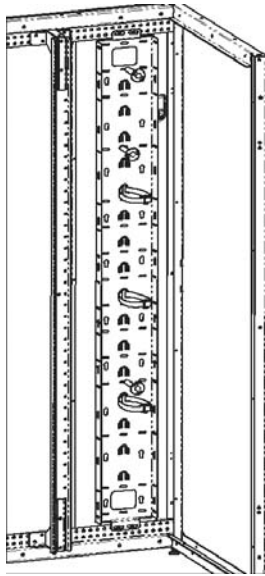
Fig. 4.3a Vertical power manager

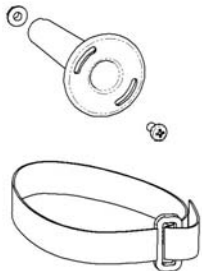Optional power strips, spools, and other power cord management tools are available from CPI.



Fig. 4.3b Cable spool and Saf-T-Grip strap

Use hardware included in the power strip kit to hold power strips in the bracket. For non-CPI power strips or PDUs, order a Power Strip Mounting Kit (P/N 34407-C01) from CPI.

### 4.3.1 Adjusting the vertical power manager

**NOTE**: When adjusting the vertical power manager, be sure to move the whole bracket assembly (the bracket plus any adapter plates).

1. Remove the M-8 hex screws and nuts holding the vertical power manager to the cabinet frame.
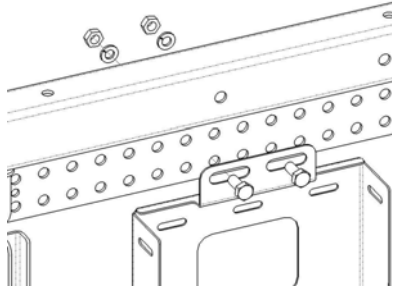
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Fig. 4.3.1a Repositioning the vertical power manager

2. Reposition the vertical power manager and attach it to the frame.
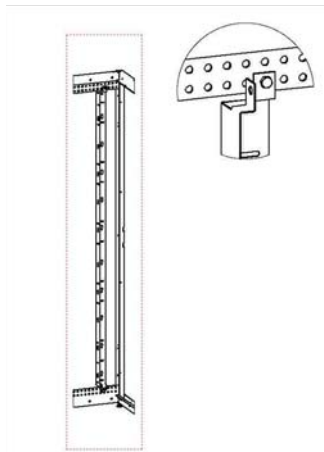


Fig. 4.3.1b Vertical power manager (narrow)

The vertical power managers are optimized for 42U and 45U N-Series TeraFrame™ Cabinets, and attach without adapter plates to the top and bottom of the frame. For 24U and 36U cabinets, use horizontal power strips, available from CPI.

**NOTE**: Other height cabinets require power strip bracket and adapters as described in the following chart.
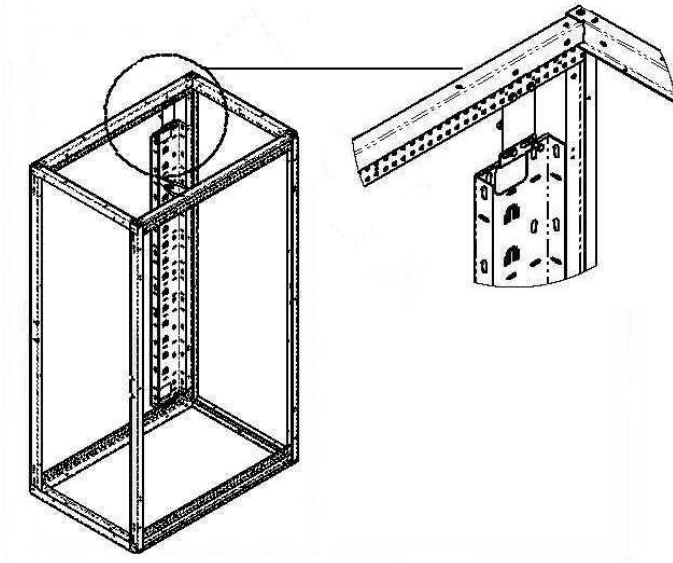
Fig. 4.3.1c Adapter plate attached to the bracket

**Adapter plates**

| Cabinet height | Adapter plate size | Bracket Height |
|---|---|---|
| 43U | 1U | 42U |
| 44U | 2U | 42U |
| 46U | 1U | 45U |
| 47U | 2U | 45U |
| 48U | 3U | 45U |
| 49U | 4U | 45U |
| 50U | 5U | 45U |
| 51U | 6U | 45U |

## 4.3.2 Vertical Power Strip Brackets

Optional vertical power strip brackets (P/N 34434) support 66-inch power strips in 42-, 43-, 44-, 45-, 46-, and 47-RMU N-Series TeraFrame cabinets.

The mounting brackets attach to the top and bottom of the cabinet frame. Shoulder standoffs (included with all standard CPI vertical power strips) attach to the power strip, then the standoffs "slot" into the keyholes in the power strip brackets.
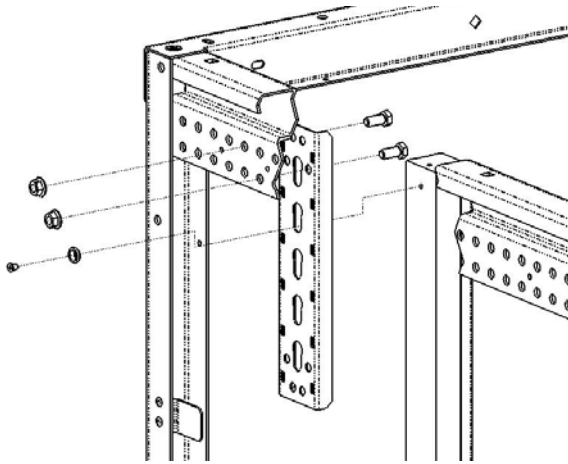
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Fig. 4.3.2 Vertical power strip bracket

### 4.3.3 Power Strip Mounting Kit (non-CPI)

The optional Power Strip Mounting Kit (P/N 34407) is used to attach non-CPI power strips or PDUs to the wide Vertical Power Manager (P/N 34582).
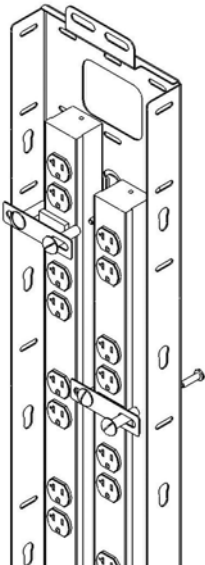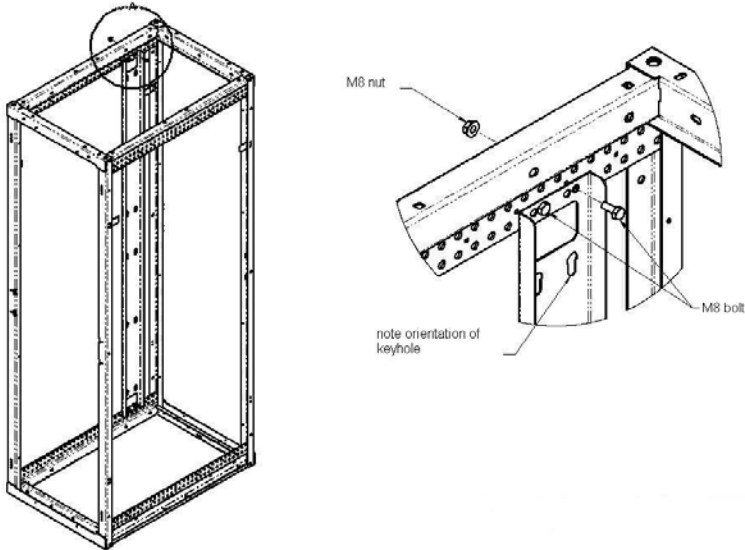


Fig. 4.3.3 Brackets securing non-CPI power strips

### 4.3.4 Dual/Quad Power Managers
The optional dual power strip bracket holds up to two CPI 66" or 38" cabinet power strips.



4.3.4a Dual power strip bracket

The optional quad power strip bracket holds up to four CPI 66" or 38" cabinet power strips. The offset provides space for the side panel attachment.
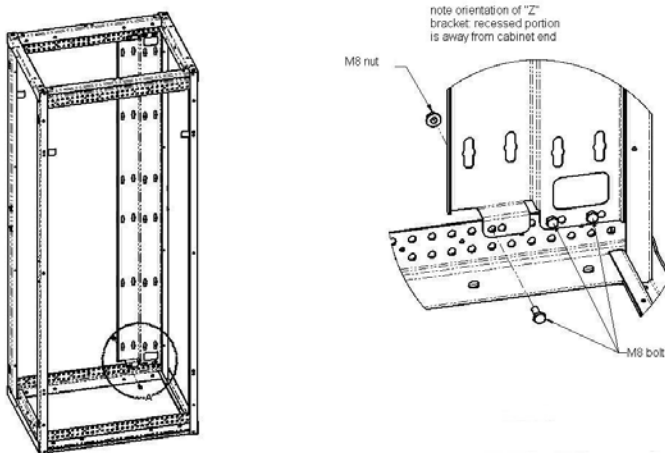


Fig. 4.3.4b Quad power strip bracket

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## 4.4 ADDING/ADJUSTING THERMAL MANAGEMENT ACCESSORIES

Thermal management accessories for the N-Series TeraFrame Network Cabinet include air ducts, filler panels, and environmental monitors. Cabinet side panels can be installed to prevent hot air from escaping the side of the cabinet or from entering adjacent cabinets in a multi-cabinet bay.

### 4.4.1 Installing snap-in filler panels in open RMU spaces

Install snap-in filler panels in unused rack and cabinet spaces to improve the functioning of hot and cold aisles (TIA/EIA 942, section 5.11.2). The panels prevent back-vented hot air from recirculating to the front of the cabinet.

Filler panels are available in plastic and in aluminum and come in variable sizes. The figure below shows a plastic 1 RMU panel and a 2 RMU panel installed in the mounting rails.

- Press plastic filler panels (P/N 34537 [1 RMU] or 34538 [2 RMU]) into square hole equipment mounting rails. The plastic panels do not fit tapped rails. To release the panels, pull straight out.
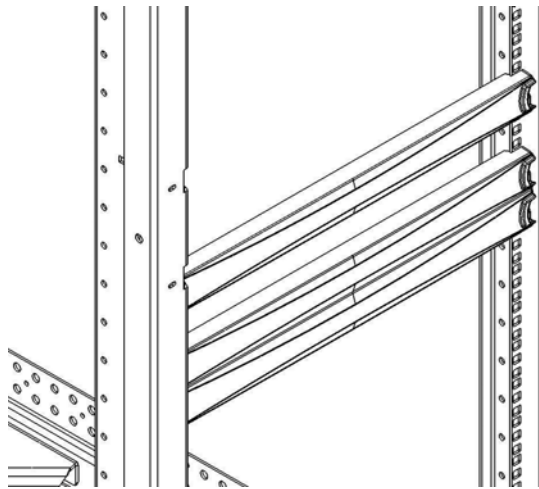


Fig. 4.4.1 Plastic filler panels

**NOTE**: For cabinets with tapped and drilled equipment mounting rails, use aluminum filler panels (P/N 30026). These metal, weight-bearing filler panels require screws for assembly and come in 1 to 12 RMU sizes.

### 4.4.2 Configuring the Network Switch Exhaust Duct System

1. For new installations, prior to installing duct panels, install vertical rubber seal material on the inside flanges of the duct as shown in Figure 4.2.2a.
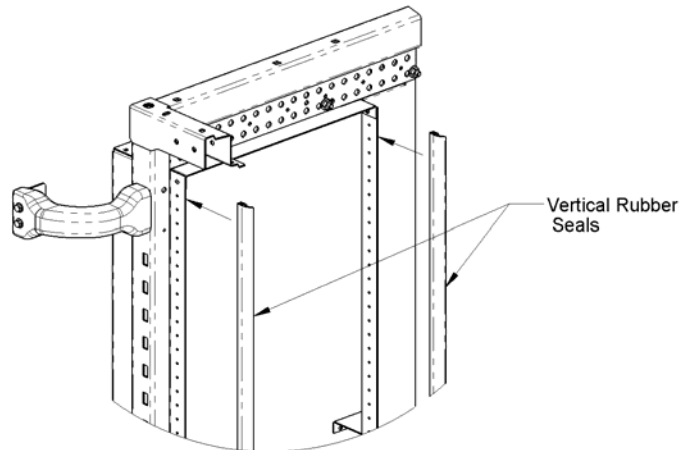


Fig. 4.2.2a Installing vertical rubber seals

2. Determine the equipment layout of the cabinet and identify equipment side exhaust locations.
3. Starting from the bottom of the cabinet, install duct panels to fill portions of the duct opening that are not directly adjacent to a side exhausting equipment grill.  Panels that are installed in the uppermost and lowest positions must be configured as shown in Figure 4.2.2b.  The panels can be adjusted in height in 1/2 RMU increments. Attach the panel to the mounting rails on both sides of the duct with the M4 self tapping screws
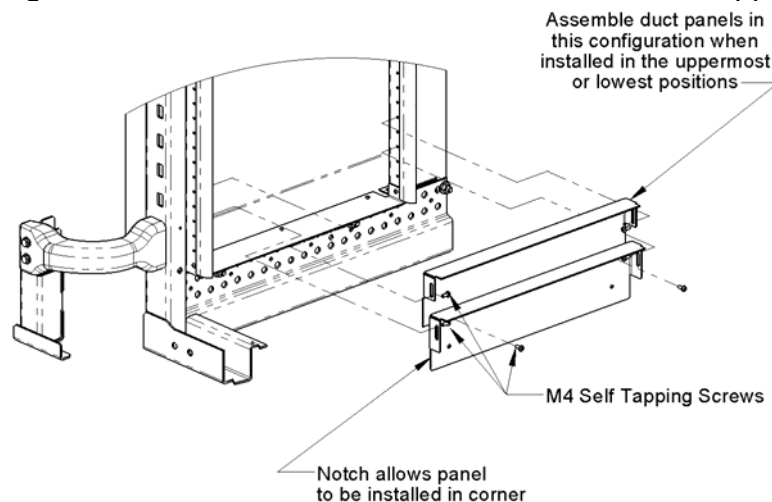


Fig. 4.2.2b Duct Panels configured at bottom of duct

4.  Panels that are installed in locations other than the upper most and lowest should be configured as shown in Figure 4.2.2c.  The panels can be adjusted in height in 1/2 RMU increments. Attach the panel to the mounting rails on both sides of the duct with the M4 self tapping screws. Several panel sets can be placed next to each other to cover up large portions of the duct opening.
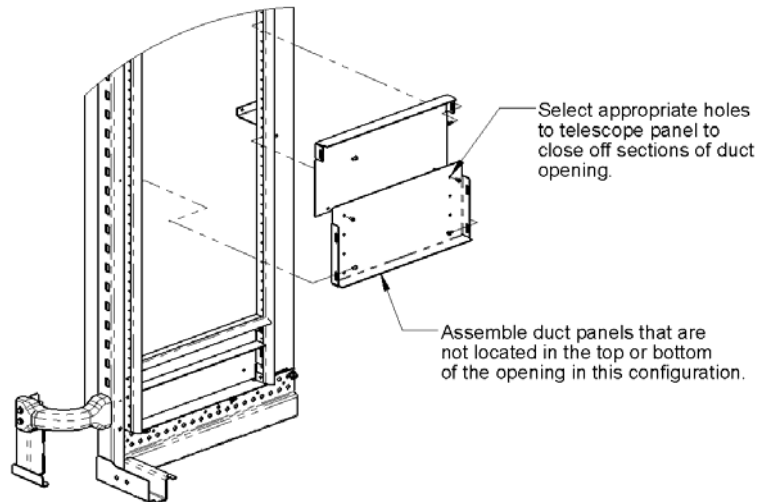
Select appropriate holes to telescope panel to close off sections of duct opening.

Assemble duct panels that are not located in the top or bottom of the opening in this configuration.

Fig. 4.2.2b Installing Duct Panels

5.  Install the lateral seal strips at the top and bottom of every duct opening.
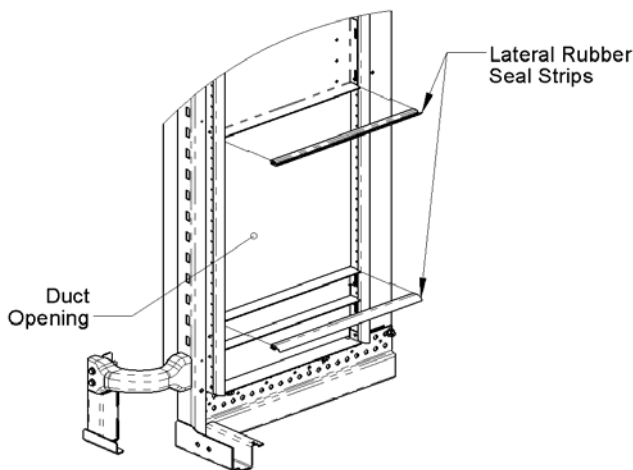
Lateral Rubber Seal Strips

Duct Opening

Fig. 4.4.2 Network Switch Exhaust Duct System

## 4.5 SECURING EQUIPMENT TO THE EQUIPMENT MOUNTING RAILS

The N-Series TeraFrame cabinet supports all manufacturers' equipment that conforms to the EIA-310D standard. Most equipment attaches directly to the equipment mounting rails; however, some manufacturers may provide brackets or slide assemblies that require additional installation.

⚠️ **WARNING**: The N-Series TeraFrame cabinet can support many system configurations. The amount of force required to tip or make the cabinet unstable differs with each configuration. Be sure to read and follow your equipment manufacturer's specific assembly, installation, and safety instructions.

### 4.5.1 Positioning equipment by RMU marks

Adjustable (front to rear) vertical mounting rails maximize the flexibility of the N-Series TeraFrame Cabinet.

- Tapped rails, made of steel and featuring #12-24 tapped holes, are best suited for network applications with interconnect equipment, switches, and routers.
- Steel Multi-Mount rails feature square-punched holes for most servers and data storage equipment.

Both styles feature the EIA universal 5/8"-5/8"-1/2" alternating hole pattern.

RMU marks are clearly printed on the equipment mounting rails to simplify installation of components, thus saving time and minimizing errors. Align equipment with the RMU marks on each side of the frame before securing the equipment.

The N-Series TeraFrame Cabinet is provided with hardware to secure equipment to the mounting rails. Cabinets with tapped rails include 50 each #12-24x5/8 screws. Cabinets shipped with square-punched rails include 25 sets of M6 cage nuts and screws. Additional hardware is available for purchase under the following part numbers:

| TAPPED RAIL HARDWARE KITS (SOLD SEPARATELY) | | | | |
|---|---|---|---|---|
| PART NO. | NOMINAL SIZE | PACKAGE OF | FINISH | SHIPPING WEIGHT |
| 40605-001 | 12-24 | 50 | ZINC | 1 lb |
| 40605-004 | 12-24 | 1,000 | ZINC | 9 lb |
| 40605-005 | 12-24 | 50 | BLACK | 1 lb |
| 40605-006 | 12-24 | 1,000 | BLACK | 9 lb |

| MULTI-MOUNT HARDWARE KITS (SOLD SEPARATELY) | | | | |
|---|---|---|---|---|
| PART NO. | NOMINAL SIZE | PACKAGE OF | FINISH | SHIPPING WEIGHT |
| 12637-001 | M-6 | 25 | GOLD OVER ZINC | 1 lb |
| 12638-001 | 10-32 | 25 | ZINC | 1 lb |
| 12639-001 | 12-24 | 25 | BLACK | 1 lb |

## TABLE OF CONTENTS

## 5.1 CABLE ROUTING RECOMMENDATIONS

It is important to route cables so that they do not prevent cold air from easily reaching the network switch equipment. CPI recommends that cable be routed according to the following guidelines.

### 5.1.1 Single network switch installation

When cabling a single network switch, cable routing is not a significant concern as long as cable is kept from blocking the switch intake. You can route cables either out of the top or the bottom of the cabinet.
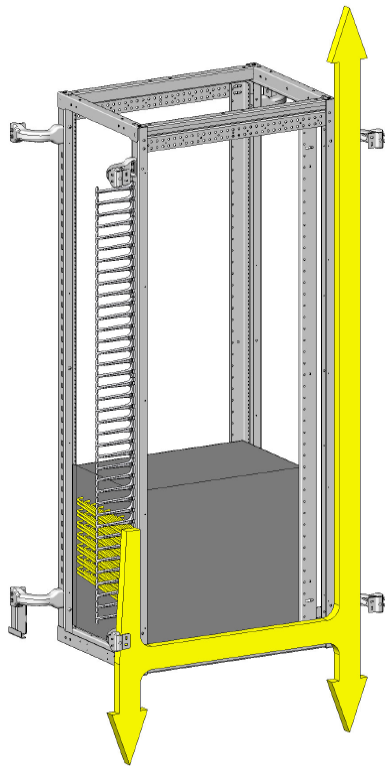
Fig. 5.1.1 Recommended cable routing for single network switch

### 5.1.2 Two network switch installation

When cabling two network switches in the N-Series TeraFrame, route cables away from the center of the cabinet. Initially, route cables from the top switch toward the top of the cabinet and cables from the bottom switch toward the bottom of the cabinet. If a Cisco compliant duct is specified, the upper switch should be installed fully above RMU 23, the lower switch should be fully below RMU 22. If you are

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planning to use the cable pathways both below the floor and over the top of the cabinets, then simply continue to route the cables out of the cabinet.
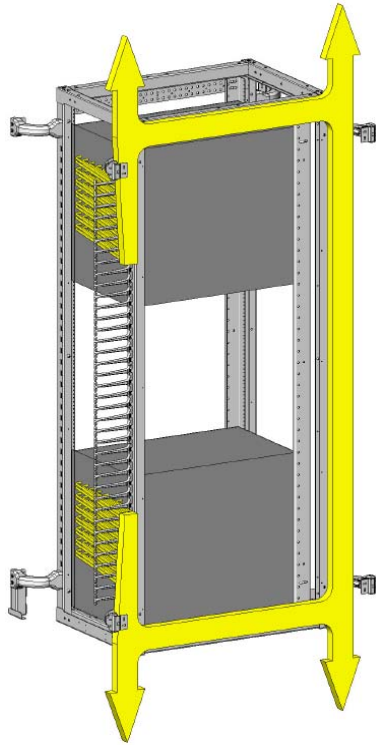


Fig. 5.1.1 Recommended cable routing for two network switches

If you are consolidating your cable runs either above the cabinets or under the floor, you will need to route your cables accordingly.

### 5.1.2.1 Cable routing under a raised floor
Once the cables from the top switch have been routed beyond the top of the switch, route the cables toward the rear of the cabinet. Be sure not to run cables in front of the air intake for the switch. In the right rear of the cabinet, turn the cables toward the floor and continue out of the bottom of the cabinet.

### 5.1.2.2 Cable routing over the top of cabinets
Once cables from the bottom switch have been routed beyond the bottom of the switch, route the cables toward the rear of the cabinet. Be careful not to run cables in front of the air intake for the switch. In the right rear of the cabinet, turn the cables toward the top of the cabinet and continue out the top of the cabinet.

## 5.2 DRESSING CABLES AND ATTACHING EQUIPMENT TO POWER

CPI cable management products provide the proper cable bend radii for better data transmission; fewer tangled cords and cable damage; and ease in moving, adding, and changing connections. The products assist in complying with ANSI/TIA/EIA installation of Category 5/5e/6/6a and fiber cables.

### 5.2.1 Bundling cables

Separate the cables by type, gather into bundles, and fasten loosely with hook and loop fasteners. CPI offers Saf-T-Grip Reusable Cable Management Straps to fasten cable bundles (P/N 0200X-series).



Fig. 5.2.1 Bundled power cables

Arrange the cable bundles horizontally on cable pathways under an access floor or above the cabinets. Do not fill the cable pathway more than 6 inches deep.

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### 5.2.2 Maintaining the proper radius bends

Use radius drops (P/N 12100-series and 12101-series) to maintain the proper 1.5-inch radius bend in the cable bundles. Position a radius drop where cable enters or exits the pathway to maintain a gradual bend in the cable. Installation instructions are included with the radius bend service kit.
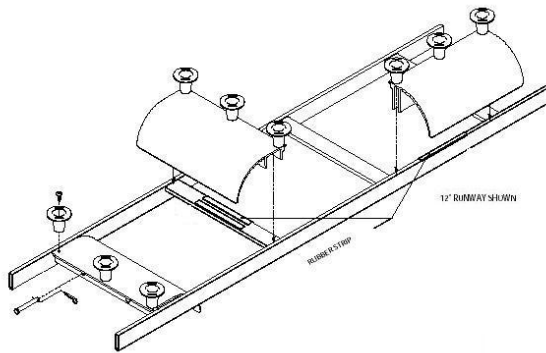


Fig. 5.2.2 Radius bends

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## 5.3 ENVIRONMENTAL MONITORING

The RIM-600 (remote infrastructure management) system enables comprehensive monitoring of critical environmental conditions such as temperature, humidity, smoke, sound level, motion, water, intrusion, and power outages. When a sensor exceeds or drops below the threshold you configure—high temperature, for example—RIM-600 notifies you about the condition. You can also call into the RIM-600 system to obtain status information about your infrastructure.
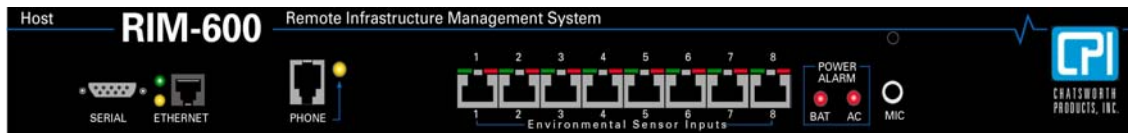


Fig. 5.3 RIM-600 host

See the Chatsworth RIM-600 Installation Manual for complete installation, configuration, and maintenance instructions (www.chatsworth.com/rim600). This manual includes the instructions and commands necessary to install and program the RIM-600. Additional summary and application chapters are included to help you speed programming and to understand RIM-600's features. Read this manual thoroughly to establish a basic understanding of the system, and keep the manual as a reference. Especially observe all warnings and cautions in the manual.

Each RIM-600 Host monitors up to eight environmental conditions via sensors that you attach. Each unit contains its own internal UPS to ensure that power failures will not prevent the RIM-600 Host from sending the message that your infrastructure is in trouble.

Full event-history and trending are provided with the RIM-600 Data Logging feature. User-selectable sampling lets you store critical temperature, humidity, or other environmental information about your infrastructure by the minute, hour, or day.

### Stand-alone solution

The RIM-600 can act as a stand-alone infrastructure monitoring system in a simple-to-install, 1U high, rack-mountable package.

### Network solution

The RIM-600 is scalable for networks of all sizes and complexities. It can expand along with the infrastructure, without the need for additional technology investment.

### 5.3.1 Locating the sensors

Decide where you want a sensor to be located. Attach a standard patch cable, plug it into your patch panel, and do the same in your server room to connect your sensor to the RIM-600 system. See "Chapter 7, RIM-600 Sensors," in the Chatsworth RIM-600 Installation Manual.

**NOTE**: CPI suggests placing one mini-temperature sensor inside the cabinet near the air intake of the server that is mounted highest in the cabinet.

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